

POLICY BRIEF

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.a. 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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Introduction:

In recent years, many countries have put forward strategies, roadmaps, planning documents or policy visions geared towards a quick hydrogen deployment.¹ While a large majority of countries agree that hydrogen will play a fundamental role in their future energy mix, some discrepancies still exist when it comes to the technological scope for hydrogen production, end uses and self-sufficiency of hydrogen. As portrayed in the figure below, a wide range of EU and third countries have signed or are in the process of signing government-to-government trade agreements to secure clean hydrogen supply. 2023 will be a key year to assess whether these agreements succeed to move from strategy to implementation.

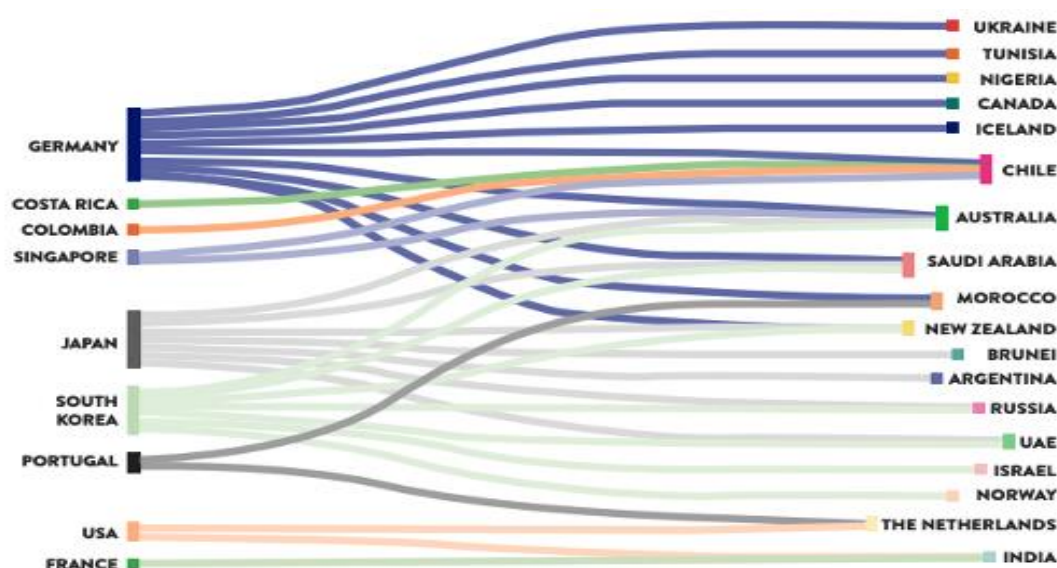


Figure 1 International hydrogen partnerships. Source: World Energy Council, modified from German Member Committee map 2021.

The purpose of this policy brief is to assess the suitability and adequacy of the aspirational target of 10 Mt of renewable hydrogen imports by 2030 that is included in the REPowerEU communication from different angles and perspectives.

The REPowerEU communication and hydrogen

On 16 May 2022, the European Commission (EC) published the REPowerEU communication, placing renewable hydrogen at the core of the Commission's strategy to speed up decarbonization, improve security of supply and reduce dependency on Russian gas. The communication makes a clear reference to the importation of 10 Mt of renewable hydrogen by 2030, in addition to 10 Mt of renewable hydrogen produced in the EU. Altogether, the EC has set a new ambition of 20 Mt of renewable hydrogen by 2030. It is important to highlight that this figure almost doubles the renewable hydrogen aspirational target outlined in the EU Hydrogen Strategy.

Although the focus of this policy brief is to assess the REPowerEU hydrogen imports ambition, some other important elements of the communication on hydrogen are also mentioned

¹ HyResource 2022, international, key global hydrogen policy documents. [\(See more\)](#)

below. This should provide the reader with a clear view of the overall implications of the REPowerEU communication for hydrogen, enhancing a better understanding of the assessment presented in further sections of this policy brief.

- **New ambition:** REPowerEU sets an aspirational target of 10 Mt of domestic renewable hydrogen production and 10 Mt of renewable hydrogen imports by 2030.
- **Renewable Fuels of non-biological origin (RFNBOs) mandates:** The communication called upon the European Parliament (EP) and the Council to increase the proposed 2030 mandates for RFNBOs for industry and transport to 75% (industry) and 5% (transport).²
- **International partnerships:** To facilitate the import of up to 10 Mt of renewable hydrogen, the communication calls for the development of three major hydrogen import corridors via the Mediterranean, the North Sea area and, as soon as conditions allow, with Ukraine.
- **Technological neutrality:** The communication mentions that other forms of fossil-free hydrogen, notably nuclear-based, also play a role in substituting natural gas³.
- **Renewable Energy Directive Delegated Acts:** Key elements of the renewable hydrogen definition were presented in two different draft Delegated Acts in May 2022, just a few days after the publication of the Repower EU communication. These include the regulatory requirements to qualify electricity as renewable to produce renewable hydrogen (i.a. additionality, geographical and temporal correlation, absence of state aid for renewable electricity generation), and the methodology to assess the GHG footprint of hydrogen production.⁴ The adoption of the Delegated Acts has been delayed several times since December 2021.⁵

The EU hydrogen Bank

During the State of the Union address 2022, EC President Ursula von der Leyen announced the creation of a hydrogen bank that will drive hydrogen supply and demand by, among other things, pooling resources from the Innovation Fund. The hydrogen bank will have two legs:

- **Domestic:** The hydrogen bank will support domestic hydrogen production using EU-ETS revenues. The mechanism used to support domestic hydrogen production will be competitive bidding under the Innovation Fund. So far, an overall envelope of EUR 3 bn. has been announced. The communication for A Green Deal Industrial Plan for the Net-Zero Age, published on February 1, mentioned that the first auction will focus on

² The EC Renewable Energy Directive (RED) proposal from July 2021 sets a 50 % RFNBOs mandate for industry and 2,6% RFNBOs mandate for transport. The Council in its general approach asked for a 35% RFNBOs mandate in industry and a non-binding mandate for transport of 5,2%. This aspect is currently being discussed in the trilogues.

³ Other hydrogen production pathways such as biomass pyrolysis have not been explicitly mentioned in the communication.

⁴ The adoption of the Delegated Acts has been delayed several times since December 2021 when they were first expected. Once adopted the Parliament and the Council will have two months to examine the adopted texts and may decide to reject them but will not be able to modify them.

⁵ The lack of regulatory certainty with regards to the renewable and low-carbon hydrogen definitions has been identified by stakeholders as one of the main reasons holding back hydrogen investments in the EU. For further information about the RED Delegated Acts and hydrogen please see: ERCST Reflection Note: [Taking stock of the H2 regulatory framework](#) and ERCST [feedback to the RED DAs](#).

the support of renewable hydrogen production and will have an indicative budget of EUR 800 million. This first competitive bid will be launched in Autumn 2023⁶. Winners of this auction will receive a fixed premium for each kg of renewable hydrogen produced over a period of 10 years. In the coming years, the European Commission is also considering the introduction of demand side auctions using other forms of remuneration, such as contracts for difference (CfDs), or carbon contracts for difference (CCfDs), as well as applying a broader technological scope beyond renewable hydrogen.

- **Imports:** A task force has been put in place by DG ENER to explore different options for renewable hydrogen imports. Different remuneration instruments are now being considered, including double-sided auctions with long-term buying and short-term selling contracts. It is still unclear where the funding for imports will come from. Germany is one of the most advanced EU countries in the field of hydrogen imports. Within the framework of the H2 Global initiative, a EUR 900 million auction scheme for imports of clean hydrogen and its derivatives was launched in December 2022.

EU hydrogen consumption in the EU 2020 (mostly grey hydrogen) and the REPowerEU renewable hydrogen ambition for 2030

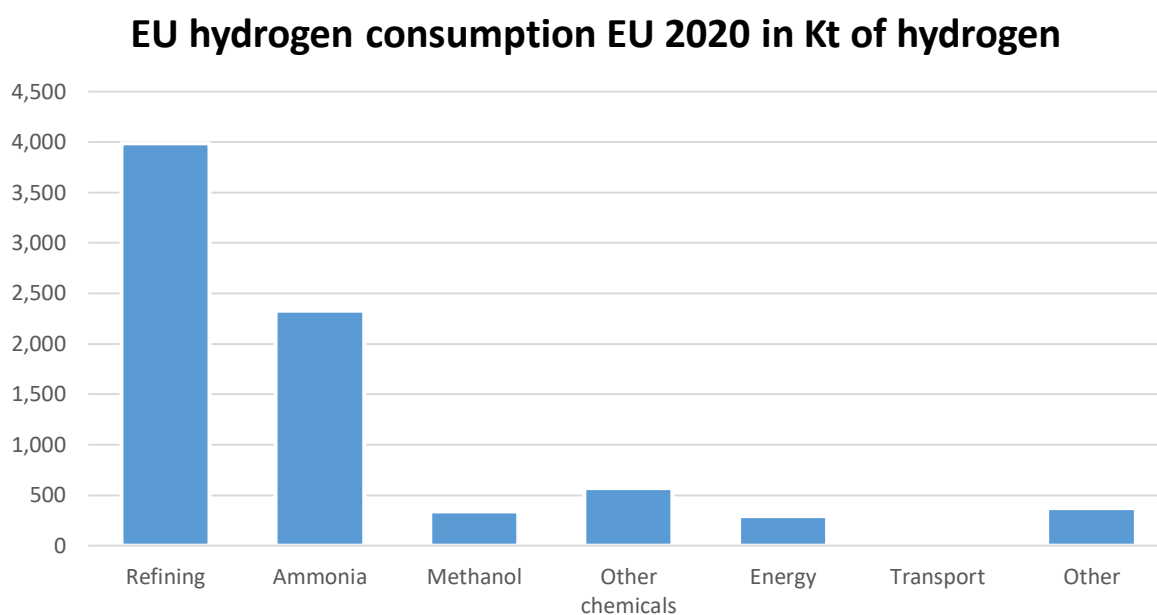


Figure 2: EU 27 hydrogen consumption EU 2020 in Kt of hydrogen by sector. Over 95% being produced from hydrocarbons.
Source: FCHO observatory

⁶ The terms and conditions for the first pilot auction will be announced in June 2023.

REPower EU RES hydrogen ambition for 2030 (Kt of hydrogen)

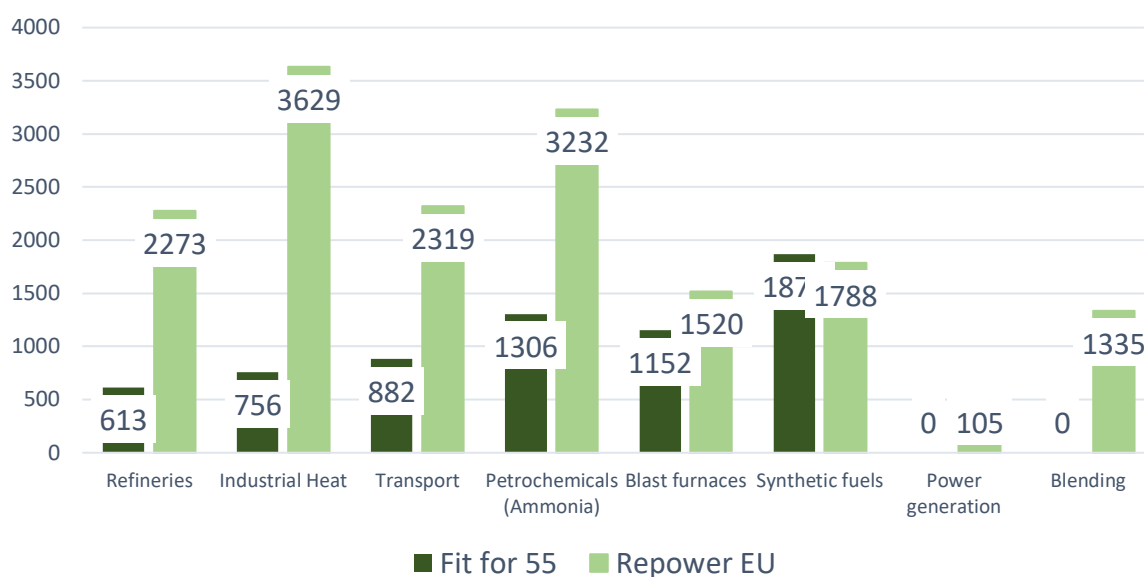


Figure 3 : hydrogen use by sector. Source: REPower EU Communication; own elaboration by ERCST

REPower EU RES hydrogen ambition for 2030 (Kt of H₂)

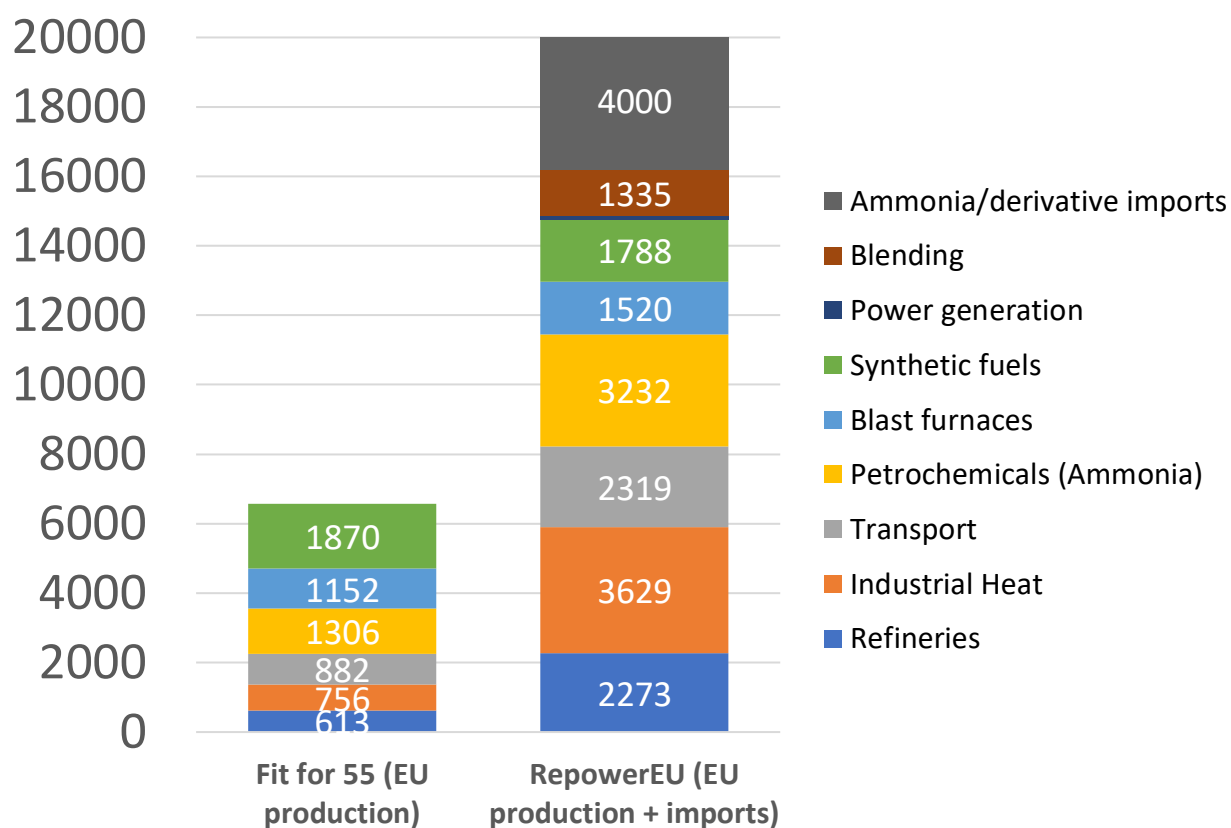


Figure 4: hydrogen use by sector 2030. Source: REPower EU Communication; own elaboration by ERCST

Assessment of REPowerEU imports ambition

Current energy crisis: What is the impact of the current energy crisis on the EU clean hydrogen imports ambition?

A rebound in natural gas demand caused by the COVID-19 economic recovery in Europe, followed by supply constraints derived from the war in Ukraine, have changed the economics of hydrogen production in the EU. This is true for both gas-based and electrolytic hydrogen if the electrolyzer is connected to the grid and under the current electricity market design.

As an example, with natural gas prices of 45-50 USD per MBtu⁷ which have been peaking in the EU throughout the year 2022, hydrogen produced with natural gas with CCS may exceed USD 8 Kg/H₂ and USD 7 Kg/H₂ without CCS. This represents price levels up to three to five times higher than those seen in 2019 and 2020. Due to very high gas prices and the current electricity market design, electricity prices have also been peaking during a large part of the year 2022. The European Commission has opened a consultation for the reform of the EU electricity market. However, it is unclear when and if the current reform will deliver the desired results.

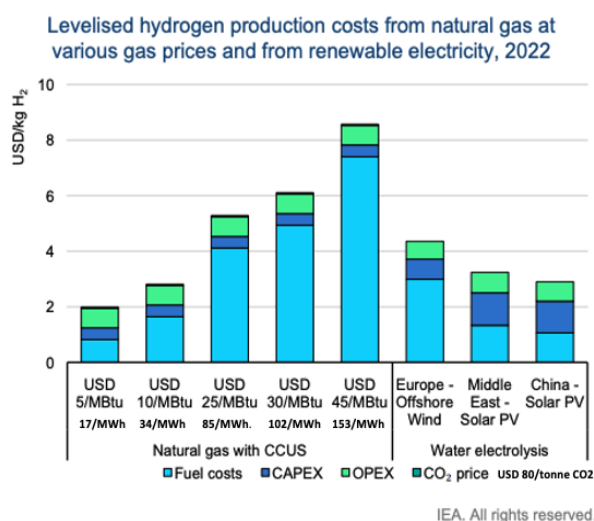


Figure 5: Levelised hydrogen production costs from natural gas at various gas prices 2022: Source: IEA modified by ERCST

Although gas and electricity prices today are far from the price levels reached in summer 2022, they are still higher than in many other locations around the world and it is still difficult where prices will be in a couple of years from now. High EU energy prices could not only change the economics of hydrogen production, but they could also influence the EU appetite for hydrogen imports. (As an example, gas prices in the US have remained relatively constant ranging from USD 4 MBtu to 8 MBtu⁸). In the face of very high gas and electricity prices, one possible scenario could be the substitution of future EU own production by imports.

Another important factor to consider is that hydrogen import quantities and the colors thereof may also depend on EU regulatory incentives. The REPowerEU communication called upon the European Parliament and the Council to increase the proposed 2030 mandates for RFNBOs for industry to 75% and for transport to 5%. Besides, many stakeholders and some EU countries have been advocating for low-carbon hydrogen to be counted, or indirectly contribute towards the RFNBO targets in RED III.

⁷ 154-171 USD per MWh

⁸ 13,6-27,3 USD per MWh

⁹ US Energy Information Administration. Henry Hub Natural Gas Spot Price. [\(See more\)](#)

This could certainly help to ramp-up the market and offer more affordable prices to consumers during a transition period. Nonetheless, and in light of high energy prices, an increase of the RFNBOs targets with the contribution of low-carbon hydrogen could also act as an incentive for clean hydrogen imports from third countries with cheaper access to hydrogen inputs (natural gas and electricity). This is particularly true on the basis of attractive incentive schemes for clean hydrogen production outside the EU such as the Inflation Reduction Act¹⁰ in the United States.

Therefore, it should be ensured that some sort of protection or incentive is put in place to avoid the EU hydrogen being flooded by hydrogen imports. CBAM could be considered as part of the toolbox to address this problem. However, CBAM is a mechanism that protects against carbon leakage by equalizing the carbon costs between imported and EU produced products, rather than a tool to address volatility of very high energy prices in the EU.¹¹ The combination of CBAM with other support instruments such as CCfDs, CfDs or premiums should be seen in a good light.

2030 hydrogen demand: Will demand in 2030 require 10 Mt of renewable hydrogen imports?

The clean hydrogen market is in a nascent stage. Making an accurate prediction about overall hydrogen demand by 2030 is not an easy task. In any case, it is likely that clean hydrogen will mainly be used to replace the current grey hydrogen production and in other sectors of the economy where clean hydrogen would deliver the best combination of economic efficiency, energy savings and emissions abatement with respect to other options. Taking this into account and from a demand-side perspective, it is difficult to justify the importation of 10 Mt of renewable hydrogen as explained below.

The REPowerEU communication refers to 20 Mt of renewable hydrogen, out of which 10 Mt (approx. 333 TWh of energy) would be domestically produced and 10 Mt would be imported. As indicated above, the EC has proposed mandates for renewable hydrogen uptake in industry (50%) and the transport sector (2,6%). This would amount to 5,6 Mt of renewable hydrogen by 2030.¹² Taking the overall Fit for 55 renewable hydrogen ambition into account, which includes the use of renewable hydrogen in other sectors besides industry and transport, this brings us to around 7 Mt of renewable hydrogen by 2030. Based on this, it is difficult to understand an increase in ambition of approx. 13 Mt of renewable hydrogen without having geopolitical considerations prevailing over market, climate, and industrial competitiveness related aspects.

Besides and according to some conservative (“no regret”) forecasts, the hydrogen demand in 2030 will range between 300 to 500 TWh (see figure below). If we compare the EU ambition for domestic hydrogen production (around 333 TWh) with the forecasted demand in “no

¹⁰ The IRA introduced a tax credit for clean hydrogen capped at USD 3 per Kg of H₂ depending on the GHG footprint, during a 10 year period.

¹¹ As shown in figure 5, the carbon cost is very low when compared to the cost of energy for blue hydrogen production.

¹² European Commission 2022, REPowerEU, Hydrogen Accelerator, scaling up the production of renewable hydrogen to 20 Mt by 2030 ([See more](#))

regret” and conservative scenarios, it can be argued that there may be some room for renewable hydrogen imports, but not in the range of additional 10 Mt (666 TWh).

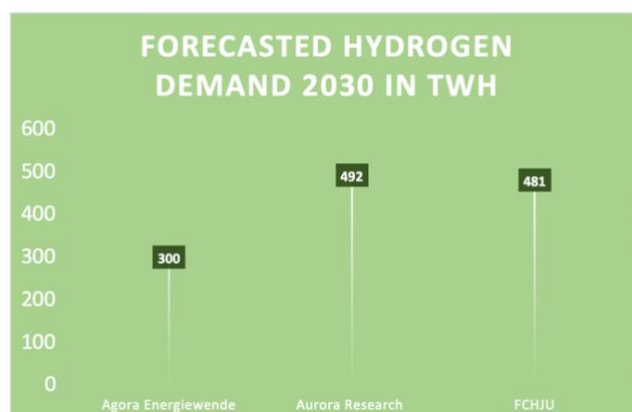


Figure 6: Forecasted hydrogen demand 2030. Source: Agora Energiewende no-regret hydrogen study, Aurora Research and FCHJU, own elaboration by ERCST

Scarcity of renewable electricity: Is the scarcity of renewable electricity enough to justify reliance on renewable hydrogen imports?

One of the arguments in favor of renewable hydrogen imports is that the additional renewable electricity needed to produce 10 Mt of RES hydrogen will not be available in time in the EU. The production of 10 Mt of renewable hydrogen would require approx. 500/550 TWh (depending on the efficiency of the electrolyzer) of renewable electricity, which equals more than half of the renewable power generation in the EU in 2020 (905,76 TWh)¹³

The scarcity of renewable electricity and the availability of clean hydrogen in general should not be confused. What may create a shortage of EU clean hydrogen supply and a wider reliance on imports, is not the scarcity of renewable electricity, but a regulatory framework which is not sufficiently flexible and technologically neutral. This is especially visible in the introduction of ambitious targets for renewable hydrogen in RED III¹⁴ and rigid criteria to certify the renewable properties for electricity to produce it (at the same time).¹⁵ All this may preclude other decarbonized hydrogen production types from contributing to the reduction of hydrogen imports reliance and supporting the ramp-up of the EU hydrogen market.

An EU ETS-driven and technology-neutral approach to incentives based on the GHG footprint of the hydrogen rather than on the production source (renewable electricity) would reduce reliance on imports.

Moreover, a 50 % - 75% renewable hydrogen target for industry in the RED¹⁶ coupled with a strict geographical correlation criteria to qualify the electricity as renewable, may be very difficult to meet in the Member States with low deployment of renewables. This may force industrial users to import hydrogen and its derivatives rather than to produce them in the EU. Against this backdrop additional support for industry should be considered.

¹³ Eurostat, Electricity production, consumption and overview including wind, hydro and solar. [\(See more\)](#)

¹⁴ European Commission 2021, Proposal for a revised Renewable Energy Directive. [\(See more\)](#)

¹⁵ ERCST 2022, ERCST feedback to the RED Delegated Acts, focus on hydrogen. [\(See more\)](#)

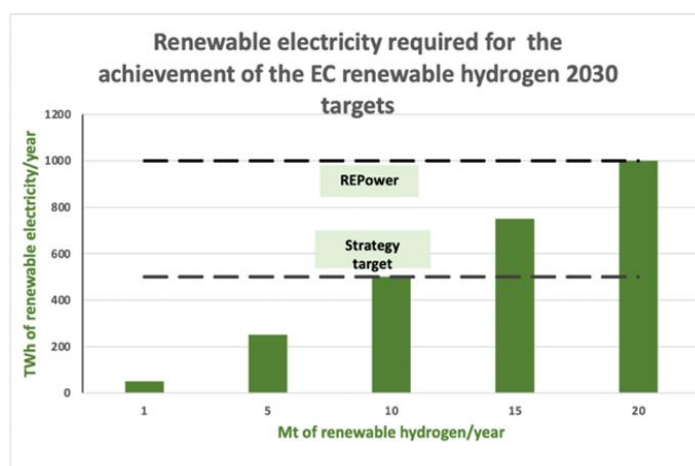


Figure 7: Renewable electricity required for the achievement of the EU RES ambition. Own elaboration by ERCST

Climate change considerations: Are hydrogen imports needed to achieve the 2030 climate targets?

From a climate change perspective, according to the 2030 Climate Target Plan Impact Assessment, emissions can be reduced by 55% before 2030 without significant deployment of hydrogen, by using carbon pricing, electrification, and implementing energy efficiency related measures.¹⁷ All policy scenarios for 2050 include the contribution of hydrogen to decarbonization. However, none of them appear to justify the importation of 10 Mt of hydrogen, be it for inaccurate predictions of the model used or for other reasons.

Final energy consumption by fuel in 2019 and 2030 in the Fit-for-55 and REPowerEU scenarios (Mtoe)

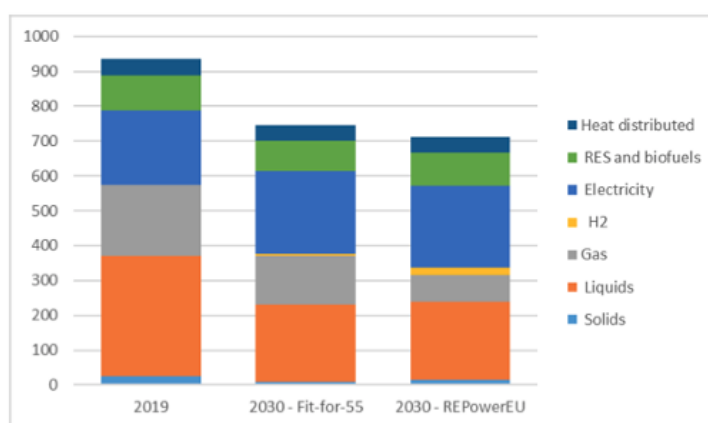


Figure 8 Final energy consumption by fuel 2019 and 2030. Source: Eurostat (2019) and Primes

¹⁷ European Commission 2020, Impact Assessment, stepping up Europe's 2030 climate ambition. [\(See more\)](#)

Regulatory level playing field: What are the implications for hydrogen imports of an unbalanced regulatory level playing field?

Regardless of the final amounts of hydrogen that will be imported, EU producers will be subject to strict regulatory requirements to qualify their production as renewable or low-carbon. The European Commission has already expressed its willingness to apply these requirements to hydrogen imports. Although the intention is there, it remains unclear how/if this is realistically possible. Some obstacles have already been identified, ranging from the reliability and limitations of voluntary certification schemes to the application of specific EU regulatory requirements in third countries which do not employ the same market design for electricity. If non-EU hydrogen producers are de facto subject to less stringent regulatory requirements, this could translate into favoring hydrogen imports over domestic production.

Creation of strategic dependencies: Will the import of 10 Mt of hydrogen enable the creation of strategic dependencies?

Whereas extraction of natural gas is bound to the place where the natural resources are located, the inputs for hydrogen production can be delocalized more freely. This will probably contribute to a more liquid and competitive market and, if not eliminate, at least decrease the risk of dependencies.

However, strategic dependencies may arise from the location of certain raw materials needed to develop the EU hydrogen economy. For example, the raw materials needed to produce electrolyzers (such as scandium, iridium, titanium, nickel or zirconium) are scarce and available mainly outside the EU. More than 75% of today's scandium is produced in China and Russia, while most iridium production is localized in South Africa.¹⁸ As part of the European Green Deal Industrial Plan, the European Commission has announced that it will publish a Critical Raw Materials Act to ensure access to some of those materials.^{19,20}

What is the EU interest in importing renewable hydrogen?

The EU interest in fostering imports of renewable hydrogen should be assessed from different perspectives, avoiding the geopolitical dimension to prevail over market and climate considerations.

	Pros	Cons
Socio-economic perspective	• Development of the hydrogen market in Europe. • Higher cost-efficiency due to economies of scales for	• Slowing down the development of the EU hydrogen value chain. • Incentive for investments in H2 derivatives in third

¹⁸ Dera 2021, mineral raw-materials for electrolysis. https://www.deutsche-rohstoffagentur.de/DERA/DE/Downloads/DERA%20Themenheft-01-22.pdf;jsessionid=CEF4AF826D5E40112BEA2B4A96D3ED40.1_cid331?_blob=publicationFile&v=2

¹⁹ A Green Deal Industrial Plan for the Net-Zero Age. ([See more](#))

²⁰ https://ec.europa.eu/commission/presscorner/detail/es/speech_23_232

	transportation and consumption. • Boosting sector coupling which may bring higher efficiency to infrastructure utilization rates and lower regulated investment costs to the public.	countries and putting the EU industry at risk. • Weakening the EU hydrogen technological and innovation sovereignty.
Geo-political perspective	• Contribution to sustainable development in other regions. • Deepening commercial ties with third countries.	• Risk of strategic dependencies, e.g., for raw materials needed to develop the EU hydrogen economy. • Competition between EU Member States to secure hydrogen imports.
Climate change perspective	• Emissions reductions if hydrogen replaces fossil fuels.	Decarbonization illusion, if the imported hydrogen is not subject to the same emissions standards.
Energy transition perspective	• Reducing renewable electricity and renewable hydrogen scarcity. • Diversification of supply.	• EU consumption of renewable resources that are also needed for the decarbonization of third countries.
Just transition perspective	• Contribution to a just transition in non-EU countries.	• Reduced impact of hydrogen for the just transition in the EU, if value chains are developed in third countries.

Table 1: Assessment of the EU strategic interest in importing hydrogen from third countries. Source: own elaboration by ERCST