H4D Partnership

Navigator of Policies and Regulations Governing Hydrogen and Derivatives Imports in Europe

THE WORLD BANK
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ESMAP
Energy Sector Management Assistance Program

Hydrogen Europe

In collaboration with

International PtX Hub

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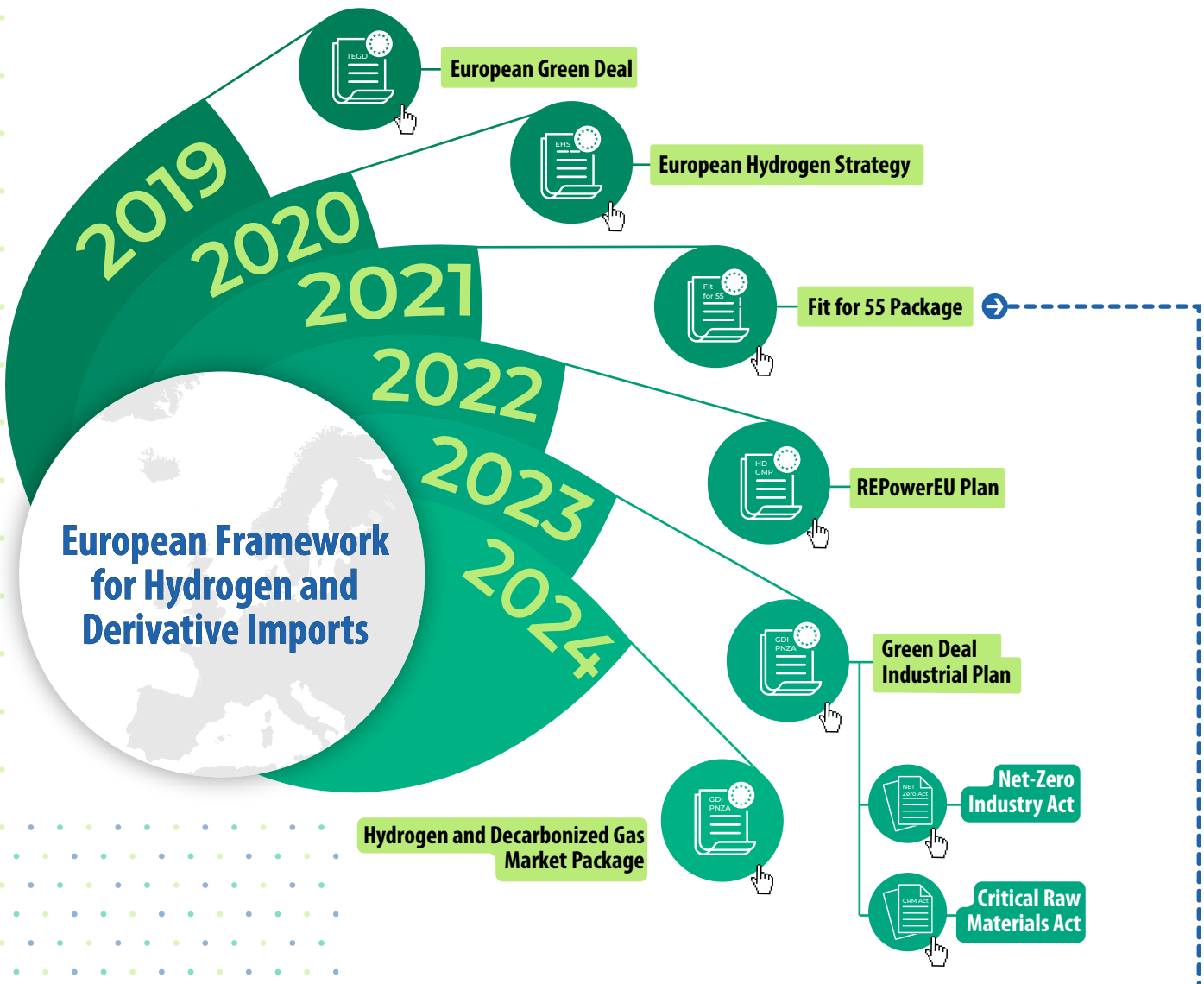
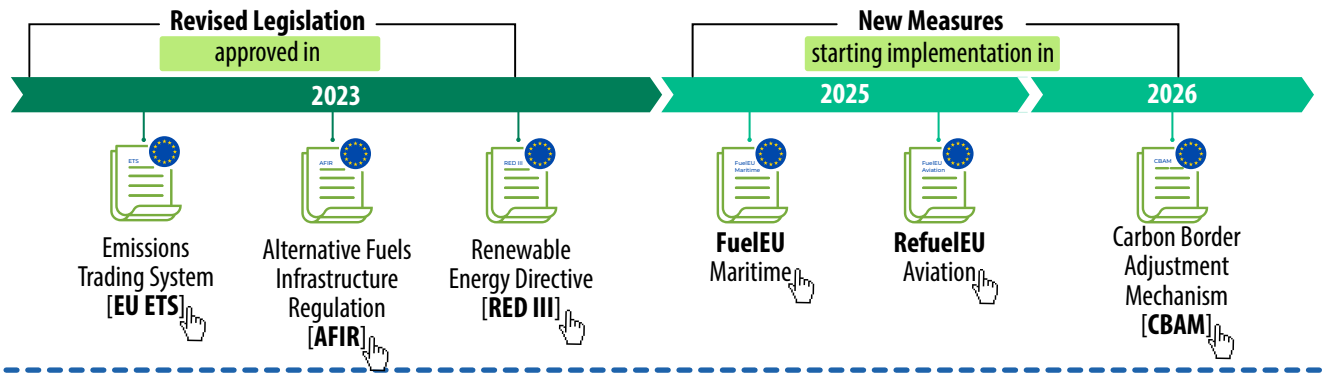
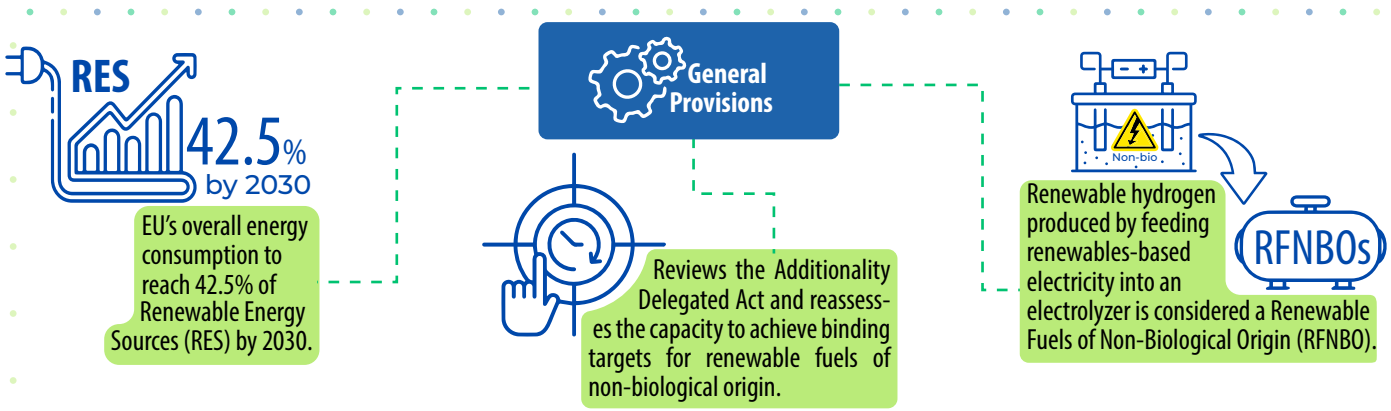
The European Union (EU) is enabling the establishment of a regional hydrogen market to achieve carbon neutrality by 2050. In line with the RePowerEU Plan, the EU put forward the target of 10 Mt of renewable hydrogen production and 10 Mt of renewable hydrogen import by 2030.

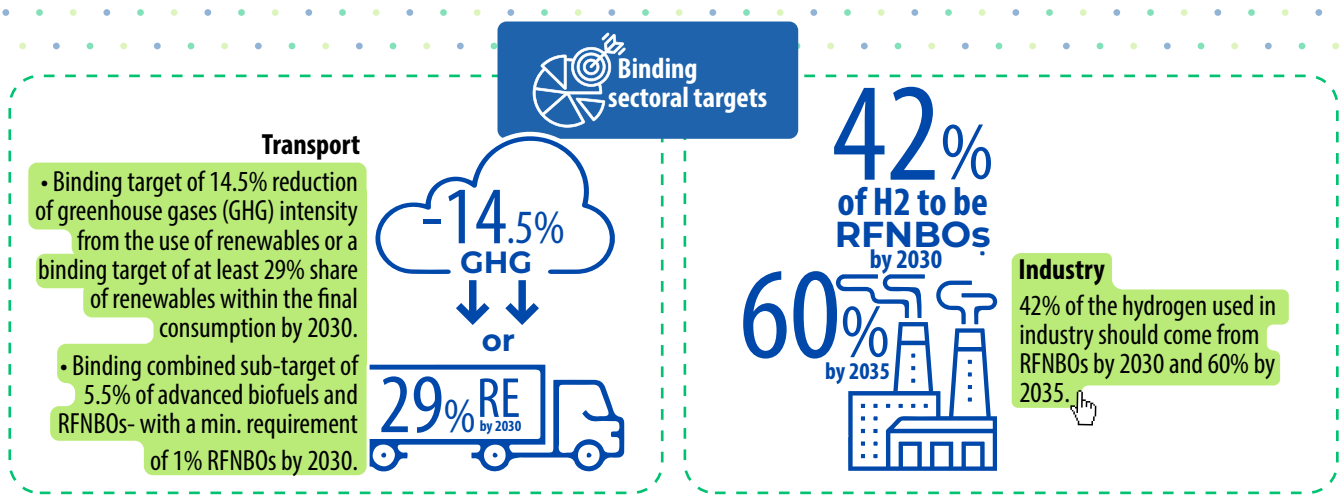


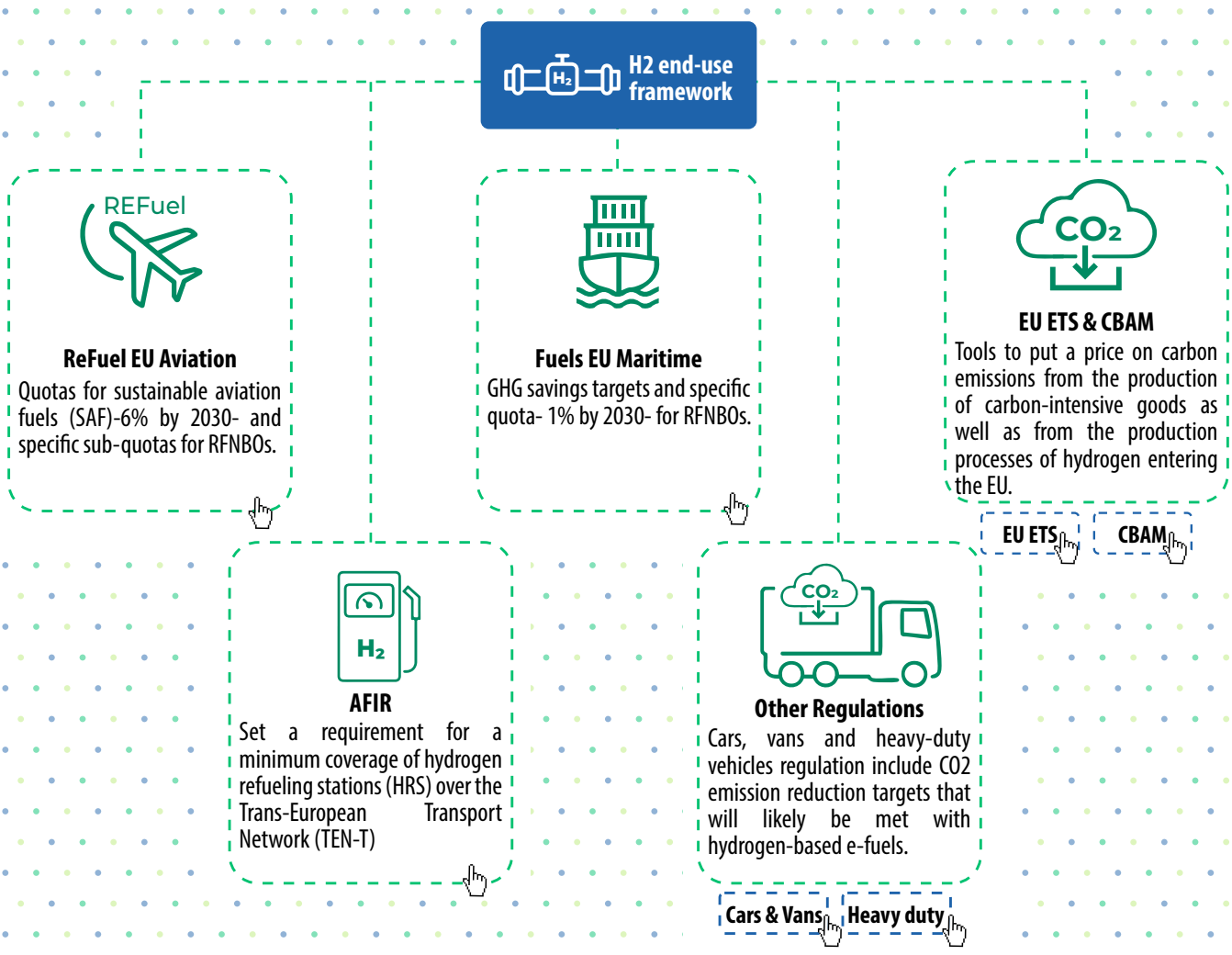
The Fit for 55 package introduces new measures and revises existing legislation to achieve a 55% reduction in greenhouse gas (GHG) emissions by 2030, supporting the broader objective of carbon neutrality by 2050. Key elements include:



Renewable Energy Directive III (RED III)







Delegated Acts

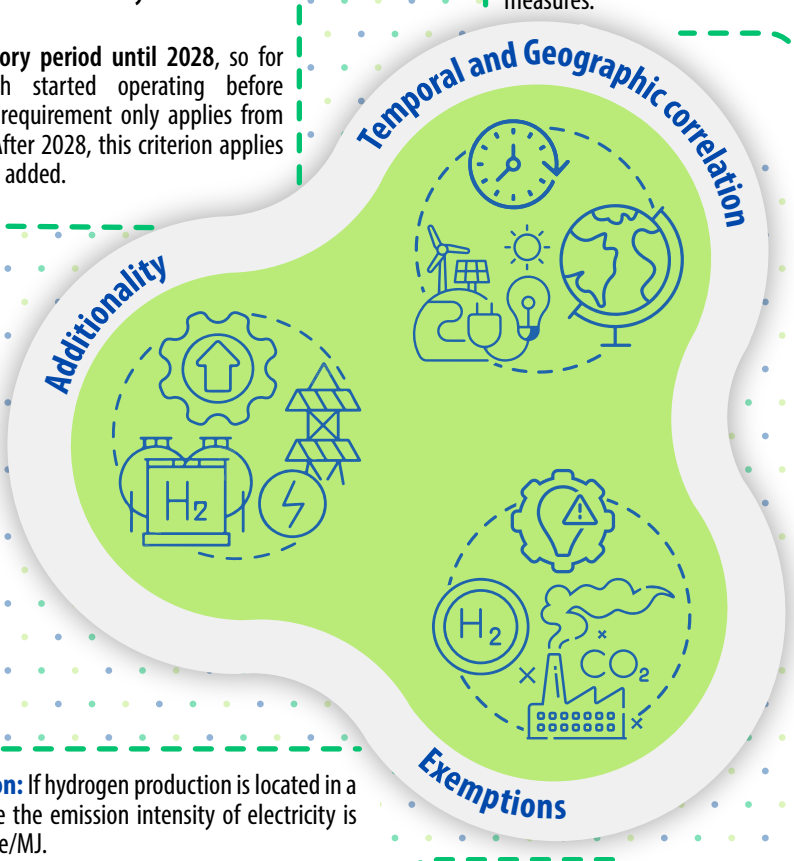
To guarantee that hydrogen is produced from renewable energy sources (RES) and achieves a minimum of 70% greenhouse gas (GHG) emissions savings, the European Commission (EC) adopted two delegated acts under the Renewable Energy Directive II (RED II) in June 2023. These regulations apply to both domestic producers within the EU and international producers exporting renewable hydrogen to the EU, ensuring uniform standards across all markets.

Delegated Act 1: Methodology for Renewable Fuels of Non-Biological Origin (RFNBO).

Production must be based on **additional renewable energy capacity**, to ensure that the increased hydrogen production goes hand in hand with new renewable electricity generation. Considerations:

- In this context "new" means that the RES must come into operation **maximum 3 years** before the electrolyzer.
- **There is a transitory period until 2028**, so for installations which started operating before January 2028 this requirement only applies from January 2038 on. After 2028, this criterion applies to all extra capacity added.

This ensures that hydrogen production occurs in **alignment with the availability of renewable electricity, both in time and location**, to prevent the demand for renewable electricity from indirectly encouraging increased fossil fuel-based electricity generation. There is a European Commission (EC) review scheduled by 2028 to assess the impact of the requirements, including temporal correlation, and to determine if adjustments are needed to ensure the effectiveness of the measures.



Temporal Correlation

Temporal correlation is considered met if hydrogen production occurs:

- **Until 2030**, within the same calendar **month** as the renewable electricity generation, and **hourly thereafter**.
- Additionally, if the spot market day-ahead price for electricity is lower than 20 €/MWh or 0.36 times the ETS price.

Geographic Correlation

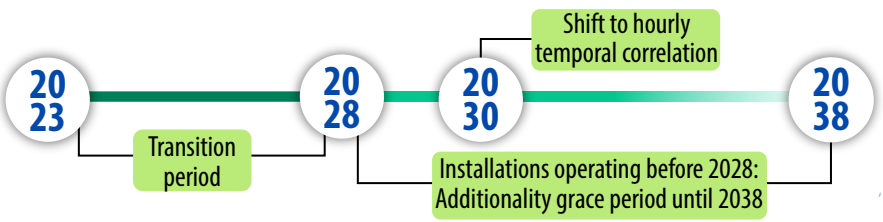
- Same bidding zone with some flexibility for third countries (See Recital 3 of RFNBO Delegated Act).
- Plus, interconnected bidding zone when no congestion (based on hourly prices).

General exemption: If hydrogen production is located in a bidding zone where the emission intensity of electricity is lower than 18 gCO2e/MJ.

Exemption to additionality: If hydrogen production located in a bidding zone with an average renewable electricity share exceeding 90 % in the previous calendar year.

It is important to consider that if either of these two requirements is met, the hydrogen production will continue to be considered under these conditions for the following five calendar years.

Timeline for implementation



Delegated Act 2: Minimum threshold for greenhouse gas emissions savings of recycled carbon fuels.

This regulation provides a methodology for calculating life-cycle GHG emissions for RFNBOs (such as green methanol and SAFs).

1. Sustainable CO2 sources

- Biogenic
- Direct Air Capture.
- CCS Industrial process (ETS) until 2041.
- CSS Power plants (ETS) until 2036.

Main aspects in emissions calculation

2. GHG emissions

- 70% GHG savings required.
- Benchmark (94 gCO2eq/MJ) in transport fuel which equals 28.2 gCO2eq/MJ or (if converted with lower heating value (LHV) of hydrogen (120MJ/kg)) 3.4 kgCO2eq/kg.

3. Allocation of emissions

- Carbon footprint proportionally distributed among all of the output fuels (except in co-processing with conventional fuels).
- Energetic allocation method for fuels and economic-value based allocation for non-fuels.

4. Emissions from use of non-renewable electricity. 3 (yearly) choices:

- Average electricity mix.
- Grid electricity is zero emissions for # hours (when nuclear and RES set spot price minus hours of the power purchase agreement (PPA) production).
- Hourly emissions of the marginal unit in the market.

The Low-Carbon Delegated Act is currently in consultation (until October 27, 2024). It defines the methodology for calculating greenhouse gas (GHG) emissions savings for low-carbon hydrogen and fuels. According to the available draft, a 70% GHG emissions savings requirement is anticipated to be a central condition for compliance.

International Trade

Mutual Recognition Agreements (MRA)

Multilateral agreements facilitate compatibility between certification schemes from different constituencies, essential for global hydrogen trade. The certification schemes recognized by the EU can indeed certify different parts of the hydrogen production chain. For example, an electrolyzer could be certified by CertifHy, while a Fischer-Tropsch facility might be certified by International Sustainability and Carbon Certification (ISCC), ultimately leading to a single EU-compliant certificate. The EU requires mutual recognition between these schemes for RFNBOs. Despite this framework, political and regulatory challenges add complexity.

Digital Product Passport (DPP)

This digital tool stores and shares detailed information throughout the entire life cycle, promoting transparency, reliability, and compliance in hydrogen value chains while supporting digital innovation. While it holds great potential, it is still in the very early stages of development.

Internationally Recognized Standards

Establishing unified standards, such as ISO TS 19870:2023:

Methodology for determining the greenhouse gas emissions associated with the production, conditioning and transport of hydrogen to consumption gate.

Carbon Border Adjustment Mechanism (CBAM)

CBAM aims to address carbon leakage risks by pricing the carbon content of imports of selected goods based on the EU's average carbon price and embedded emissions, helping to level the playing field between EU and third-country producers.

CBAM Timeline: gradually replace free allowances in time and product scope.

Transitional Period (2023-2025): reporting requirements no financial obligations.

Full Implementation (2026-onwards): with the requirement to purchase CBAM certificates. The full financial obligations of CBAM, meaning the payment of fees (through CBAM certificates), will take effect after the transition period ends.

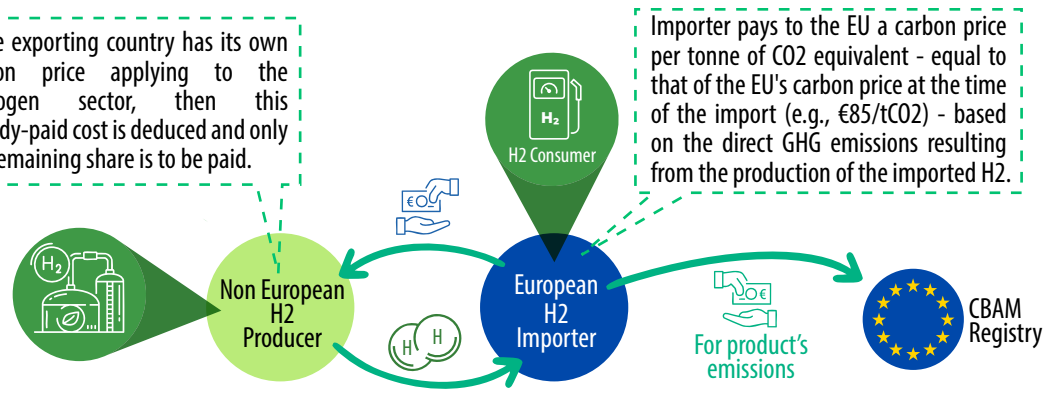
Phase-Out of Free Allowances (2026–2034): under the EU ETS, some industries currently receive free carbon allowances to stay competitive. However, as CBAM takes effect, these free allowances will be gradually phased out by 2034, with CBAM addressing carbon leakage risks for those sectors.

CBAM Coverage: It covers iron, steel, cement, aluminum, fertilizers (ammonia), electricity and hydrogen. It is important to highlight that other hydrogen derivatives, such as e-fuels, including e-SAF or e-methanol, are not currently under the scope of CBAM.

How does the scheme work in practice?

If the exporting country has its own carbon price applying to the hydrogen sector, then this already-paid cost is deduced and only the remaining share is to be paid.

Importer pays to the EU a carbon price per tonne of CO2 equivalent - equal to that of the EU's carbon price at the time of the import (e.g., €85/tCO2) - based on the direct GHG emissions resulting from the production of the imported H2.



After 2025, the European Commission is to evaluate whether to introduce an export rebate for EU exporters. This raises the issue of WTO compatibility.

Hydrogen derivatives and carbon emissions accounting

Until 2024, emissions can be calculated using measurement-based or calculation-based methods (standard or mass balance). The CBAM allows for existing carbon pricing or emission monitoring schemes to be used if they provide similar accuracy and coverage.

There is limited infrastructure for hydrogen in Europe in particular for:
- Liquid hydrogen infrastructure/ terminals
- Industrial-scale crackers (needed to decompose ammonia back into hydrogen).

Import Infrastructure

Several ports will offer services to transport CO2, H2 or derivatives via pipelines in the next 5 years, in their efforts to decarbonize their operations and enable Europe's net zero objectives.

Backbone

Define the critical role of hydrogen infrastructure – based on existing and new pipelines – in enabling the development of a competitive, liquid, pan-European renewable and low-carbon hydrogen market.

Focus on Strategic Investments on Import Infrastructure

Many ports plan to offer transport via pipeline in the next 5 years

Overview of Key Pending Issues

- Approval of the Low- Carbon Delegated Act, which is in consultation period since September 27, 2024.
- Union Database: the rules for this database will be published in Q4 2024.

International trade:

- Certification and standardization: Digital Passports and uniformed certifications. Currently, there is only one developed pilot Digital Product Passport (DPP), promoted by United Nations Economic Commission for Europe (UNECE).
- Uniform GHG accounting standards.
- Import ports infrastructure regulations.
- CBAM:
  - CBAM is moving from its transitional phase (2023-2025), during which emissions are monitored without financial obligations, to a full phase-out of ETS free allowances, set to be completed by 2034. At the end of the transitional period, there may be a gradual extension of both the product and emissions scope.
  - A progressive introduction of a CBAM financial adjustment.
  - The possible introduction of export rebates for EU exporters could lead to potential compatibility issues with World Trade Organization (WTO) regulations.
- Potential demand gap: with the current legislation (RFNBO) the expected demand is of about 6.4 Mt of H2. There is a gap of 13.6 Mt in comparison to REPowerEU ambition of 20 Mt of H2 consumption by 2030.
- In the EU 2040 Climate Target, a reduction of 90% GHG emissions, H2 is present but its decarbonization potential is under-represented.