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Hydrogen inclusion in the EU CBAM: ERCST's assessment

Hybrid meeting.

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- ERCST counts with extensive expertise on CBAM and hydrogen analysis

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2021

Border Carbon Adjustments in the EU Sectoral Deep Dive



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POLICY BRIEF

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Hydrogen: the import dimension of REPowerEU

This policy brief intends to look at the hydrogen imports dimension and ambition of the REPowerEU communication from different angles and perspectives.

Highlights

- Geopolitical aspects prevailed over market and climate considerations when establishing the EU ambition of 10 Mt of imported renewable hydrogen by 2030.
- High EU energy prices may not only change the economics of hydrogen production but may also influence the EU appetite for hydrogen imports. This can be exacerbated by the introduction of attractive incentive schemes for hydrogen in third countries. (i.e. Inflation Reduction Act in the USA)
- Introducing ambitious demand-side mandates for renewable hydrogen in the RED III at the same time as introducing rigid criteria to certify the renewable properties for electricity to produce it, may increase reliance on imports.
- If the EU hydrogen regulatory framework is not sufficiently technologically neutral, it may create a shortage of domestically produced clean hydrogen and an increased reliance on hydrogen imports.
- Overregulation may have several side effects, such as forcing the EU industry into hydrogen imports, increasing scarcity of renewable electricity and pushing hydrogen investments out of the EU.

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Structure

Hydrogen related considerations



-  Market considerations
-  Environmental considerations
-  Trade patterns and other considerations

Implications of the inclusion of hydrogen in the EU CBAM



-  Accelerated free allocation phase out for grey hydrogen producers
-  Conflicting methodologies?
-  Hydrogen carriers and risk of circumvention
-  Indirect emissions not covered during the transition period

CBAM agreement / hydrogen

- **Product scope:** Cement, Electricity, Fertilisers, Iron and Steel, Aluminium, Hydrogen (+ some product codes within these sectors such as Ammonia).
- **Scope of emissions:** The CBAM should also apply to indirect emissions. Indirect emissions should not be calculated **initially** for the goods that receive indirect cost compensation. Hydrogen is included in Annex 1a for which only direct emissions will be taken into account.
- **Review Clause:** Before the end of the transition period the EC will assess the possibility of extending the CBAM scope to embedded indirect emissions (Annex 1a).
- **Trade flows:** Imports only. The EC will assess every two years from the end of the transition period, as part of its annual report, the situation as regards exports and act accordingly.
- **Free allocation (agreed as part of the EU-ETS revision):** free allowances for CBAM sectors will be phased out over a nine-year period between 2026 and 2034. 2026: 2.5%, 2027: 5%, 2028: 10%, 2029: 22.5%, 2030: 48.5%, 2031: 61%, 2032: 73.5%, 2033: 86%, 2034: 100%
- **Delegated and implementing acts:** The EC will adopt over 10 Delegated and Implementing acts to complement and supplement some of the provisions in the Regulation.

Market considerations (current situation)

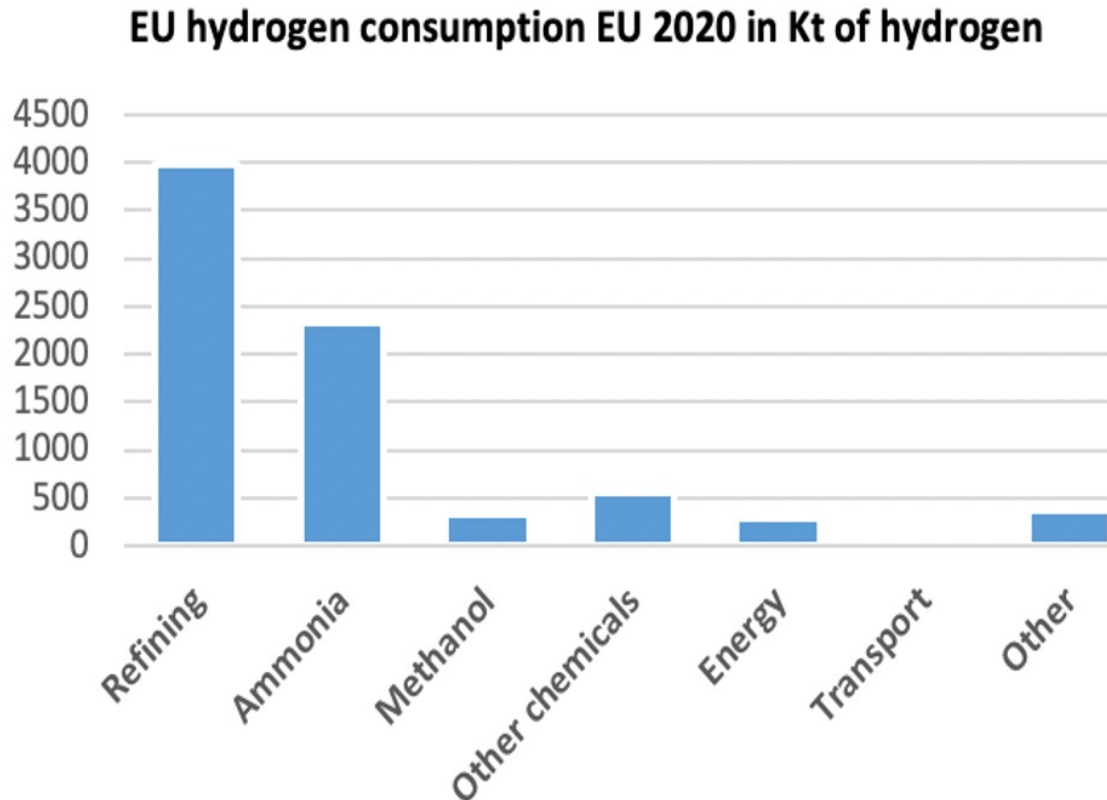


Figure 2 EU 27 hydrogen consumption EU 2020 in Kt of hydrogen by sector. Over 95% being produced from hydrocarbons.

- ❖ At present, a liquid hydrogen commodity market does not exist in the EU.
- ❖ At the end of 2020 hydrogen demand in the EU 27 was approx. **8 Mt per year** with about **50% of hydrogen used in refineries** and about **40% used in ammonia production**.
- ❖ **Over 95%** of current hydrogen production is produced from hydrocarbons, primarily from methane in a process known as **methane reforming (SMR)**.
- ❖ **90%** of the total hydrogen production capacity is self-produced on-site or recovered (as a by-product).
- ❖ So-called “**merchant hydrogen**” (produced and sold by third parties based on long term contracts) only represents about **10%**.

Market considerations (future)

- ❖ In the future, the EU hydrogen market is expected to become a **largely decarbonized, liquid commodity market, using Guarantees of Origin as certificates.**
 - ❖ **EU Commission ambition: 10 Mt of renewable hydrogen produced in the EU.**
 - ❖ **+ additional 6 Mt of imported renewable hydrogen and 4 Mt in the form of ammonia and other derivatives** (i.a. e-methanol, e-kerosene, or e-diesel).
 - ❖ Different incentives and mandates have been proposed primarily as part of the Fit for 55 Package.
- ⚠ This view contrasts with other more conservative demand-driven forecasts, where hydrogen demand by 2030 will be significantly lower and **therefore reliance on imports will be reduced.**

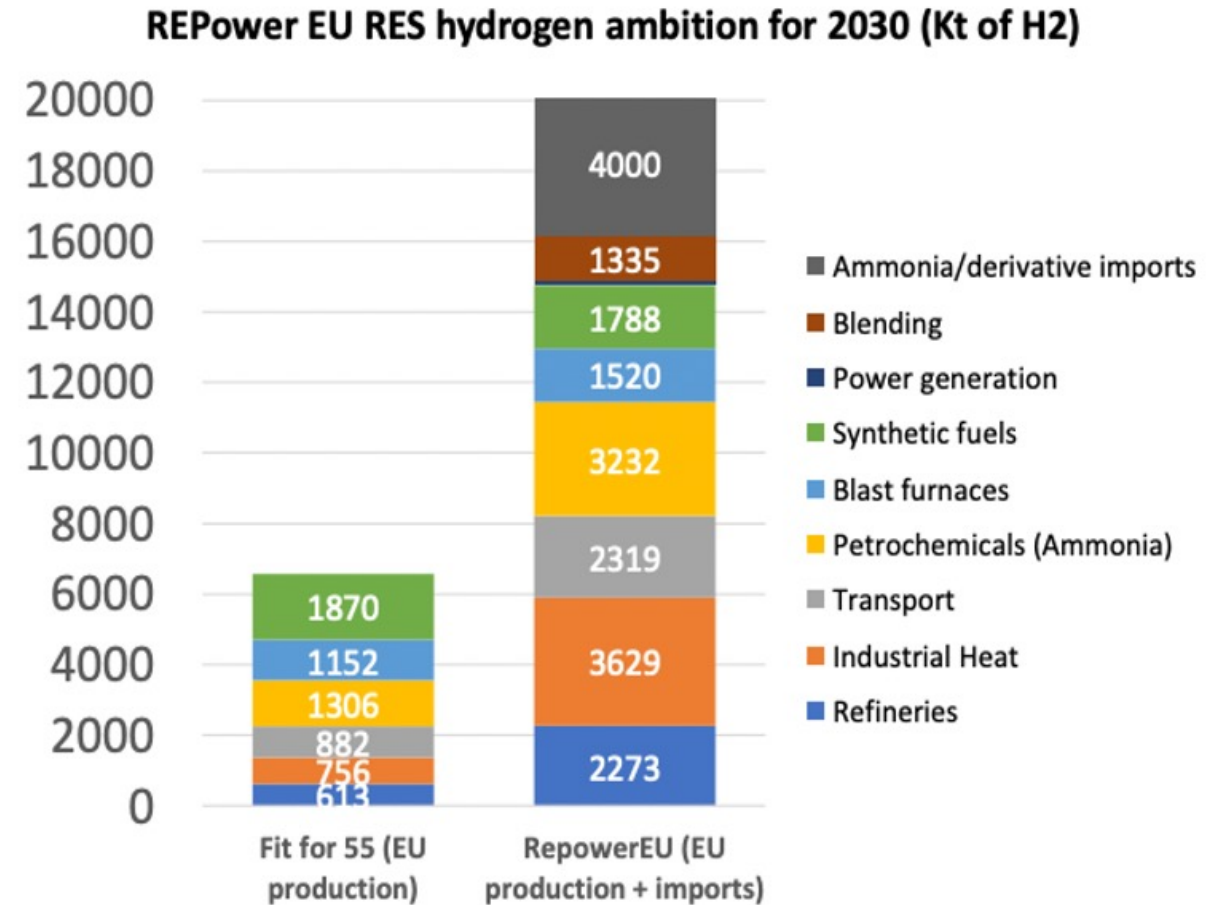


Figure 3 hydrogen use by sector 2030. Source: REPower EU
Communication: own elaboration by ERCST

Environmental considerations

- The average GHG emissions intensity of all hydrogen installations covered by the EU ETS for the years 2016/2017 was **10.78 tonnes of CO2 equivalent per tonne of hydrogen produced**.
- The average GHG emissions intensity of the **10% most efficient installations for the years 2016/2017 was 4.09 tonnes of CO2** equivalent per tonne of hydrogen.
- The main source of emissions for hydrogen production under the EU ETS Directive **are direct emissions**, and the scope of the EU-ETS Directive **only includes processes based on fossil inputs**, namely steam methane reforming and partial oxidation (grey hydrogen).
- **Free allocation:** Under the current EU ETS Directive, only fossil-fuel based hydrogen is entitled to free allowances.

Environmental considerations

- In the future, hydrogen produced through the electrolysis of water is expected to play a key role. The carbon footprint of electrolytic hydrogen will be as high as the indirect emissions that it embeds.
- **Indirect cost compensation:** Hydrogen has been included as an **eligible sector for indirect cost compensation** as part of the revised EU-ETS state aid rules beyond 2021. (Given the increasing importance of electricity for hydrogen production)
- **Free allocation:** As result of the ongoing EU ETS Directive reform, **the scope of the Directive and subsequently the scope for free allowances will be expanded to cover all production modes (de facto including electrolytic hydrogen).**

Trade patterns and other considerations

What types of H2 imports are expected

☐

☐ Today H2 imports/exports are very low

☐ The RED proposed binding mandates for the use of RFNBOs in industry (50% share by 2030) and transport sector (2.6% share by 2030)

☐ It seems reasonable that imports will pursue alignment with regulatory incentives and quotas

☐ The H2 and gas package, may also include some sort of demand-side incentive for low-carbon hydrogen.

How will be the RES H2 delivered

☐

☐ For short distances, compressed hydrogen pipelines where hydrogen is transported in gaseous form offer lower costs than chemical carriers do.

☐ Chemical carriers such as Liquid Organic Hydrogen Carriers (LOHC) or ammonia become more competitive for longer delivery distances.

☐ Hydrogen imports are also expected in the form of other hydrogen derivatives and carriers, such as methanol, synthetic gases and e-fuels (e-kerosene, e-diesel or e-methane)

☐ In the future hydrogen will also be embedded in final products such as green fertilizers or green steel

Impact factors

☐

☐ Energy prices and prices of H2

☐ EU incentives

☐ EU regulatory framework

☐ Incentives in other jurisdictions

CBAM considerations: Acceleration of free allocation phase-out for grey hydrogen

- According to the recently adopted revision of the EU ETS Directive, benchmark values would decrease by a maximum of 2.5% per year starting in 2026.
- On top of that, the CBAM is set to replace free allowances in a gradual manner for several goods, including hydrogen.
- This means that hydrogen coverage by the EU CBAM will translate into a faster phase out of free allowances when compared to applying only the maximum benchmark annual reduction rates that would have applied to hydrogen if not covered by CBAM.
- If hydrogen produced in the EU faces higher costs – for instance for electricity and gas inputs – than competing foreign production, the loss of free allowances could result in imports being favoured over domestic production.
- At this point, it is difficult to anticipate whether (amid all other supply- and demand-side measures that are being introduced in the EU for hydrogen) the loss of free allowances will be a decisive factor in determining the competitiveness of domestic renewable or low-carbon hydrogen production.

CBAM considerations: Disparate methodologies across relevant regimes?

- ❖ It is still too early to assess whether and to what extent the process and methodology for determination of embedded carbon in hydrogen under the CBAM will align with the definitions and criteria under the other relevant regimes.
- ❖ As an example, imports of H₂ will have to go through two different administrative steps:
 - ❖ Accreditation through the CBAM Methodology.
 - ❖ Certification through to the RED Delegated Acts.
- ❖ This creates a risk of regulatory uncertainty and increased transaction costs.
- ❖ It is essential to ensure alignment and mutual coordination.

Initiative / legislative text and type of hydrogen	GHG threshold	Methodology	Aim/Purpose	Status
RED (Renewable hydrogen)	3.384 CO ₂ e/tH ₂ (70% fossil fuel comparator 94 gCO ₂ e/MJ)	RED Delegated Acts adopted by the EC on 13/02/2023.	Providing a definition for renewable hydrogen at the EU level to assess compliance towards regulatory incentives and mandates.	Adopted and under scrutiny of Parliament and Council.
Hydrogen and Gas Directive, ITRE Position, (low-carbon hydrogen)	3.384 tCO ₂ e/tH ₂ (70% fossil fuel comparator 94 gCO ₂ e/MJ)	Delegated Acts to be adopted after the adoption of the Directive.	Providing a definition for low-carbon hydrogen at the EU level to assess compliance towards regulatory incentives.	Under negotiation
EU Taxonomy ("sustainable hydrogen")	3 tCO ₂ e/tH ₂ (73.4% fossil fuel comparator of 94g CO ₂ e/MJ)	RED Delegated Acts or alternatively, ISO 14067:2018 or ISO 14064-1:2018	Drive investments towards "sustainable" hydrogen.	In place
CertifHy (low-carbon hydrogen)	4.36 tCO ₂ e/tH ₂ (60% fossil fuel comparator 91 gCO ₂ e/MJ)	CertifHy methodology – ISO compliant voluntary scheme	EU first attempt to certify low-carbon hydrogen.	Voluntary scheme
CBAM	No threshold applicable	In process	Avoid carbon leakage	In progress

CBAM considerations: Circumvention, relocation and resource shuffling

- Transport of hydrogen over longer distances is likely to occur in the form of hydrogen derivatives and carriers to overcome some of the inherent limitations in transporting gaseous and liquid hydrogen.
- Except for ammonia, H₂ derivatives and carriers such as LOHCs, methanol, and synthetic gases and e-fuels (i.a. e-kerosene, e-diesel, or e-methane) are not included in the scope of CBAM.
- **Circumvention:** Producers looking to sell hydrogen on the European market could thus be incentivized to focus their production on derivatives and carriers not covered by the CBAM, having these converted to liquid or gaseous hydrogen only after entry in the EU.
- **Relocation:** Conversely, this could act as an incentive to relocate e-fuels and synthetic fuels production outside of the EU and export the final fuel into the EU market, rather than importing the precursor H₂ (captured and taxed by CBAM) to produce the final product in the EU.
 - This substitution effect could also extend to other products for which H₂ is a precursor.
- **Resource shuffling:** Where foreign producers can deliver both products covered by the CBAM – hydrogen and ammonia – as well as derivatives or carriers that do not fall within the scope of the CBAM, they could avoid imposition of the CBAM by only exporting the latter into the EU.

CBAM considerations: Indirect emissions of hydrogen are not covered by CBAM

- The scope of coverage for hydrogen in the CBAM will, at least initially, involve only direct emissions – no emissions embodied in the generation of electricity used in production.
- No impacts for fossil-fuel-based hydrogen, since very few indirect emissions. But relevant for H₂ from electrolyzers - high electricity use.
- For RES H₂ producers, if indirect emissions are not covered, there is risk of leakage. Relatively high electricity prices because of ETS, and because of EU marginal pricing regime.
- So hydrogen producers are eligible for indirect cost compensation from MS (as are other similar sectors, e.g. aluminium, iron and steel).
- Pros:
 - Reduces risk of resource shuffling
- Cons:
 - Not given by all member states
 - Not necessarily tied to actual carbon costs; may over- or under-compensate
 - No incentive for foreign producers to decarbonize production
 - Costs to MS will increase significantly as EU production of RES H₂ increases



Thank you for your attention

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