



International PtX Hub

EU Regulation for Hydrogen

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Fomentado por:
 Ministerio Federal
 de Economía
 y Protección del Clima



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giz Deutsche Gesellschaft
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2 General framework & context, EU regulation

European Green Deal

- Transformative strategy that aims to integrate climate and environmental sustainability into all aspects of the EU's economy.
- Climate law at the core: Legally binding target: climate neutrality by 2050 and -55% by 2030 compared to 1990 levels.
- Among others, implemented by:

➤ Fit for 55

- The 'Fit for 55' package of legislation intends to make all sectors of the EU's economy fit to meet the -55% target by revising all relevant energy and climate legislation in the EU as well as proposing new legislation.
- **Status:** All legislative proposals have been already adopted.

➤ Green Deal Industrial Plan (Combination of legislative and non-legislative proposals)

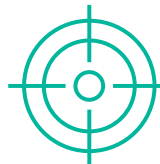
- Goal: Increasing **the competitiveness of European industry** in the face of the climate crisis.
- **Status:** In progress.

➤ Climate Goal 2040 (non-binding, strategic document)

- In February 2024, the Commission recommended reducing the EU's net greenhouse gas emissions by **90% by 2040 compared to 1990.**

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EU hydrogen ambition

➤ European hydrogen strategy 2020 (*non-legally binding*) based on 20 X 40 GW Hydrogen Europe.

- Focused on 5 main areas: investment support, support for production and demand, creation of a hydrogen market and infrastructure, research and cooperation and international cooperation
- Main goals and time frame:
 - From **2020 to 2024**: the EU ambition is to reach 6 GW renewable hydrogen and produce 1 Mt of renewable hydrogen in the EU
 - From **2025 to 2030**: hydrogen should be an essential part of the energy mix. The EU ambition is to reach **40 GW** of electrolyzers capacity in the EU and the production of up to **10 Mt of RES H2** and **import another 40 GW**
 - From **2030 to 2050**: renewable hydrogen technologies should be used on a large scale, with particular emphasis on sectors that are difficult to decarbonize

➤ REpower EU (*Combination of legislative and non-legislative proposals*)

- EU response to the energy crisis created by Russia's invasion of Ukraine
- Goals: to promote energy savings, increase renewable production and diversify energy supply.
- Increases the ambition to **20 Mt of renewable hydrogen**, of which **10 Mt would be produced** in the European Union and **10 Mt imported by 2030**. (non-legally binding)

Legislative framework for hydrogen (overview)

| Nature | Transport | Industry | Storage | Infrastructure | |
|------------------------|--|-----------|-----------------------|----------------|---------------|
| Target & Rules | RED II and RED III | | | Ten-E | AFIR |
| | Delegated Acts on RFNBOs* | | | | |
| | CO ₂ Emissions standards for cars and vans | | | | |
| | CO ₂ Emissions standards for Heavy-Duty Vehicles | | | | |
| | Fuel EU Maritime | | | | |
| | REFuel EU Aviation | | | | |
| | Hydrogen and Decarbonized gases Package (Directive and Regulation) | | | | |
| Carbon pricing | EU-ETS | | | | |
| | EU CBAM* | | | | |
| Financing & Incentives | EU Hydrogen bank* | | | | |
| | Modernization and Innovation Fund & Others | | | | |
| | EU Taxonomy* | | | | |
| | Net-Zero Industry Act* | | | | |
| | Regulation | Directive | Delegated legislation | Other | *New creation |



Supported by:
 Federal Ministry for Economic Affairs and Climate Action
 on the basis of a decision by the German Bundestag



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Legislative binding targets and rules

Renewable Energy Directive and Delegated Acts (Delegated legislation)

- RED I (2009), RED II (2018) and RED III (2023), **promote the use of renewable energies in the EU**. It defines deadlines and set binding targets. Last reform: 42,5% of renewables from total energy consumption in the EU by 2030.

Renewable hydrogen and PtX in RED III

- Definition of **RFNBO - Renewable Fuels of Non-Biological**, expanded beyond the transport sector to cover all sectors. RFNBOs includes renewable hydrogen and synthetic fuels (applies to domestic and **imported** RFBNOs).
- From renewable sources delivering a 70% emission reductions compared to a fossil fuel comparator of 94 gCO₂eq/MJ (3.384 tCO₂e/tH₂)
- **Delegated Acts:**
 - Definition of **requirements to qualify the electricity** used for the production of RFNBOs **as renewable**, and
 - **Methodology for calculating GHG savings** through the use of RFNBOs
- **Binding targets for RFNBOs in RED III**
 - **Industry: 42%** of the hydrogen used in industry for energy and non-energy purposes should come from **RFNBOs by 2030 and 60% by 2035**.
 - **Transport: 5.5% from biofuels and RFNBOs** out of the total share of renewables in the transport sector. Of this, at least **1.2% from RFNBOs by 2030**

Binding targets and rules

Hydrogen and decarbonized gas market package

Regulatory scope: revision of the Gas Directive 2009/73/EC and Gas Regulation (EC) No 715/2009.

Main goals: creation of the framework for the gradual phase-out of fossil gas by enabling the integration of renewable and low-carbon gases.
Time limit for long-term gas contracts: they should not last beyond 2049.

- Introduces a new regulatory framework for dedicated hydrogen infrastructure and create the right conditions for some of the existing natural gas infrastructure to be repurposed for hydrogen.

Hydrogen and gas Directive regulatory highlights

- **Definition for low-carbon hydrogen:** hydrogen from non-renewable sources, which meets the GHG reduction threshold of 70 % compared to the fossil fuel comparator (same comparator as for RFNBOs). (3.384 tCO₂e/tH₂) Draft methodology for calculating emission savings of low-carbon fuels currently open for consultation in alignment with the RFNBOs methodology.
- **Unbundling:** One of the main regulatory tools set by the EU in the liberalization of its gas and electricity markets, leading to the break-up of former vertically integrated monopolies.
 - **Vertical unbundling:** separation of production and supply activities from transmission and distribution.
 - Ownership unbundling is the default rule for dedicated H₂ systems and needs to be complied with by two years after the entry into force of the GD. This means that hydrogen network operators must be fully independent of companies involved in hydrogen production or supply.
 - Similar to the gas sector, the directive allows for ITO or ISO models as alternatives to full ownership unbundling. These models may be applied in specific circumstances.
 - **Horizontal unbundling:** in the context of hydrogen refers to the separation of activities between different sectors or energy carriers. In the Gas Directive, combining the activities of natural gas with the operation of dedicated hydrogen systems is allowed under two conditions:
 - A dedicated H₂ transmission network operator should be established in a separate legal entity from the activities of natural gas transmission/distribution.
 - There should be separate accounts applicable to different infrastructures.



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Hydrogen and decarbonized gas market package regulatory highlights

- **Cross-subsidization from Existing to New Infrastructure Assets:** The Gas Package facilitates limited cross-subsidies between the natural gas and H2 sectors. In principle, H2 networks must have separate regulated asset base from gas and electricity networks.
- **Third party access:** The TPA has been a fundamental regulatory instrument for liberalizing the energy sector,
 - Third party access: The Gas package gives flexibility to Member States to apply negotiated third-party access to dedicated hydrogen networks up until the end of 2032. After this date, the default rule shall be the regulated, non-discriminatory and objective regulated third party access.
- **Governance:** A new governance body has been created: The European Network of Network Operators for Hydrogen (**ENNOH**) it will be responsible for: Infrastructure Planning, Cross-Border Coordination coordinating infrastructure planning, harmonizing standards, facilitating cross-border projects, and supporting market integration, ENNOH ensures the efficient and accelerated development of the hydrogen economy.
- **Blending:** blends of 2% hydrogen volume into natural gas flows must be accepted and facilitated at cross-border points.
 - Transmission systems are free to set local thresholds higher than this if they wish to.
 - Nevertheless, in the preamble (74) of the Regulation, it is noted that this hydrogen blending should be considered a 'last resort' use case, again reflecting its scarcity and therefore the importance of using it in a targeted way.
- **Hydrogen quality and purity:** Highlights the importance of and need for EU-wide harmonization of hydrogen quality standards.



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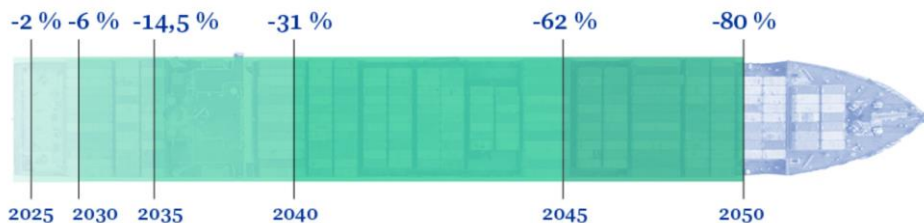
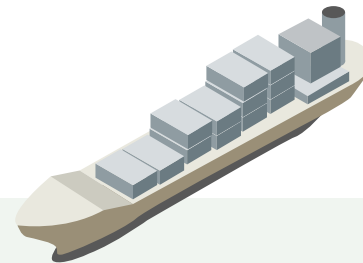
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Binding targets and rules (Transport)

FuelEU Maritime

- Regulatory scope: revision of the European regulation on renewable and low-carbon fuels for the maritime transport.
- It shall apply from 1 January 2025 for most of its provisions.**
- Its main goal is to reduce GHGs and **gradually increase the use of sustainable fuels** in maritime transport.
- It does not set targets for specific technologies but for reducing the emissions intensity** of fuels used in shipping (technology neutral).
- Includes specific incentives for the use of RFNBOs.**
- It applies to vessels over 5,000 gross tons, including container or passenger ships.
- Use of shore-side power supply (OPS) in major European ports.



Fuente: <https://www.consilium.europa.eu/>

Binding targets and rules (Transport)

RefuelEU Aviation

- Regulatory scope: Revision of the European REfuelEU Regulation for the aviation sector.
- It shall apply from 1 January 2025 for most of its provisions.**
- Main goals: to increase **both demand for and supply of sustainable aviation fuels (SAF)** and to put air transport on the trajectory of EU climate targets for 2030 and 2050.
- Key points:
 - Applicable to aircraft operators, EU airports** and their respective EU airport managing bodies, **and aviation fuel suppliers.**
 - Fuel suppliers are required to blend increasingly higher levels **of sustainable aviation fuels (SAF), from 2% in 2025 to 70% in 2050.**
 - The minimum percentage of synthetic fuels in **SAF should range from 0.7% in 2030 to 35% in 2050.**



| Year | 2025 | 2030 | 2032 | 2035 | 2040 | 2045 | 2050 |
|--|------|-------|------|------|------|------|------|
| Share of SAF | 2% | 6% | 6% | 20% | 34% | 42% | 70% |
| Minimum share of synthetic aviation fuels | 0% | 1.2%* | 2%* | 5% | 10% | 15% | 35% |

a.eu/



Binding targets and rules (transport)



Although no specific targets for hydrogen and PtX products have been introduced, hydrogen is expected to play a key role in the achievement of the CO2 reduction targets, specially in the heavy-duty vehicles segment.

CO2 standards for cars and vans Regulation

- The adopted revision set more ambitious standards for reducing CO2 emissions of new cars and vans.
- Compared to 2021, the emissions of new passenger cars registered in the EU would have to be:
 - 55 % lower for cars, 50 % lower for vans by 2035.
 - By 2035 of new passenger cars and vans CO2 emissions would have to be reduced by 100 %, i.e. all new vehicles would have zero emissions.



CO2 standards for heavy duty vehicles Regulation

- The adopted revision will expand the scope of the Regulation to include urban buses, coaches, trailers and other types of lorries.
- The average CO2 emissions of heavy-duty vehicles, compared to 2019 levels, would have to fall by:
 - by 45 % from 2030,
 - by 65 % from 2035, and
 - by 90 % from 2040 onwards.

Binding targets and rules (Infraestructure)

AFIR (Alternative Fuels Infrastructure Regulation)

- **Regulatory scope:** The AFIR Regulation expands on the already existing Directive on the deployment of alternative fuels infrastructure COM/2013/018
- Includes specific deployment targets that will have to be met in 2025 and 2030 for the deployment of recharging infrastructure for cars, vans and heavy-duty vehicles and also for maritime ports, airports, users and operators.
- **Hydrogen refueling stations must be deployed with a maximum distance of 200 km in between them along the TEN-T core and the TEN-T comprehensive network and at least one must be available in every urban node.**

Trans-European-Networks for Energy / TEN-E Regulation

- Main goals: Support for the improvement and modernization of cross-border energy infrastructure in the EU and to achieve the objectives of the European Green Pact.
- The revised Regulation requires the selection of Priority Projects of Common Interest (PCI) and **Projects of Mutual Interest (PMI)**. Projects of mutual interest are those between the EU and third countries.
- PCI projects benefit from accelerated approval and implementation procedures as well as under certain conditions, access to European funding from the Connecting Europe Facility (CEF) (EUR 33,71 billion MFF 2021-2027).
- South H2 Corridor (Hydrogen Corridor Italy-Austria-Germany is part of the 6th PCI list. (From 166, 65 are H2 infrastructure projects)



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Carbon pricing mechanisms



ETS - Emission Trading System



CBAM – Carbon Border Adjustment Mechanism

EU Carbon pricing

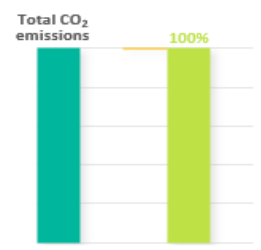
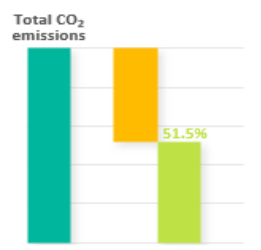
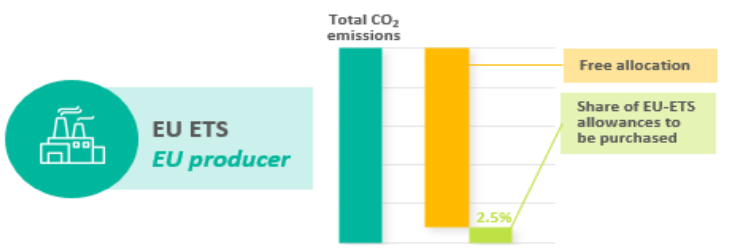
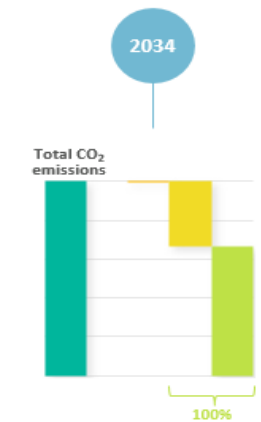
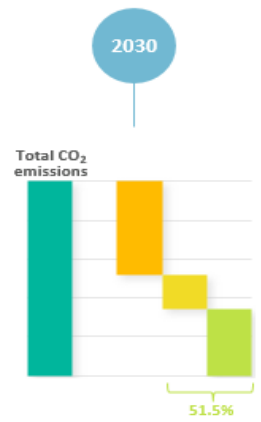
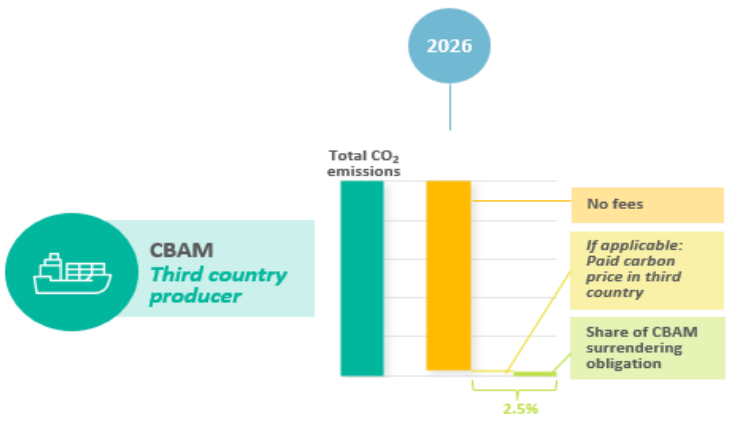
EU Emission Trading System (EU-ETS)

- **Regulatory scope:** Commission proposal to amend Directive 2003/87/EC concerns the ongoing phase 4 of the ETS (2021-2030)
- **Main goal : Flagship EU climate tool. Main elements of the new revision:**
 - reduced cap and more ambitious linear reduction factor for GHG emissions,
 - revised rules for free allocation of allowances and the market stability reserve. To be replaced by CBAM in CBAM covered sectors.
 - extension of the EU-ETS to maritime transport
 - a separate new ETS for buildings and road transport
 - increase of the Innovation and Modernisation Funds and new rules on use of ETS revenues
- **Main hydrogen related provisions**
 - Under the last revision, the scope of the Directive – and subsequently the scope for free allowances – will be expanded to cover all hydrogen production methods, de facto including electrolytic hydrogen.
 - Hydrogen producers are eligible to receive indirect cost compensation. This refers to financial support provided to industries that face increased electricity costs due to the carbon price under the EU Emissions Trading System (EU ETS).
 - Examples: Producers of RES hydrogen will be able to sell free allocated allowances for a profit. Benchmark will be reduced in favor of RES hydrogen producers, reduced compliance costs + indirect cost compensation.

CBAM Overview and differences between the transitional and definitive period

| | Cement | Fertilisers | Iron/Steel | Aluminium | Hydrogen | Electricity |
|---|--|--|-----------------------------------|---|----------|-------------------------|
| Reporting metric | (per) Tonne of good | | | | | (per) MWh |
| GHG covered | Only CO2 | CO2 (plus nitrous oxide for some fertiliser goods) | Only CO2 | CO2 (plus perfluorocarbons (PFCs) for some goods) | Only CO2 | Only CO2 |
| Emission coverage transitional period | Direct and Indirect | | | | | Direct only |
| Emission coverage definitive period | Direct and Indirect | | Only direct but subject to review | | | Direct only |
| Determination of direct embedded emissions | Based on actual emissions. For imports until 31 December 2025, estimations (including default values) can be used for up to 20% of the total specific embedded emissions of complex goods | | | | | Based on default values |
| Determination of indirect embedded emissions | Based on actual electricity consumption and default emission factors for electricity, unless conditions are met. Estimations (including default values) could be used for up to 100% of the specific indirect embedded emissions for imports until 30 June 2024 | | | | | Not applicable |

EU Carbon pricing, relation between the EU-ETS and CBAM



Incentives and sustainable finance

- ✓ **EU Taxonomy**
- ✓ **EU hydrogen bank**
- ✓ **Green Deal Industrial Plan**
- ✓ **Other funds**

Financial needs

➤➤ Total investment needs to produce, transport and consume 10 million tonnes of renewable hydrogen are expected to be in the range of **EUR 335-471 billion**

➤➤ Additional renewable electricity production will require in the range of **EUR 200-300 billion**

**Electrolysers and
key infrastructure:
EUR 50-75 bn.**

**EU internal
pipelines:
EUR 28-38 bn.**

**Storage:
EUR 6-11 bn.**

➤➤ To enable the import of 10 million tonnes of Renewable hydrogen and derivatives:
EUR 500 billion

➤➤ **Bulk of investments will have to be covered by private capital**

EU Taxonomy

- Objective: To help direct investment flows and **private capital** toward sustainable activities.
- Renewable hydrogen production has been included in the taxonomy to encourage investment flows into this technology.
- Storage of hydrogen, and the manufacture of equipment for the production and use of hydrogen have been also included.

Comparison between RED Delegated Acts & EU taxonomy

| Legislative File | GHG threshold | Aim/porpuse |
|---------------------------|---|---|
| RED Delegated Acts | 3.384 tCO ₂ e/tH ₂ (70% of a fossil fuel comparator of 94 gCO ₂ e/MJ) | Provide a definition for renewable hydrogen at the EU level |
| EU Taxonomy | 3 tCO ₂ e/tH ₂ (73.4% of a fossil fuel comparator of 94g CO ₂ e/MJ and 70% for hydrogen-based synthetic fuels 3.384 tCO ₂ e/tH ₂) | Drive investment flows toward renewable hydrogen and hydrogen-based synthetic fuels production. |

Net-Zero Industrial Plan (Three main components)



Net-Zero Industry Act: Aims to scale up the manufacturing of clean technologies in the EU.

- **Legislative vehicle:** EU Regulation (New)
- **Hydrogen:** Hydrogen is one of the key technologies of Europe's Net-Zero Industry Act.



Critical Raw Materials Act: Aims to encourage the EU's capacities and strengthening the resilience of its critical raw material supply chains.

- **Legislative vehicle:** EU Regulation (New)
- **Hydrogen:** Includes several key raw materials essentials for a hydrogen market. E.g. Platinum metals

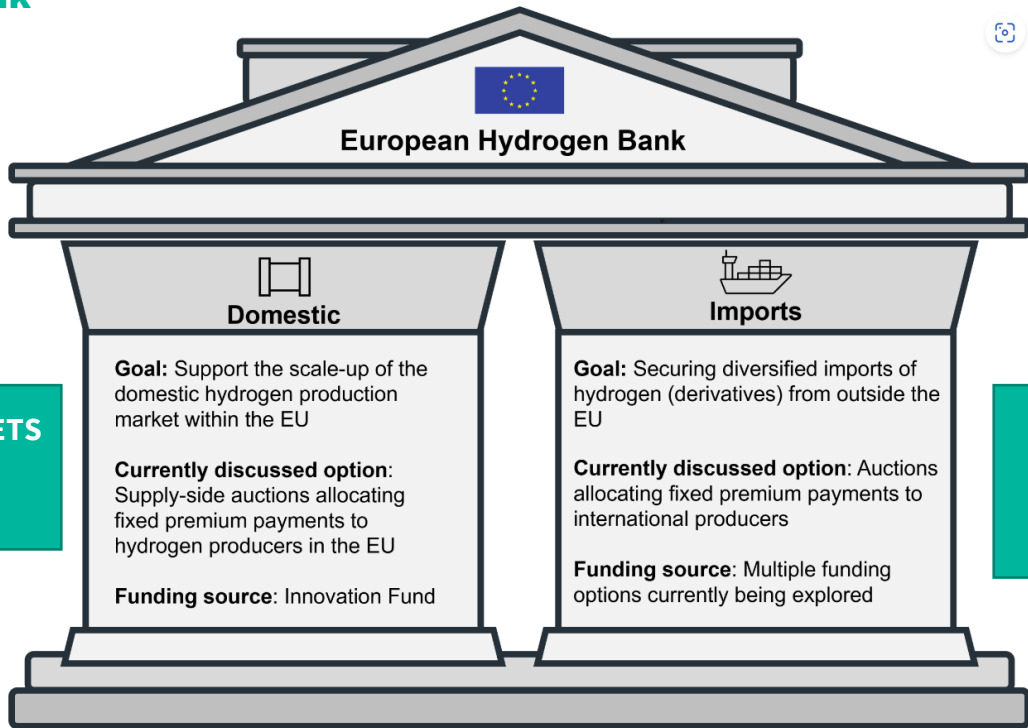


Reform of the electricity market design: aims to make the EU energy market more independent from the short-term market price of electricity.

- **Legislative vehicle:** EU Regulation revision
- **Hydrogen:** Fosters and facilitates the use of PPAs which are essential to fulfil the certification requirements for RFNBOs when the electrolyzer is connected to the grid.

EU hydrogen bank

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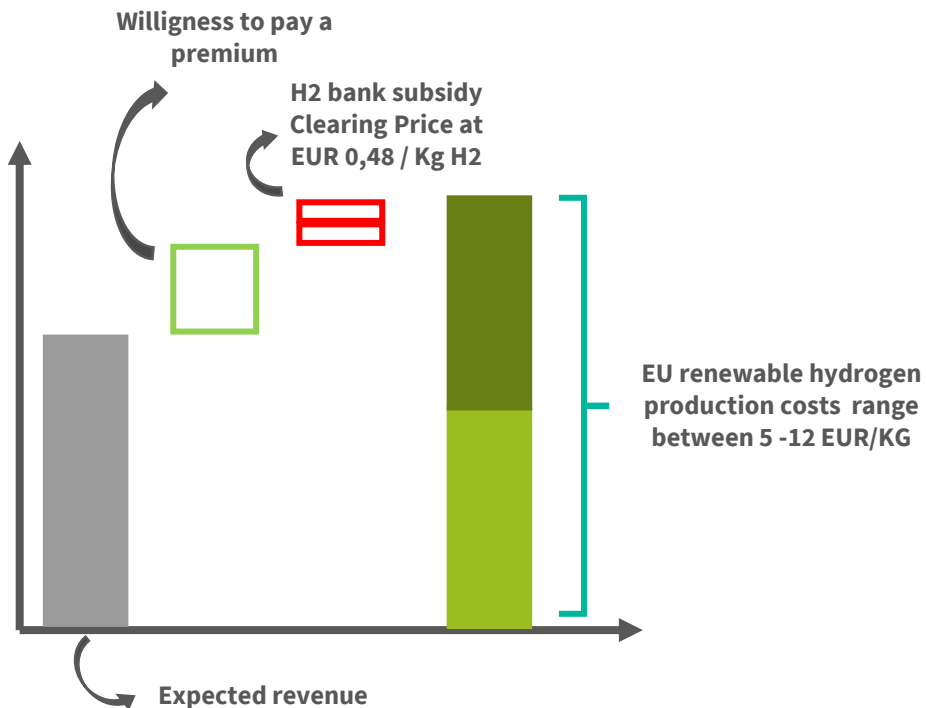
Will be financed with EU-ETS revenues from the Innovation Fund

Funding source not clear yet.

EU hydrogen bank: results of the first EU pilot auction

Comparing the first and the second EU auctions

| | 1st pilot auction | 2nd auction |
|-------------------------------------|----------------------|---|
| Closing Dates | February 2024 | February 2025 |
| Budget | 800 M EUR | 1.2 bn. EUR |
| Auction ceiling price | 4.5 EUR/Kg | 4 EUR/Kg |
| Financial closing | | 2.5 years |
| Max. entry into operation | 5 years | 5 years |
| Budgetary Baskets | All sectors combined | Separate basket of the Maritime sector EUR 200 M. |
| Third country sourcing restrictions | None | Max. 25% cap. Sourced by China |

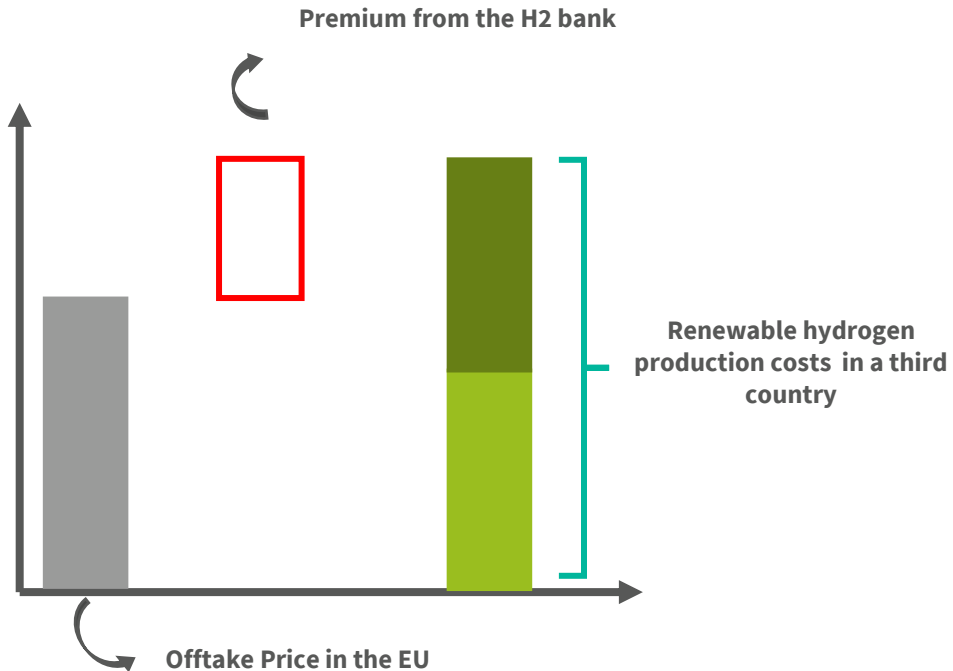
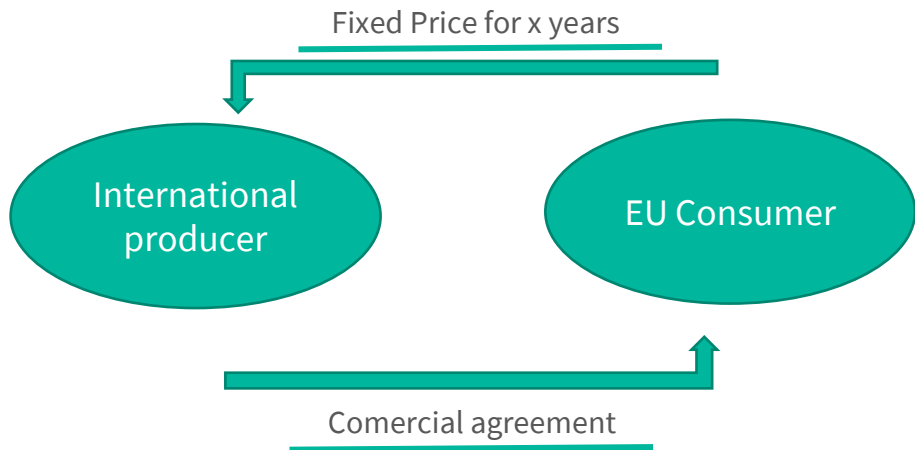


Conceptual design for a fixed premium auction for international suppliers

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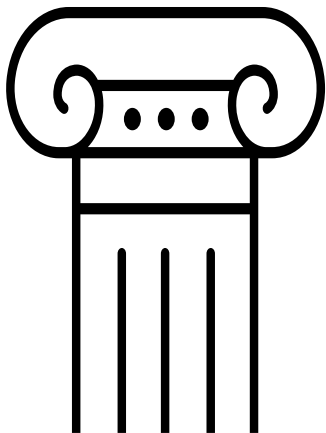
»» EC stil assesing the design and funding sources

»» EC stil assesing the use of a similar scheme based on a premium



EU hydrogen bank, new pillar

New pillar:
Transparency and
coordination



Pilot hydrogen mechanism: It will collect, process, and make available information on demand and supply for renewable and low-carbon hydrogen submitted by market players.

➤ This will increase transparency on the market and **enable European buyers to match with both European and international suppliers.** Expected to start functioning in 2025.

Other EU Funding sources for renewable hydrogen and derivatives

