

DESIGN OPTIONS FOR A

EUROPEAN HYDROGEN BANK

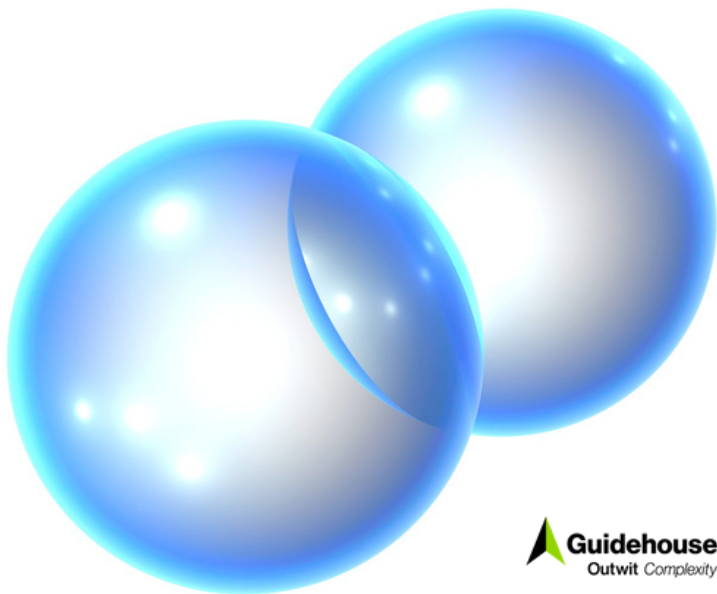


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About us

EPICO KlimalInnovation

Think tank and network for sustainable, market-based and innovation-oriented climate and energy policy that brings together key actors in climate and energy policy to set and implement a socially broad-based agenda.

Konrad-Adenauer-Stiftung e. V. (KAS)

A political foundation active worldwide. KAS stands for the promotion of liberal democracy and a social market economy, of peace and freedom, transatlantic relations and European unification.

Guidehouse Germany GmbH

Guidehouse, combines unequalled expertise and deep domain experience to solve problems that cross sectors, industries and geographies for clients of the public sector.

Introduction



Dr. Bernd Weber
CEO and Founder
EPICO Klimainnovation

To kick-start the market uptake of green hydrogen and its derivatives, public support will be required in the initial market phases. This will allow to bridge the substantial funding gaps between the costs of green hydrogen production and offtakers' willingness to pay, and to address the significant investment uncertainties in the absence of a liquid market and an extensive transport infrastructure.

As mentioned by President of the European Commission Ursula von der Leyen, hydrogen represents a “game changer” for Europe. Indeed, hydrogen and its derivatives can replace fuels in hard to abate sectors, and complement National Climate Plans to reach net-zero.

More stringent climate targets and the unsolicited Russian war on Ukraine indicates the need to phase out fossil fuels, green hydrogen can help EU consumers to decarbonise, and diversify their energy mix and energy suppliers.



The European Hydrogen Bank thus represents a key tool to ease hydrogen uptake, that needs to be designed effectively.

1. State of Play

On 14 September 2022, the President of the European Commission Ursula von der Leyen announced the creation of a European Hydrogen Bank.

This key instrument has the primary role of creating a market for hydrogen and kick-start a concrete and functioning link between supply and demand for hydrogen and its derivatives.

The initiative came with little further details, other than its initial funding of €3 billion from the Innovation Fund.

REPowerEU

20

million
tonnes
of H₂

10 million tonnes
of imported H₂

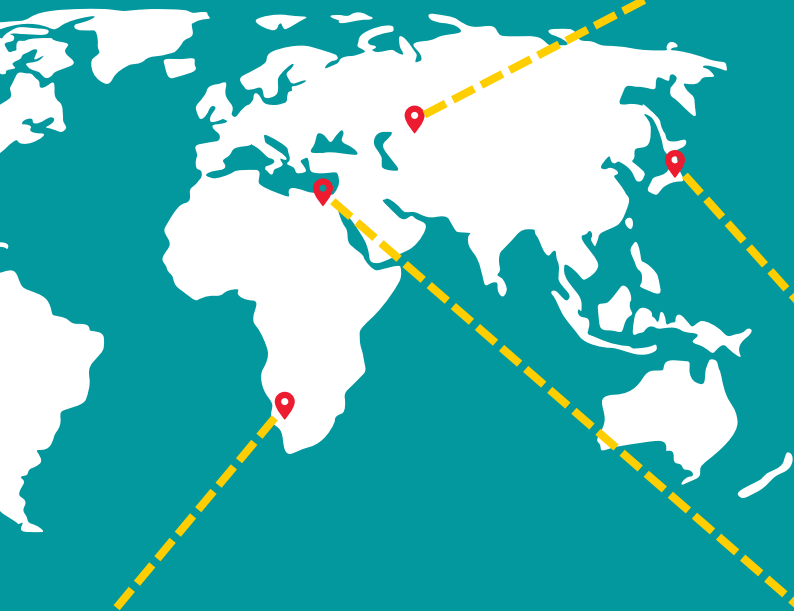
+

10 million tonnes of
domestically
produced H₂

2030



Energy partnerships / MoU



The MoU signed with Kazakhstan aims at establishing closer economic and industrial integration in the strategic value chains of green hydrogen. It focuses on joint projects, including in recycling and attracting private investment, and aligning high environmental, social and governance standards.



Memorandum of Cooperation between the EU and Japan focuses on sharing "best practices and lessons learnt in renewable and low-carbon hydrogen research, development and applications."

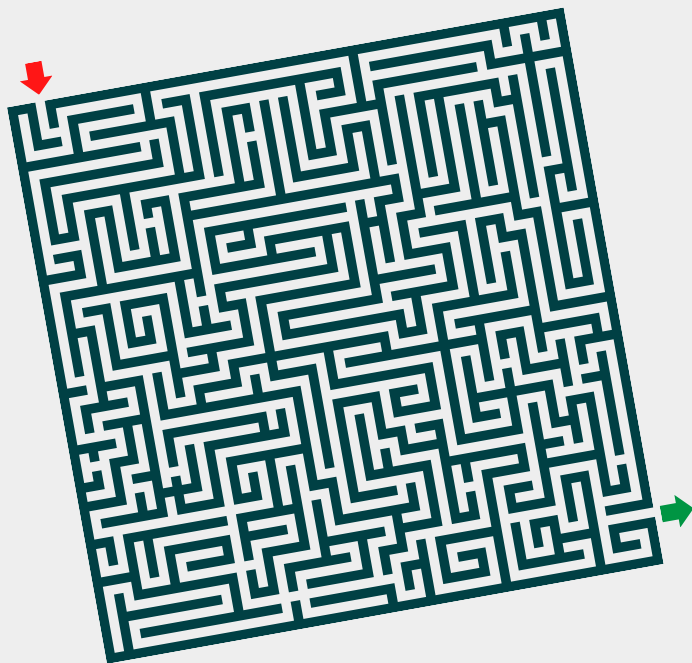


The European Investment Bank (EIB) and Namibia signed an MoU, which would provide the country with a loan of up to €500 million for the development of renewable hydrogen.



EU-Egypt hydrogen MoU signed at COP27 remarkably turns the spotlight on the need to "develop standards", and highlights the importance of hydrogen produced by solar and wind power.

Challenges



When referring to imports of renewable hydrogen, the challenge involves addressing and balancing the following questions.



Reduce investment risks to fuel a supply market from third countries, and reduce the supply/demand gap.



Ensure the infrastructure is available and ready for a steady hydrogen uptake.



Define and regulate clear uses for green hydrogen within the EU.

Challenges



✓ Shipping is much more versatile in terms of the range of hydrogen compounds it can potentially carry, thus cheaper than trucks and pipelines.

✗ Yet, there is still no developed transport infrastructure that can support the uptake of hydrogen in the scale of the REPowerEU targets.

✓ Pipelines, have a higher payload capacity, and less flexibility, hence requiring a lot of planning and funding.

✗ Currently, hydrogen pipeline infrastructure is insufficient to establish a mature hydrogen market in the short term.

2. Design options for the European Hydrogen Bank

The European Commission's 2023 Working Programme politically committed to delivering the Hydrogen Bank by the third quarter of 2023, with a proposal to be delivered in May 2023.

Policy instruments will aim at helping first movers by addressing the cost gap between green hydrogen and fossil-based alternatives, hence the non-existence of a liquid hydrogen market impeding a market-driven ramp-up of green hydrogen and its derivatives.

Measures



Inherently, public support should focus on designing measures that:

- are cost-effective,
- ensure investment security globally,
- incentivise a sustainable market that can operate without public support in the mid- and long-term, and
- entail a degree of complexity that is limited and proportionate to a level necessary for the achievement of its goals.

To this aim, this brief assesses three measures:

- ① Double-sided auctions for supply and demand contracts.
- ② Supply- or demand-side auctions determining market premium.
- ③ Default guarantees for hydrogen producers.

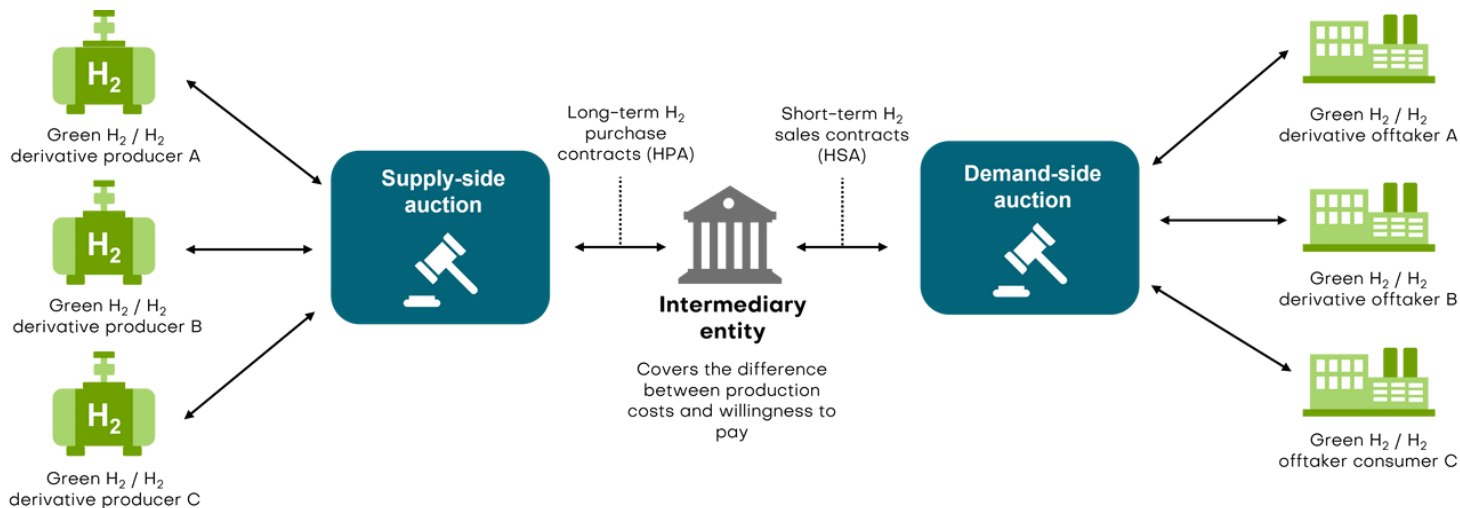
2.1 Double-sided auctions for supply and demand contracts



The goal of double-sided auctions is to allow the transaction of green hydrogen and its derivatives through a (double-sided) auction that suits both parties. This would determine the gap between the lowest possible renewable hydrogen/derivative offtake prices (on the supply-side) and the highest willingness to pay for renewable hydrogen/derivative (on the demand-side).



The identified price gap is then covered by the support giver, in this case the European Hydrogen Bank.



Double-sided auctions may help to provide the necessary investment security for producers to exporting countries as a result of allocating long-term purchase agreements. Entering into shorter-term hydrogen sales agreements (e.g. 2 to 5 years) with EU off-takers on the other side avoids locking in an initially low willingness to pay.


Double-sided auctions create a market for green hydrogen or its derivatives as part of the support scheme. The instrument therefore entails very limited market orientation. As a very similar system to H2Global, it would also be unclear how the two instruments would interact.

2.2 Supply- or Demand-Side Auctions Determining Market Premium



Supply-side auctions address producers of green hydrogen (i.e., electrolyzers) or its derivatives, receiving (upon award) operational support for each unit of hydrogen produced, similarly to the system put in place in the US through the Inflation Reduction Act (IRA).

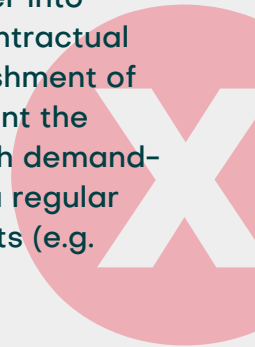
Demand-side auctions, on the other hand, address green hydrogen users, such as steel plants, receiving a premium for each unit of hydrogen consumed that is required to close the funding gap with fossil-based alternatives, i.e., the gap between their own willingness to pay and the required offtake price for green hydrogen.



Both demand- and supply-side auctions determining market premiums allocate subsidies covering the funding gap, but the support counterparty would not purchase and sell hydrogen or hydrogen-based derivative volumes itself. Instead, producers would remain responsible to negotiate and enter into bilateral hydrogen purchase contracts and assume the resulting risks and liabilities resulting from these contracts.

Market orientation can be considered relatively high. Intrinsically, subsidies do generally influence the market, but these would be clearly limited in time, adding to security of investment.

Similarly, to the case of double-sided auctions, in this instance too, a well-developed backbone of existing infrastructure would be needed to fully maximise the efficacy of such system. Such regulatory tool would also have a complex design, which would have to be adapted on a third country basis to accommodate the capacity, requirements, and geographical conditions accordingly.



While neither supply- nor demand-side auctions require the support giver (i.e., the European Hydrogen Bank) to enter into complex and potentially novel contractual arrangements and/or the establishment of dedicated institutions to implement the instrument. At the same time, both demand- and supply- side auctions imply a regular disbursement of support payments (e.g. monthly or quarterly).

Supply-Side Auction

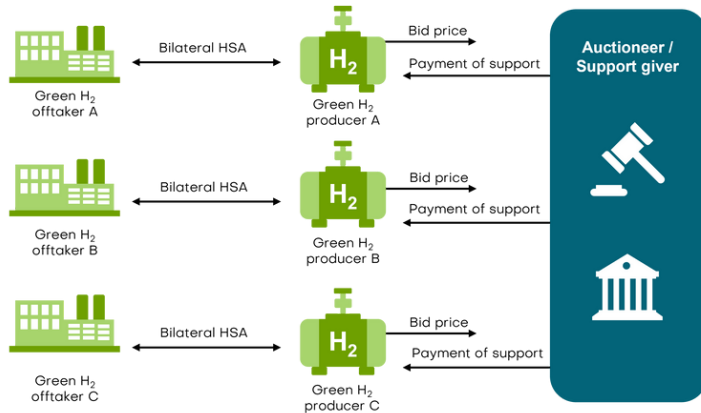


Illustration of supply-side auctions determining market premiums for hydrogen or its derivatives. .

Demand-Side Auction

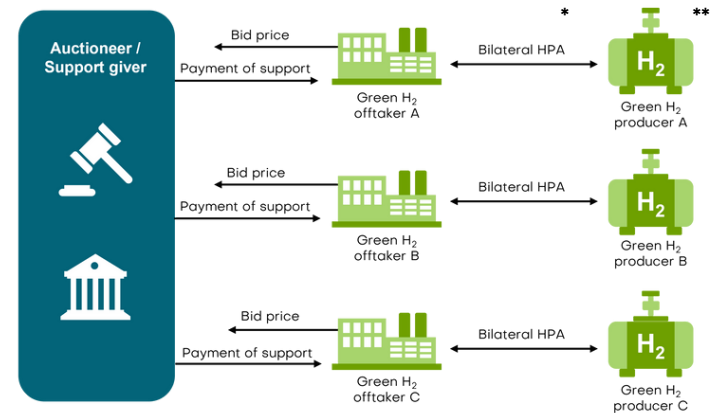


Illustration of demand-side auctions determining market premiums for hydrogen or its derivatives.

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HPA= Hydrogen Purchase Agreement

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Illustrations: Guidehouse

2.3 Default Guarantees for Hydrogen Producers

Default guarantees hedge against risks related to potential default events in take-or-pay contracts for hydrogen or its derivatives that are outside the control of producers.

This includes in particular risks related to:

- the completion of import or transport infrastructure (e.g., pipelines and/or terminals),
- transportation (e.g., ship-based or pipeline based),
- default by the hydrogen offtaker, such as an industrial plant (e.g., due to bankruptcy, delay in commissioning the industrial installation, shutdown of the project).

An instrument ensuring default guarantees would reduce market uncertainty, while entailing no risk of overcompensation for the support giver, since actual payments only arise in case of an actual default event.

The primary risk-hedging effect leading to a reduction of financing costs for the investor results from the initial security provided by the public authority.

However, the design of default guarantee should not incentivise risky transactions.

Default guarantees are usually a secondary support instrument that enables a reduction of investment risks for producers with respect to default risks that are outside their own control.

However, they are not able to directly close the funding gap between the cost of producing green hydrogen or its derivatives, and the willingness to pay by potential offtakers. They also do not match suppliers and offtakers of green hydrogen in the absence of a liquid market.

As a result, default guarantees in themselves would not provide sufficient incentives for continuously making available the required hydrogen or hydrogen-based derivative volumes in the EU if implemented as part of the European Hydrogen Bank.



Overview Design Options

Objective	Double-sided auctions for supply and demand contracts	Supply- or demand-side auctions determining market premiums	Default guarantees
Effectiveness	+	o	-
Cost effectiveness	o	+	+
Market orientation	-	+	+
Low Complexity	-	o	o

Findings

1

Domestic production of hydrogen can be incentivised through **supply-side auctions determining market premiums**. These offer high support cost effectiveness, good market orientation and high effectiveness in terms of closing funding gaps for green hydrogen.

2

As a complementary tool to hydrogen imports strategies, **default guarantees** can cover difficult to estimate default and delay risks for private purchase contracts.

3

Default guarantees can also serve as a parallel, stand-alone support instrument for hydrogen producers without funding needs.

4

In most cases, hydrogen imports can be incentivised through **supply-side auctions** determining market premiums. These allow for a more efficient use of available public funds and stronger market orientation, compared to double-sided auctions.

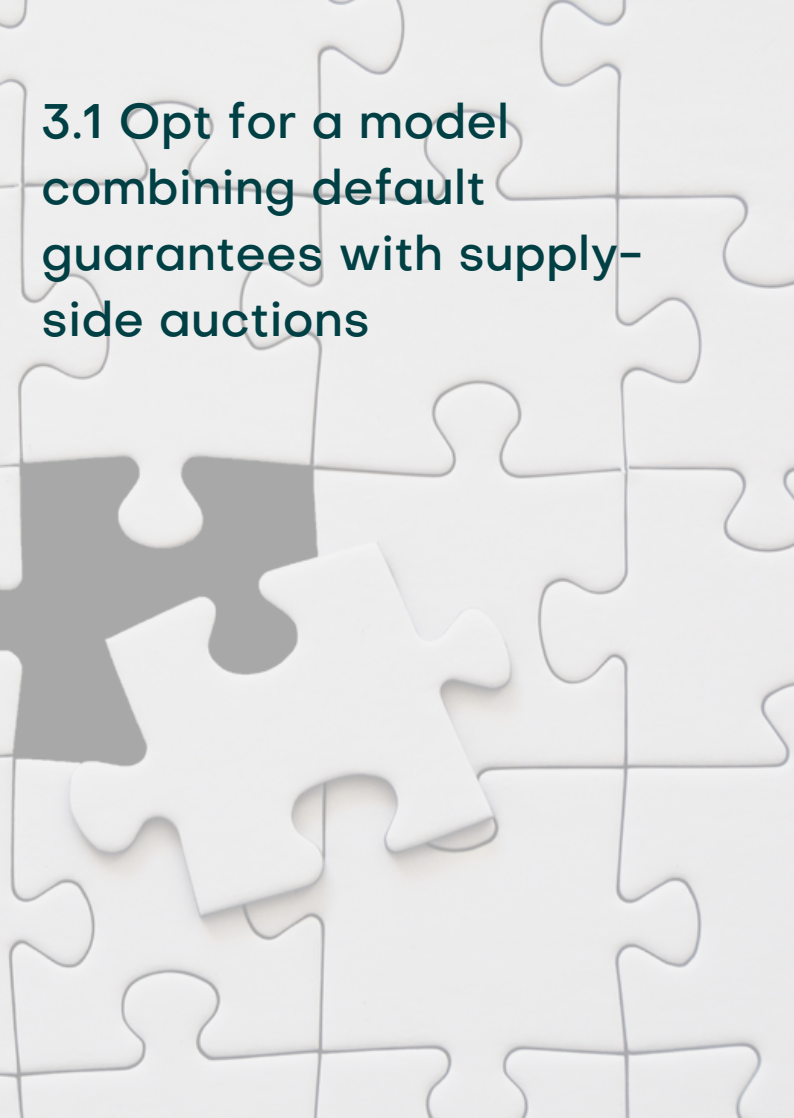
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Imports of hydrogen and its derivatives from third country suppliers can be boosted through **double-sided auctions for supply and demand contracts** under certain circumstances, such as agreements with exporting countries with unreliable regulatory frameworks, or with high political and delivery risks.

3. Policy Recommendations

Design options for the European Hydrogen Bank turned the spotlight on some shortcomings of the suggested models. These include significant financial risks if producers or offtakers fall short of their commitments, design complexities (with regard to third countries in specific), and lack of potential offtakers' willingness to pay.





3.1 Opt for a model combining default guarantees with supply-side auctions

A combination of default guarantees combined with supply-side auctions is the model the most suited for a short-term structure that can unlock a sustainable global hydrogen market in the short-term. When third country suppliers face high political and delivery risks, double-sided auctions can help kick-starting a hydrogen market, though less market-oriented.



Besides the potential of the European Hydrogen Bank to help member states and third countries alike to decarbonise their Emissions-Intensive and Trade-Exposed industry, such a system would allow the EU to import the highest amount of hydrogen and its derivatives compared to other potential models.

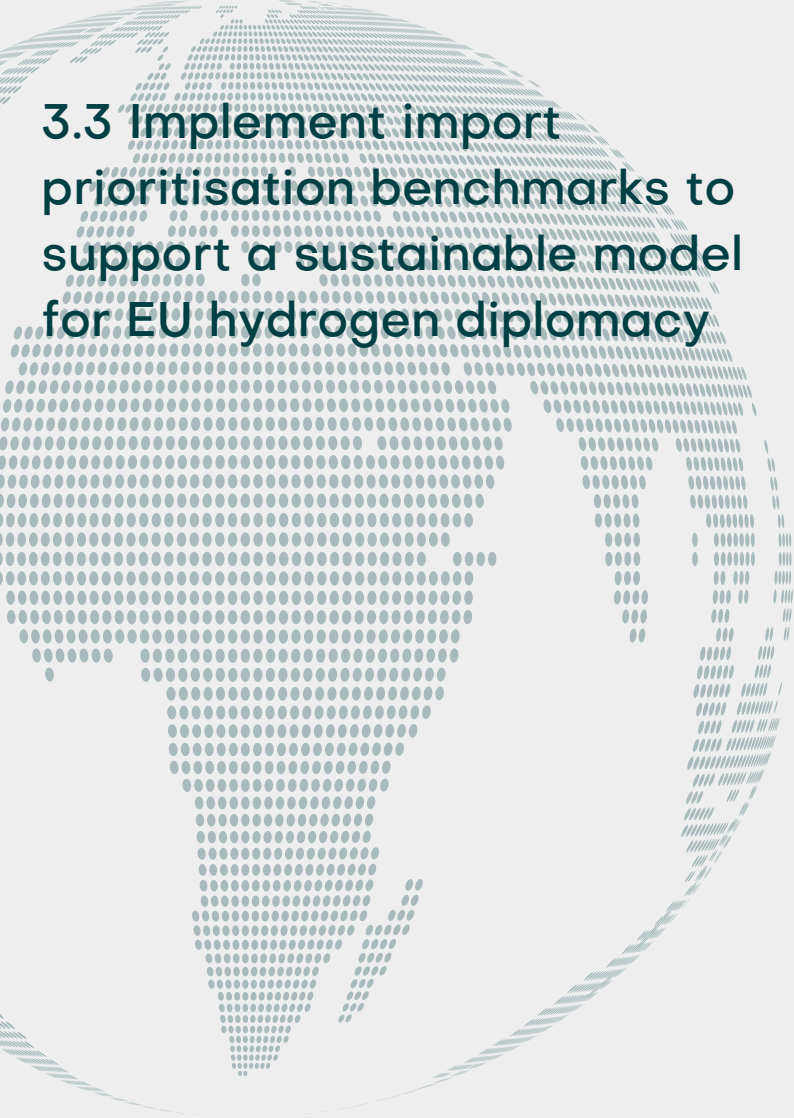
3.2 Focus on domestic and international infrastructural developments

Default guarantees should focus on addressing the lack of infrastructural development at the global level.

The primary goal of a required European Import Strategy should be ensuring that the setup of a hydrogen market hardware, as well as the software, is built in a timely and efficient manner. This should be conscious of the broader aims of the European Hydrogen Bank to unlock the market to be sustainable without public intervention, and to naturally close the gap between the demand-side willingness to pay, and production and transport costs.

In specific, infrastructural developments should target the funding of the transport architecture required for the EU to import hydrogen and its derivatives.





3.3 Implement import prioritisation benchmarks to support a sustainable model for EU hydrogen diplomacy



It is essential to maximise the efficiency and the sustainability through time of the design of the European Hydrogen Bank.

Interventions in the market need to phase-out gradually, and be limited at establishing a global, as well as European, hydrogen market.

Inherently, the system needs to perfectly align to the targets set by the Paris Agreement, and limit as much as possible market volatility caused by political uncertainty. This means designing a system through calibrated sustainable partnerships with third countries, fully respecting the need for both suppliers and consumers to coherently achieve their energy transition equally.

4. Conclusions

In the initial market ramp-up, public support will be needed to kick-start the uptake of green hydrogen and its derivatives in order to bridge the substantial funding gaps between the production costs and the offtakers' willingness to pay. Support instruments may also be needed to address the significant investment uncertainties in the absence of a liquid market and an extensive transport infrastructure.

1

Supply-side auctions determining market premiums (e.g. fixed premiums) should be considered for the domestic pillar.

2

When importing hydrogen, auctions for both supply and demand contracts could be a successful tool, but only under specific conditions.

3

In most cases, supply-side auctions determining market premiums should be considered for the imports pillar.

4

Default guarantees should be considered as a risk-hedging instrument under the imports pillar to cover difficult to estimate default and delay risks for private purchase contracts involving hydrogen (derivative) imports.

5

Independent of potential support auctions organized under the European Hydrogen Bank, default guarantees can also serve as a parallel, stand-alone support instrument for hydrogen producers without funding needs.

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