



## FACT SHEET

# HYDROGEN STANDARDS AND CERTIFICATION IN THE UK AND GERMANY

As of March 2025 **Renewable and low-carbon hydrogen standards and certification are vital tools for providing certainty and transparency, ensuring that hydrogen is indeed renewable and low-carbon and that its production contributes to reducing greenhouse gas (GHG) emissions. In both the UK and Germany, renewable and low-carbon hydrogen standards are in place that set maximum thresholds for the amount of GHG emissions allowed in the production process, with Germany adhering to EU hydrogen standards. Voluntary certification schemes to verify compliance with these standards are currently being developed in both the UK and Germany/the EU, with some already in place.**

## Definitions

### Low-carbon hydrogen

UK: The UK definition of low-carbon hydrogen includes green hydrogen, produced by electrolysis, and 'blue hydrogen, produced by natural gas reforming with Carbon Capture and Storage (CCS)

Germany/EU: As Germany is embedded within the EU's regulatory framework, the EU's standards on hydrogen are applicable to Germany. The EU distinguishes between low-carbon hydrogen, known as 'blue' hydrogen, and renewable hydrogen, also called 'clean' or 'green' hydrogen (European Parliament 2023b).

In this factsheet, we will use the term 'low-carbon hydrogen' in the UK context to refer to both green and 'blue' hydrogen. In the EU context, we will refer to low-carbon hydrogen (including 'blue' hydrogen) and green hydrogen separately.

### Recycled carbon fuels

A term used in the EU context to refer to fuels produced from liquid or solid waste streams of non-renewable origin. Their production involves carbon management strategies, such as carbon capture and storage (CCS).

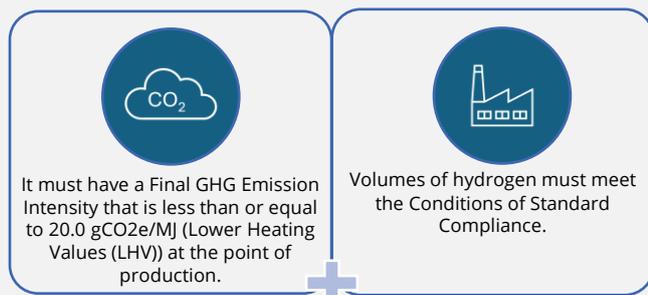
## Hydrogen Standards in the UK

The UK government introduced its **Low Carbon Hydrogen Standard (LCHS)** in 2022.

The LCHS provides a **GHG Emission Intensity Calculation Methodology for eligible pathways**. This methodology is based on the IPHE (International Partnership for Hydrogen and Fuel Cells in the Economy) methodology and focuses on emissions up to the point of production. It specifically excludes GHG emissions related to the distribution or use of hydrogen, as well as emissions from the construction, manufacturing, and decommissioning of capital goods (like production equipment, upstream pre-processing equipment, vehicles, and storage assets), business travel, employee commuting, and upstream leased assets (DESNZ 2023b).

The standard has been reviewed twice since its first publication. The latest version of the LCHS, Version 3, was published in 2023. The standard will be reviewed to ensure that it remains fit for purpose and Version 4 is currently under development (DESNZ 2024).

The standard specifies that any volumes of hydrogen produced need to fulfil two requirements (see Figure 1).



**Figure 1:** LCHS Compliance Requirements for Hydrogen

To meet the latter requirement, a Hydrogen Production Facility must

- Utilise an Eligible Hydrogen Production Pathway for hydrogen production. These include electrolysis, natural gas reforming with CCS, biogas reformation with or without CCS, biomass/waste gasification and methane pyrolysis. New pathways can be added to the Standard, provided they demonstrate they can meet the LCHS and there is a clear understanding of their environmental impact.
- Fulfill evidence and sustainability requirements for inputs and outputs of the facility. For example, when producing green hydrogen, Hydrogen Production Facilities must document the GHG emissions associated with all electricity inputs and verify that the electricity is sourced from renewable sources.
- Manage Solid Carbon Outputs from carbon capture processes responsibly and sustainably, thereby minimising the environmental impact. The Standard sets out additional requirements to achieve this (DESNZ 2023b): First, the solid carbon produced must conform to one of the two Solid Carbon Permissible End Uses, which are either incorporation into concrete or cement for construction OR storage in inert underground facilities (DESNZ 2023c). Second, the responsibility for the solid carbon must be transferred to a third party. Third, to be included in the overall emissions calculation for this standard, any emissions accounted for must not be credited or claimed elsewhere and need to be directly related to the point of production.
- Produce monthly reports on emissions intensities of volumes of hydrogen (Final GHG Emission Intensity and Raw GHG Emission Intensities, i. e. the GHG Emission Intensity for volumes of hydrogen before any addition of extra emissions from periods without hydrogen production). The **GHG Emission Intensity** of hydrogen from a production facility often fluctuates over time due

to variations in the facility's performance and its various inputs and outputs. Hence, the LCHS establishes consistent reporting units of 30 minutes.

- Produce and review annually a Fugitive Hydrogen Emissions Risk Reduction Plan and a Fugitive Hydrogen Emissions Annual Report to identify, assess, and mitigate the risks associated with unintentional releases of hydrogen into the atmosphere.
- Implement a data collection and monitoring procedure in collaboration with delivery partners.

The standard specifies that any hydrogen produced by a plant is assigned to 30-minute **discrete "consignments"**. All discrete consignments must meet the Standard Conditions of Compliance set out above. If a discrete consignment does not meet the required GHG Emission Intensity Threshold on its own, the facility has the option to calculate **Weighted Average Consignments** at the end of a calendar month, using a selected aggregation of discrete consignments. Discrete consignments with negative Final GHG Emission Intensities cannot be included in the weighted average consignments.

## Hydrogen Certification in the UK

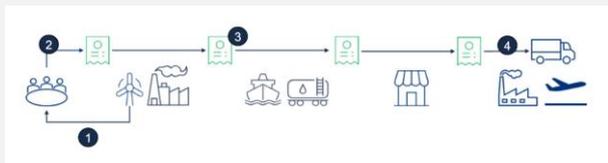
To verify compliance with the LCHS, the UK government is planning to launch a **voluntary, low-carbon hydrogen certification scheme** based on the LCHS. The government has consulted industry on the design of the certification scheme and published a government response in 2023 (DESNZ 2023a). The government is progressing the detailed operational design of the certification scheme in collaboration with stakeholders through the Standards and Certification Working Group of the Hydrogen Delivery Council's – a dedicated Council for the UK hydrogen industry (DESNZ 2024).

The intention is that the government oversees the scheme, with the government-owned Low Carbon Contracts Company (LCCC) serving as the delivery partner. The government proposes the following certification procedure (see Figure 2):

1. Producers will need to provide data to the LCCC to demonstrate compliance with the UK LCHS.
2. Upon verification, a certificate will be issued to the producer, reflecting the corresponding volume of low-carbon hydrogen produced, the emissions

figure, and the Hydrogen Production Pathway used.

- The certificate is bundled with the volume of hydrogen produced and traded together (**mass balance chain of custody**). By using this approach, the UK ensures the seller only sells as much low-carbon hydrogen as was produced by the production facility.
3. The certificate is sold to the end user, who can use it to prove the usage of low-carbon hydrogen.



**Figure 2:** Mass balance chain of custody for Low-Carbon Hydrogen Certification

The certificates will be issued to producers on a monthly basis. Certificates will be issued in MWh, consistent with the Hydrogen Production Business Model and matching the unit used in several European schemes, thereby positioning the scheme for international alignment. Future phases of the scheme are expected to broaden the emissions scope to include transport, storage, hydrogen carriers, and derivatives like ammonia.

As the hydrogen market and economy develop further, the scheme may be legislated, depending on future policy decisions (DESNZ 2023a).

*To note: renewable hydrogen for transport purposes in the UK can receive Renewable Transport Fuel Certificates (RTFCs) under the UK's Renewable Transport Fuel Obligation (RTFO).*

## Hydrogen Standards in Germany

The EU Renewable Energy Directive (RED) II, along with its delegated acts, sets the standards for **green hydrogen**. With several revisions over time, RED III is the latest version. Green hydrogen and its derivatives were recognised as a “**renewable fuel of non-biological origin**” (RFNBO) within the transport sector under RED II. RED III expanded this recognition to include hydrogen used in the industrial and building sectors (European Commission 2023a; FfE 2023a; PwC 2023; European Parliament 2023a). In April 2024, Germany adopted the European RFNBO requirements nationally under the 37th Federal Immission Control Ordinance (Federal Ministry of Justice 2024).

According to RED II and its delegated acts, RFNBOs must have emissions that are **70% lower than the fossil benchmark of 94 gCO<sub>2</sub>e/MJ**. This results in maximum allowable emissions of 28.2 gCO<sub>2</sub>e/MJ for RFNBOs. For hydrogen specifically, this translates to a limit of **3.38 tCO<sub>2</sub>e per tonne of hydrogen (tH<sub>2</sub>)**. (European Commission 2023a; European Commission 2023b; European Parliament 2018; CMS 2023).

In addition, RED II and its first Delegated Act stipulate that green hydrogen must meet certain requirements for the electricity input to be recognised as renewable, and thus the hydrogen as green. Electricity is considered renewable when sourced **directly from a new renewable energy (RE) plant via a direct line**. The RE plant must have started operating no more than 36 months before the electrolyser started operation. Additionally, the plant must not be connected to the grid, unless it can demonstrate via a smart meter that no power was taken from the grid.

For electricity drawn **from the grid** to qualify as renewable, it must meet **one** of the following conditions:

- The electricity is sourced from a **grid zone where the average proportion of RE exceeds 90%**. The production of green hydrogen using this grid electricity is capped at a specific limit, which is determined by the proportion of RE within the bidding zone.
- Electricity is also considered renewable if it comes **from RE sources that would otherwise have been curtailed** – this requires evidence from the responsible Transmission System Operator.
- **Electricity obtained through a RE power purchase agreement (PPA) is counted as renewable if it meets the criteria of additionality, temporal correlation, and geographical correlation**. If the installation is located in a bidding zone where the emission intensity of electricity is below 18 gCO<sub>2</sub>eq/MJ, any power from the RE PPA that meets temporal and geographical correlation can be used. In this case, additionality is not required.

Additionality: For green hydrogen production facilities starting operation from 2028 onwards, the associated RE installations must be considered 'new'. This means they must have **begun operation no more than 36 months before the hydrogen facility started operation and must not have received operating or investment aid**, with some exceptions (e. g. aid received before repowering, financial assistance for grid connections). Facilities that begin operation

before 2028 are exempt from these requirements for 10 years, until January 1, 2038.

**Temporal correlation:** The hydrogen facility must either use electricity from the grid that is generated within the **same month, transitioning to an hourly basis by December 31, 2029**, or produce hydrogen during an hour when electricity prices are low (at or below €20/MWh, or less than 0.36 times the price of an EU ETS (European Union Emissions Trading System) allowance per tonne of CO<sub>2</sub> equivalent). Member States are permitted to impose the hourly correlation requirement starting from July 1, 2027, for green hydrogen produced within their territory.

**Geographical correlation:** Renewable energy installations need to be located either within the **same bidding zone as the electrolyser** (or in an interconnected offshore bidding zone) **or in a neighbouring bidding zone** where electricity prices are at least equal to those in the electrolyser's bidding zone. Member States can set additional criteria for the location of electrolysers and RE installations to align with national plans for hydrogen and electricity grids as long as these criteria do not negatively impact the internal electricity market's operation (European Parliament 2018; European Commission 2023a).

The second Delegated Act under RED II provides the **methodology** to calculate the GHG emissions for RFNBOs and recycled carbon fuels. The GHG emissions are to be calculated by accounting for all emissions along the entire value chain excluding production of machinery and equipment (see Figure 3).

$$E = e_i + e_p + e_{td} + e_u - e_{ccs}$$

**Figure 3:** Formula GHG emissions of RFNBOs & recycled carbon fuels

This means that the total emissions (E) consist of emissions (e) stemming from inputs (i), processing (p), transport and distribution (td), and end use (u), subtracting the emissions that can be saved through Carbon Capture and Storage (CCS) (European Commission 2023b).

Reductions achieved through CCS should specifically relate to emissions avoided by capturing and storing CO<sub>2</sub> directly associated with the extraction, transportation, processing, and distribution of the gas, provided that the CO<sub>2</sub> is geologically stored correctly (for more information, see Directive 2009/31/EC of the

European Parliament and of the Council) (European Parliament 2018).

Provisions for low-carbon fuels, including **blue hydrogen**, are detailed in the **EU Hydrogen and Decarbonised Gas Market Package**, consisting of Regulation 2024/1789 and Directive 2024/1788. The latter states that similar standards apply to low-carbon fuels as to RFNBOs, requiring life cycle **GHG emissions to be 70% lower than the reference value of 94 gCO<sub>2</sub>e/MJ**. The Directive came into force on June 13, 2024, and is to be transposed into national law by mid-2026 (European Parliament 2024a; European Parliament 2024b). Germany has not yet implemented it.

The EU Commission has drafted a **Delegated Act** under the EU Hydrogen and Decarbonised Gas Market Package, outlining the methodology for calculating the GHG emissions related to low-carbon fuels, including blue hydrogen. The public consultation on this draft concluded at the end of October 2024. The Delegated Act is expected to be adopted by 5 August 2025 at the latest. EU Member States have until 5 August 2026 to incorporate the new rules of the directive into their national legislation (European Commission 2024).

## Hydrogen Certification in Germany

In the EU, no overarching hydrogen certification scheme is planned. Instead, **private schemes** are being developed to serve as European Hydrogen Guarantees of Origin. The EU can recognise these **voluntary** schemes to confirm that these are in line with the EU requirements. However, EU member states can also accept evidence from voluntary or national certification schemes that are not recognised by the Commission if their national authorities trust the quality of these certification services.

At present, six voluntary certification schemes have submitted applications for recognition by the EU Commission. In December 2024, three of these schemes (CertifHy, REDCert, and ISCC) achieved formal recognition as RFNBO certification schemes at the EU level. The remaining three certification schemes are still undergoing technical evaluation and are pending formal approval by the European Commission.

Green hydrogen certificates will be traded using a **mass balance chain of custody approach** where the whole supply chain is certified (European Parliament 2018).

As the Delegated Act detailing the GHG assessment methodology for low-carbon fuels, including blue hydrogen, has not yet been finalised, no voluntary certification schemes compliant with the gas market package have been developed so far (European Commission 2023c).

## Comparison & Alignment

The UK and the EU adhere to **similar core principles** regarding standards and certification for hydrogen, such as GHG emissions calculation and mass balancing. However, there are **notable differences**. The UK Low Carbon Hydrogen Standard (LCHS) is technology agnostic, meaning it does not specifically favour any particular production method, such as electrolysis or fossil-based production with CCS, as long as the hydrogen meets the low-carbon criteria. In contrast, the EU standards differentiate between types of hydrogen based on their production methods, categorising them as renewable and low-carbon hydrogen (which includes blue hydrogen). Additionally, the UK plans to employ a government-led certification scheme, whereas the EU relies on private certification schemes.

Another difference is the **calculation method for GHG emissions**. The UK LCHS emissions limit of 20 gCO<sub>2</sub>e/MJ (LHV) is stricter than the German/EU standard of 28.2 gCO<sub>2</sub>e/MJ. However, while the UK LCHS focuses on emissions at the point of production (**well-to-gate approach**), the EU standard encompasses the entire lifecycle of hydrogen, from the initial extraction of raw materials to final use (**well-to-wheel approach**). To enable mutual recognition and trade, alignment would be needed on which emissions are included, to ensure a like-for-like comparison. The UK government has already announced their intention to consider emissions beyond the well-to-gate approach (DESNZ 2023a).

Regarding certification, Germany and the UK were among the countries that signed an agreement at COP28 to work towards the “mutual recognition of certification schemes” (COP28 2023). Already, the UK has chosen to issue certificates in MWh, consistent with the EU RED II and the emerging European Hydrogen Guarantees of Origin. The EU can recognise voluntary schemes that comply with the rules of the RED II. Consequently, the UK certification system could potentially be recognised by the EU Commission, if requirements can be met.

Acknowledging the importance of providing industry with reassurance that the scheme will facilitate imports and exports, the UK government plans to outline its envisioned pathway to international alignment for both standards and certification before the scheme's launch (DESNZ 2023a).

## Conclusion

In both the UK and Germany/the EU, renewable and low-carbon hydrogen standards are in place, and voluntary certification schemes to verify compliance are being developed. While both follow similar core principles, there are differences. One area where alignment is necessary is the calculation method for GHG emissions. While the UK's maximum threshold for GHG emissions is stricter, it does not encompass the entire lifecycle of hydrogen as the EU standard does. For the UK certification system to be recognised by the EU Commission, achieving alignment with the EU standard would be crucial. The UK plans to outline its envisioned pathway to international alignment for both standards and certification before the certification scheme's launch.

## References

CMS (2023). [Renewable energies: EU rules for renewable hydrogen](#)

COP28 (2023). [COP28 Declaration Of Intent - Hydrogen](#)

DESNZ (2023a). [Low Carbon Hydrogen Certification Scheme: government response](#)

DESNZ (2023b). [UK Low Carbon Hydrogen Standard: Greenhouse Gas Emissions Methodology and Conditions of Standard Compliance](#)

DESNZ (2023c). [Data for calculating Greenhouse Gas Emissions under the UK Low Carbon Hydrogen Standard](#)

DESNZ (2024). [Hydrogen Strategy Update to the Market: December 2024.](#)

European Commission (n.d.). [Voluntary schemes](#)

European Commission (2023a). [L\\_2023157EN.01001101.xml](#)

European Commission (2023b). [L\\_2023157EN.01002001.xml](#)

European Commission (2023c). [https://ec.europa.eu/commission/presscorner/api/file/s/document/print/en/ip\\_23\\_6085/IP\\_23\\_6085\\_EN.pdf](https://ec.europa.eu/commission/presscorner/api/file/s/document/print/en/ip_23_6085/IP_23_6085_EN.pdf)

European Commission (2024). [Commission launches consultation on draft methodology for low- carbon hydrogen](#)

European Parliament (2018). [DIRECTIVE \(EU\) 2018/2001 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 11 December 2018 - on the promotion of the use of energy from renewable sources](#)

European Parliament (2023a) [L\\_202302413EN.000101.fmx.xml](#)

European Parliament (2023b) [EU rules for renewable hydrogen](#)

European Parliament (2024a). [Directive \(EU\) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive \(EU\) 2023/1791 and repealing Directive 2009/73/EC \(recast\) \(Text with EEA relevance\)](#)

European Parliament (2024b). [Regulation \(EU\) 2024/1789 of the European Parliament and of the Council of 13 June 2024 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations \(EU\) No 1227/2011, \(EU\) 2017/1938, \(EU\) 2019/942 and \(EU\) 2022/869 and Decision \(EU\) 2017/684 and repealing Regulation \(EC\) No 715/2009 \(recast\)Text with EEA relevance.](#)

Federal Ministry of Justice (2024). [37. BImSchV - Verordnung zur Neufassung der Siebenunddreißigsten Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes 1, 2 \(Verordnung zur Anrechnung von strombasierten Kraftstoffen und mitverarbeiteten biogenen Ölen auf die Treibhausgasquote\)](#)

FfE (2023a). [Wie ist grüner Wasserstoff laut dem Delegated Act der EU definiert? - FfE](#)

FfE (2023b). [Wie ist grüner Wasserstoff laut dem Delegated Act der EU definiert? - FfE](#)

PEFC (2024). [PEFC achieves a major milestone in the recognition process of RED II by the European Commission - PEFC - Programme for the Endorsement of Forest Certification](#)

PWC (2023). [RED III im EU-Parlament und Rat beschlossen – Weg für Inkrafttreten nun frei / Auf ein Watt - Der Blog für die Energiewirtschaft / PwC Deutschland](#)

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