

Green Hydrogen Standard - Frequently asked questions

12 May 2022

Green hydrogen — hydrogen produced through the electrolysis of water with renewable energy — is a proven technology with huge potential to meet our energy security and climate change goals. By 2050, up to 25% of the world’s energy use can be met with green hydrogen. GH2 [announced](#) the development of the Standard at COP26 in Glasgow. It will be launched at [the Green Hydrogen Global Assembly and Exhibition 17-18 May 2022 in Barcelona](#). In this note, we highlight some of the key features of the Standard and address some frequently asked questions.

1. Why do we need a Green Hydrogen Standard?

Currently, there is no accepted definition of green hydrogen (sometimes called “renewable hydrogen”). National strategies and policies differ widely on the definition of renewable energy, the boundaries of the carbon accounting system, the emission thresholds at which hydrogen is considered green, the production technologies, and the sustainability criteria that should apply. The lack of clarity and standardization is undermining efforts to accelerate the use of green hydrogen. Crucially, the distinction between green hydrogen and fossil fuel-based hydrogen (with much higher greenhouse gas emissions) is often purposefully blurred under the misleading label of “clean hydrogen” or “low carbon hydrogen”.

A global standard for green hydrogen will support policy and project development, lower costs for producers and consumers, and help build support and confidence in the market for green hydrogen. Agreed standards and definitions are critically important to the rapid acceptance and use of green hydrogen.

2. How does the Green Hydrogen Standard define Green Hydrogen?

The Standard establishes a global definition of green hydrogen: “Green hydrogen is hydrogen produced through the electrolysis of water with 100% or near 100% renewable energy with close to zero greenhouse gas emissions” (the Standard). The Standard refers to “near 100% renewable energy”, because it allows for some back-up in exceptional circumstances, so long as the maximum emissions threshold is not exceeded.

The definition of renewable energy is based on the technologies that are the leading candidates for scaling up green hydrogen production: hydropower, wind, solar, geothermal, tide, wave and other ocean energy sources. GH2 notes that some countries have determined that there is a role for nuclear energy to accelerate the shift from more polluting activities, such as coal generation. However, nuclear power raises some specific environmental and safety related issues, which this Standard is not designed to address. Similarly, there are sustainability issues related to biomass and waste to energy which this Standard is not designed to address. GH2 welcomes if the Green Hydrogen Standard inspires further rules and standards also for nuclear and other forms of energy production with close to zero emissions.

The Standard requires that the environmental, social and governance aspects of green hydrogen production are addressed. It requires that the development opportunities and impacts of green hydrogen production and use are considered. These are vital considerations for investors, customers, consumers and the communities that host green hydrogen projects.

3. Why “close to zero” greenhouse gas emissions rather than zero?

Green hydrogen is sometimes characterised as having zero greenhouse gas emissions. However, the production of renewable electricity can involve some greenhouse gas emissions. In some circumstances, there may be some greenhouse gas emissions associated with electrolysis and associated processes (such as water treatment/desalination). Accordingly, GH2 refers to “close to zero greenhouse gas emissions”.

The Standard requires that projects operate at ≤ 1 kg CO₂e per kg H₂ (taken as an average over a 12-month period). The GH2 Board will review the performance of GH2 accredited projects on an annual basis, with the expectation that the boundaries of the emissions assessment framework can be widened, and that the emissions thresholds will be lowered in accordance with emerging best practice.

The ≤ 1 kg CO₂e per kg H₂ threshold is considerably lower than the thresholds proposed by other so-called “clean hydrogen” or “low carbon hydrogen” standards, which have significantly higher emissions threshold to accommodate hydrogen production based on fossil fuels. The European Union has proposed that hydrogen derived from non-renewable sources can be characterized as “low carbon” at 3.4 kgCO₂e/kgH₂. In the UK, the threshold for “low carbon” is 2.4 kg CO₂e/kg H₂. In the United States, the Bipartisan Infrastructure Law defines “clean hydrogen” at 2 kg CO₂e/kg H₂.

As noted by the UN Climate Champions ‘guiding principles’ for climate-aligned hydrogen, green hydrogen “is the only option strictly aligned with a 1.5-degree pathway”. GH2’s Standard sets a global benchmark to ensure that the green hydrogen premium is not diluted.¹

4. What GHG emissions are included?

The Standard builds on a wide accepted methodology developed by the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) with some refinements. It includes “scope 1” emissions from production, including water treatment and desalination, and “scope 2” emissions from on-site or purchased renewable electricity. It is expected that project operators calculate and report on the emissions associated with the delivery of hydrogen and its derivatives. The standard also encourages project operators to calculate and report on the embodied emissions associated with green hydrogen production. Subject to further refinement and testing, benchmarks addressing these emissions will be reflected in future versions of the Standard.

5. How does the Standard interact with national standards?

The Green Hydrogen Standard is a global minimum standard, aimed at providing national governments with a global reference point in further developing national and regional standards with a clear benchmark for green hydrogen. GH2 is working with national governments to encourage alignment with international best practice, including the Standard’s definition of green hydrogen. The Standard acknowledges that the development of natural resources and energy markets is in the domain of sovereign governments to be exercised in the interest of their citizens and national development. To avoid duplication, demonstrating adherence to credible and comprehensive national requirements shall be deemed sufficient to meet GH2’s accreditation and certification requirements.

6. How will green hydrogen be certified?

¹ <https://racetozero.unfccc.int/un-climate-champions-launch-guiding-principles-for-climate-aligned-hydrogen/>

Project operators seeking GH2 accreditation should undertake the necessary preparatory work to demonstrate their project's adherence to the Green Hydrogen Standard. Project operators engage an Independent Assurance Provider accredited by GH2 to review the project. The Independent Assurance Provider consults the project operator and other stakeholders and prepares an assessment. A draft report is made available for public comment. The final report from the Independent Assurance Provider is then submitted to GH2's Accreditation Body. Projects that meet the Standard and have agreements and/or licenses with GH2 will be certified to use the label "GH2 Green Hydrogen" (under license) and will be eligible to obtain and trade GH2 certificates of origin for green hydrogen and derivatives such as green ammonia.

7. How does the Standard relate to "additionality"?

"Additionality" refers to the notion that grid-connected green hydrogen production should have a guaranteed additional source of renewable energy capacity. The concern is that the additional demand from green hydrogen production will reduce renewable energy consumption in other sectors with a negative impact on overall emissions.

Some governments, particularly the member states of the EU, are considering regulations that would require green hydrogen producers to demonstrate that they are building new ("additional") renewable electricity capacity and/or limiting to production to periods of curtailment (when renewable electricity supply exceeds demand). There is a risk that such requirements are discriminatory and will stifle the development of the green hydrogen industry. Wider issues need to be addressed, including the subsidies that support fossil fuel-based energy and the regulatory bottlenecks that are delaying and increasing the cost of new renewable energy capacity. Moreover, additionality is not a concern in some markets, which already have high share of renewable electricity and/or where renewable electricity is the least cost option for adding generation capacity.

The Standard requires the project operator to undertake an evaluation of the project's utilisation of electricity and the impact on the energy market including, where applicable, network congestion and the impact of their operations on the greenhouse gas emissions from the electricity grid. The evaluation should consider technically feasible and cost-effective measures. Green hydrogen producers may count electricity taken from the grid as fully renewable if they have concluded one or more power purchase agreements (PPAs) and make use of credible guarantee of origin certification schemes (or similar proofs) where available. Where the hosting government has established an additionality requirement, this must be respected.

8. What other sustainability aspects are covered in the Green Hydrogen Standard?

The Standard requires that the environmental, social and governance consequences of green hydrogen production are addressed and requires that the development opportunities and impacts of green hydrogen production and use are considered. Key questions include:

- Are the social and environmental impacts of new projects fully considered?
- Does the project comply with international human rights standards and are human rights promoted where the energy is produced?
- Has a good faith effort to engage key stakeholders and communities actively been made?
- Have key stakeholders and communities been provided with the information and potential opportunities to engage that they see as most relevant and needed?

These issues are vital considerations for investors, customers, consumers and the communities that host green hydrogen projects. The Standard seeks to maximise alignment with international best practice, including the IFC's Environmental and Social Performance Standards², the Hydropower Sustainability Council's Hydropower Sustainability Standard³ and the UN Sustainable Development Goals (SDGs).

9. Who was involved in developing the Standard?

GH2 emphasizes the importance of multi-stakeholder dialogue. All stakeholders have important and relevant contributions to make. Governments, industry, consumers, public and private financial institutions, international and non-governmental organisations all have a role to play.⁴

GH2 [announced](#) the development of the GH2 Green Hydrogen Standard in November 2021, calling on governments, industry, the financial community, and civil society organizations to support a global effort to establish clear standards and accreditation for green hydrogen. On 1-2 December 2021 GH2 hosted an expert roundtable to discuss priorities and opportunities to leverage existing best practice. A report from the event is available [here](#). GH2 subsequently [called on interested stakeholders](#) to join the Green Hydrogen Standard Technical Committee.

The Green Hydrogen Standard Technical Committee (TC) was formed in January 2022 and met four times, including an in-person meeting in Geneva in March 2022. The Technical Committee formed three working groups focused on: (a) greenhouse gas emissions measurement and thresholds; (b) ESG and SDG considerations; (3) accredited and certification. A draft of the Standard was shared for public comment on 16 March (see [here](#)). The Technical Committee refined the draft and agreed a recommendation to the GH2 Board on Tuesday 12 April. The Technical Committee has recommended that the GH2 Board establishes a multi-stakeholder advisory group to further support and advise the GH2 Board on the further development of the Green Hydrogen Standard.

GH2 is committed to transparency and accountability, with key documents being made available at www.gh2.org.

10. Will the Standard evolve?

The Standard seeks to balance predictability and flexibility in a new and rapidly growing industry. Project proponents have emphasised the need for clear and stable standards to inform long term planning. Stakeholders are also in agreement that GH2 should take into account emerging best practices, particularly as projects are scaled up from pilots to large scale operation. GH2 will review the lessons learned from the accreditation and certification process in consultation with all stakeholders. Any subsequent refinements or modifications to the Standard will include transitional arrangements that will allow project operators to make the necessary adjustments within a reasonable timeframe before coming into force.

² IFC (2021) Performance Standards.

https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards

³ Hydropower Sustainability Council (2021) Hydropower Sustainability Standard

<https://static1.squarespace.com/static/5c1978d3ee1759dc44fbd8ba/t/61379550f76c7d53f2b0f446/1631032662564/Hydro+power+sustainability+standard+310821+01b.pdf>

⁴ <https://gh2.org/about/our-principles>

11. What are the next steps?

Subject to GH2 Board approval, the Standard will be launched at the Green Hydrogen Global Assembly and Exhibition in Barcelona. The next steps include:

- Further outreach to green hydrogen producers;
- Further piloting of the Standard on a wide range of green hydrogen projects;
- Development of tools for pre-feasibility stage green hydrogen projects;
- Establishment of GH2's accreditation body, and the accreditation of independent assurance providers
- Further collaboration with national standards bodies so that GH2's standard is recognised and emulated.
- Establishment of a multi-stakeholder advisory group to further support and advise the GH2 Board in the further development of the Standard

12. How can stakeholders support this work?

GH2 invites companies, governments and other stakeholders to become members. GH2 members are invited to participate in all GH2 initiatives, including its advisory and working groups. Members also join the Green Hydrogen Global Assembly, an annual meeting of senior business leaders, government officials, investment professionals, and civil society leaders to consider and agree strategies to accelerate this growth.

For more information on the Standard, contact Sam Bartlett, Director for the Green Hydrogen Standard and CEO Roundtable at sam.bartlett@gh2.org

About GH2

The Green Hydrogen Organisation is set up as a not profit foundation under Swiss law. In addition to its office in Geneva it is present in London, Perth, and Sydney. GH2 has been established to lead a global effort to promote green hydrogen in collaboration with government, industry and other stakeholders. We believe that climate disaster will only be prevented if the use of oil, gas and coal stops urgently. To do this, the world needs to accelerate the production and use of green hydrogen, made from renewable energy and water. A founding principle of GH2 is that green hydrogen must be prioritized and differentiated from all forms of fossil fuel and fossil fuel-derived hydrogen, including grey and blue hydrogen.