

NAVIGATING AND SCALING CLEAN HYDROGEN VOLUNTARY MARKETS

GUIDELINES AND INSIGHTS FOR MARKET STAKEHOLDERS



With a record amount of private equity and venture capital **investment** funneling into hydrogen development, as well as bipartisan legislation and messaging from policymakers signaling long-term support, the momentum for a clean hydrogen economy is gaining velocity. This fuel is now expected to serve as a critical component in decarbonizing the grid and wider energy system. Fossil-based hydrogen is already common, but with the right policies and market mechanisms in place, low- or zero-emissions hydrogen has strong potential to usurp its carbon-intensive counterpart.

New enabling policies and investments for clean hydrogen-powered electricity generation and storage in the United States, European Union, and Australia are fueling a new era for this technology:

- **United States:** An assortment of funding for research and development is now authorized to the U.S. Department of Energy through the CHIPS and Science Act, with another \$8 billion for regional clean hydrogen hubs available through the Bipartisan Infrastructure Act, plus up to \$3 per kilogram in a tax credit for hydrogen producers through the Inflation Reduction Act, creating big incentives to make clean hydrogen a cornerstone of the U.S. energy economy.
- **European Union:** The European Commission published **rules for renewable hydrogen** in early 2023, ensuring that Europe's clean hydrogen production prioritizes grid decarbonization. In addition, the European Union **Carbon**

Border Adjustment Mechanism, set to begin implementation in October 2023, has been broadened to include hydrogen.

- **Australia:** Aiming to be a global producer and exporter of clean hydrogen, Australia has announced **Australian \$127 billion** in hydrogen investments since 2019, as well as a regional hydrogen hub program and updated regulatory frameworks to support hydrogen production, including developing a Guarantee of Origin (GO) scheme to verify lifecycle emissions associated with hydrogen production.

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The Clean Energy Buyers Institute (CEBI) and its NextGen Activator community—including energy customers, clean hydrogen solution providers, and market stakeholders—has developed five guidelines for establishing a voluntary market for clean hydrogen and initial industry best practices:

1. **Verified carbon-free electricity sourcing matters:** Clean hydrogen is only clean if it is powered with carbon-free electricity (CFE) that is verified through energy attribute certificates (EACs).
2. **Data quality matters:** Access to consistent, granular, high-quality harmonized data that captures the lifecycle of a given kilogram of clean hydrogen—from verifying the time and place of the underlying CFE to its final use and

reporting needs—is critical in order to optimize and accelerate clean hydrogen investments and deployment.

- 3. Consistency matters:** Globally consistent frameworks, standards, and benchmarks for comparison should be created, to ensure product quality, comparability, and credible claims across diverse clean hydrogen use cases and geographies.
- 4. Customers matter:** More options for credible, verified, and comparable products should be

developed, to meet customers’ procurement needs and accelerate clean hydrogen investments and deployment.

- 5. Grid decarbonization impact matters:** Clean hydrogen markets and standards should be designed to advance grid decarbonization by incentivizing clean hydrogen deployment that accelerates investments in CFE resources operating in the places and times that are the most carbon intensive.

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CEBI developed additional considerations to inform the guidelines’ application in real-world scenarios and advance the development of a high-integrity, customer-driven clean hydrogen market:

CLEAN HYDROGEN MARKET GUIDELINES	PRACTICAL CONSIDERATIONS
<p>Verified carbon-free electricity (CFE) sourcing matters</p>	<ul style="list-style-type: none"> • Attributes should be assigned in a technology-agnostic manner to compare emission profiles on a level playing field. Hydrogen powered by renewables, nuclear, or natural gas with verified carbon capture should have comparable carbon-free credentials. • Clean hydrogen should be underpinned by CFE attributes to verify its CFE credentials and associated carbon intensity.
<p>Data quality matters</p>	<ul style="list-style-type: none"> • Ensuring credible measurability of emissions profiles is key to informing customer decision-making and establishing trust in product integrity. • Measurable emissions profiles are especially crucial for gauging lifecycle greenhouse gas emissions for natural gas-powered blue hydrogen with carbon capture and storage or direct air capture.
<p>Consistency matters</p>	<ul style="list-style-type: none"> • Hydrogen is a global commodity, and it will be imperative to have synchronous globally standardized attributes, metrics, and targets that cut across industries and use cases. • The interoperability of an energy attribute certificate scheme for clean hydrogen will be critical to achieving a streamlined and consistent accounting framework across borders and certification programs. • The formation of a new leadership program focused on clean hydrogen that is recognized across international markets would simplify customer goal setting and incentives. • An EAC for clean hydrogen issued by EAC registries would help ensure credible claims consistently across markets and use cases.

<p>Customers matter</p>	<ul style="list-style-type: none"> • New contractual arrangements and standardized procurement methods for clean hydrogen are critical to increase and aggregate customer demand. • Developer and investor confidence requires commitment from customers. To enable customer trust and long-term contracts, customers need reassurance on how clean hydrogen can be reported as part of their decarbonization impact, via the Greenhouse Gas Protocol, and that they will receive credit for their procurement. Additionally, customers need more clarity over the efficiencies around if and how the integration of hydrogen as a zero-carbon fuel can benefit customers as a decarbonization strategy.
<p>Grid decarbonization impact matters</p>	<ul style="list-style-type: none"> • As a significant source of new load to the electric grid, grid-powered hydrogen must support grid decarbonization and electrification efforts. This would ensure carbon-emitting generation resources aren't triggered by the high electricity demand of electrolyzers. As a new source of concentrated load on a local grid, it is important to create incentives for clean hydrogen production to support the development of CFE resources that meet the time-specific electricity consumption of electrolyzers. • EACs that capture the carbon-intensity of procured CFE will be imperative to ensuring grid-backed hydrogen production does not inadvertently trigger generating resources with higher emissions profiles. • To expedite market uptake and clean hydrogen deployment, it is key to minimize complexity and create an easily accessible market while including clear incentives and consistent frameworks to optimize for grid decarbonization impact.

ABOUT THE CLEAN ENERGY BUYERS ALLIANCE

The Clean Energy Buyers Institute (CEBI) is a 501(3)c nonprofit organization focused on solving the toughest market and policy barriers to achieving a customer-driven, carbon-free energy system for all. CEBI works in collaboration with clean energy customers, solution providers, policymakers, leading philanthropies, and energy market stakeholders to develop insights and solutions that solve these barriers. CEBI's **NextGen Carbon-Free Electricity (CFE) Initiative** aims to expand the suite of CFE solutions and procurement options available to enable energy customers.

CEBI, together with the **Clean Energy Buyers Association (CEBA)**, a 501(c)6 business association with over 370 commercial and industrial energy customer and solution provider member companies representing more than \$7 trillion in revenues and 16 million employees, form the Clean Energy Buyers Alliance. The alliance's aspiration is to achieve a 90% carbon-free U.S. electricity system by 2030 and cultivate a global community of customers driving clean electricity procurement to increase carbon-free energy access for all.