

DE-RISKING OPTIONS FOR EU HYDROGEN INFRASTRUCTURE

REPORT | MAY 2026



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FOREWORD

This report fulfils the following task set out in the conclusions of the Copenhagen Infrastructure Forum of 3 June 2025:

*"Securing capital remains a persistent challenge for hydrogen project promoters, particularly during the transition period leading up to the implementation of the Hydrogen and Gas Decarbonisation Package. In this sense, the Forum invites ENNOH, ENTSOG and other relevant stakeholders to further work on **the possible de-risking options and deliver a report** on this topic by the next Forum."*

The present report was prepared by European Network of Network Operators for Hydrogen (ENNOH) and European Network of Transmission System Operators for Gas (ENTSOG) and outlines their reflections and conclusions on the above matter. Frontier Economics supported ENNOH and ENTSOG in the preparation of the report and the Copenhagen School of Energy Infrastructure (CSEI) facilitated the discussion and workshops.

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INTRODUCTION BY THE ENNOH & ENTSOG PRESIDENTS

ENNOH PRESIDENT - CHRISTOPH VON DEM BUSSCHE



Dear readers,

Europe's energy transition is entering a decisive phase, and hydrogen infrastructure stands at its core. Hydrogen will be essential not only for achieving climate neutrality, but also for strengthening Europe's energy sovereignty, resilience, and competitiveness. Yet the full potential of hydrogen can only be realised if we succeed in building a truly European network that transports hydrogen from where it can be competitively produced or imported to where it is needed most. This requires infrastructure that must be developed ahead of a fully mature market. Such anticipatory investments are indispensable, but they also come with distinct

challenges. Hydrogen infrastructure projects face uncertainties around future demand, evolving business models, and initially low utilisation. Existing financing mechanisms are not designed for these conditions. As a result, project promoters often struggle to secure the financing needed to move from planning to implementation. If Europe wants to accelerate the development of cross-border hydrogen infrastructure, it must address these risks in a targeted and coordinated way.

This report therefore explores options to de-risk and enable financing for European hydrogen infrastructure during the market ramp-up phase. The aim is to expand the toolbox available to project promoters and policymakers alike. We therefore put forward the concept of an EU-level guarantee mechanism: an instrument that could provide the certainty needed to unlock investment, while ensuring that infrastructure remains affordable and accessible as the market grows. Much like insurance in conventional project finance, such a mechanism would help bridge the gap between early investment needs and the long-term vision of a self-sustaining hydrogen market.

Developing a European hydrogen network is a shared endeavor. We believe the ideas presented in this report can drive the next steps in shaping effective derisking solutions at EU level. They are intended to stimulate focused dialogue with policymakers and stakeholders and to advance the concrete measures needed to build an integrated, European hydrogen network.

Best regards,

Christoph von dem Bussche

ENTSOG PRESIDENT – PIERRE DUVIEUSART



Dear readers,

The energy transition is of utmost importance to us all and hydrogen plays an essential role. A key aspect to developing hydrogen infrastructure is our existing gas infrastructure and repurposing this infrastructure to hydrogen. Repurposing will not only save costs, but also time.

However, the hydrogen market is still a nascent market, and we face several challenges that we need to address. There are many differences concerning the current hydrogen market and the fully developed gas market.

One thing that we see already: we need to expand the de-risking toolbox for hydrogen project promoters to be able to deal with the most pressing challenges: anticipatory investments, due to a divergence in the start-up phase between bookings and future full use of the infrastructure. Thus, avoiding prohibitively high tariffs for the beginning phase of the hydrogen infrastructure.

New and additional strategies are needed to unlock the hydrogen economy. This is a topic that was picked up with the Financing Learnbook¹ for the European Clean Hydrogen Alliance, to which ENTSOG also contributed. We want to take our insights, which we have from our longstanding experience with the gas network, and contribute them to the development of the hydrogen network.

We are proud to present the following report, which presents ideas to de-risk hydrogen infrastructure. These ideas were heavily discussed with a large group of stakeholders in several workshops and a consultation.

Our goal is that this report will support our shared path to a cross-border European hydrogen network. We hope it will enhance expert discussions on the existing de-risking toolbox for hydrogen project promoters and will serve to advance measures for developing the much needed hydrogen infrastructure in Europe.

Best regards,

Pierre Duvieusart

¹ European Clean Hydrogen Alliance, Transmission & Distribution Roundtable. (2024). [Learnbook on financing of hydrogen infrastructure](#). ENTSOG.

EXECUTIVE SUMMARY

Hydrogen is expected to play a central role in achieving the European Union's climate neutrality objective and in strengthening energy security and system resilience. Cross-border hydrogen infrastructure will be essential to connect geographically dispersed production potential with industrial demand centres and to enable a competitive internal hydrogen market.

However, the hydrogen market remains nascent. Production and demand have not yet materialised at scale; price formation remains uncertain and regulatory frameworks are still being implemented. As a result, Hydrogen Transmission Network Operators (HTNOs) are not in a position to take Final Investment Decisions (FID) on anticipatory investments in the absence of robust long-term bookings and with limited visibility on future utilisation and users' willingness to pay.

This situation creates a structural investment gap driven primarily by:

- ▲ **Volume risk**, as infrastructure must be built ahead of demand;
- ▲ **Price and regulatory risk**, given uncertainty around future hydrogen prices, carbon policy and users' willingness to pay;
- ▲ **Cross-border risk**, where coordination challenges, multi-jurisdictional regulation and transit exposure further increase the risk profile of projects.

Individual Member States have already introduced support schemes to address these risks. However, national mechanisms are not sufficient for cross-border hydrogen corridors. The benefits of cross-border infrastructure materialise across the continent, while the risks remain concentrated on individual operators and Member States. A support mechanism at the EU level is therefore appropriate.

The report reviews the main available instruments, including:

- ▲ Inter-temporal Cost Allocation (ICA) combined with an amortisation account;
- ▲ State guarantees;
- ▲ Long-term capacity bookings;
- ▲ Exempted project structures;
- ▲ Dedicated charge;
- ▲ Direct EU and national grants;
- ▲ Cross-Border Cost Allocation (CBCA).

The analysis shows that:

- ▲ **ICA mechanisms directly address the revenue gap faced by project developers during the ramp-up phase** but require complementary risk coverage to be fully effective.
- ▲ **State guarantees can materially reduce financing risk**, but do not on their own close the initial revenue gap.
- ▲ **Long-term bookings can de-risk investments where demand is sufficiently mature** but are unlikely to trigger anticipatory investments in the current market context.
- ▲ **Exempted projects are suitable for the development of local projects but are insufficient**, on their own, to address the challenge of the revenue gap at EU scale.
- ▲ **Direct grants reduce capital requirements** but are constrained by budget availability and do not address long-term revenue risk.
- ▲ **CBCA reallocates risk across Member States** but does not reduce aggregate market risk and is not designed for anticipatory investment in a nascent market.

While there are several instruments that can potentially support investment, no single mechanism is sufficient to address the scale and nature of the challenge.

ENTSOG and ENNOH therefore propose the development of an EU-level de-risking mechanism targeted at cross-border hydrogen infrastructure. **The preferred options include:**

- ▲ An **ICA-based tariff approach** to ensure non-prohibitive tariffs during the ramp-up phase, combined with a **European Special Purpose Vehicle** (SPV) responsible for managing disbursements and an **EU budget-backed guarantee** to attract private capital and provide a safety net if market development falls short of expectations.
- ▲ **Long-term capacity bookings** through a dedicated European SPV.

To be operational, such a mechanism would require a clear legal basis, potentially through a revision of TEN-E, the Connecting Europe Facility or the European Competitiveness Fund.

In the absence of a European-level de-risking framework, there is a material risk that cross-border hydrogen infrastructure will not develop at the pace required to meet Union climate and energy objectives.

GLOSSARY

“Anticipatory investments”¹ refer to investments into hydrogen infrastructure assets that proactively address the future hydrogen network development needs, based on projected market development and anticipated future hydrogen transportation demand. Anticipatory investments are necessary to advance the hydrogen market by enabling sufficient connection between production and consumption sites. Examples include the construction of new hydrogen pipelines and other related facilities, such as measurement installations, or investment in repurposing of the former natural gas transportation infrastructure and facilities.

“Inter-temporal Cost Allocation” or **“ICA”** means a mechanism that allows hydrogen network operators to spread network development costs over time by enabling future users to bear part of the initial costs, thereby preventing the application of prohibitively high network tariffs to the early hydrogen network users. Such a mechanism requires a financing instrument to bridge the time gap between an initial period with lower revenues from capacity bookings and later periods with increasing revenues (see amortisation account). Further, it needs to be accompanied by measures to mitigate the financial risk of hydrogen network operators that the hydrogen market and respectively revenues from capacity bookings do not develop as planned (e.g. a guarantee).

“Amortisation account” means a mechanism designed to manage differences between: (i) the necessary network revenue required to cover the costs of building and operating a hydrogen network; and (ii) the network fee set by the regulatory authority to attract capacity bookings. This is achieved through annual compensation payments to the hydrogen network operators. The mechanism foresees that any additional revenues arising later will be reimbursed to the amortisation account in order to offset the initial shortfall and restore the balance by a certain pre-defined date.

“Special Purpose Vehicle” or **“SPV”** means a legal entity entrusted with managing the de-risking mechanism.

“EU de-risking mechanism” means a mechanism of de-risking, which could be established at the EU level and should provide for, first, a favourable regulatory regime and climate for investments into hydrogen infrastructure (for example by ensuring a certain level of revenue to the network operators) to support market ramp-up, and, second, a guarantee to be issued by an EU authority or institution and backed by the EU budget, which may be triggered in case the hydrogen market ramp-up is not reached at a pre-defined future date. The criteria for (not) reaching the market ramp-up shall be measured according to certain pre-defined conditions.

A **“Guarantee”** represents a written commitment by a guarantor – such as a national government or, where the guarantee is backed by the EU budget, an EU institution – to assume full or partial responsibility of a borrower’s debt in cases of default or other specified events. By mitigating the financial risks for lenders, guarantees encourage commercial banks and other financing entities to extend credit to projects that might otherwise be considered too risky.

¹ European Commission (2025), Commission notice on guidance on anticipatory investments for developing forward-looking electricity networks. [Official Journal of the European Union, C/2025/3179](https://eur-lex.europa.eu/eli/notice/2025/3179).

1 NEED FOR DE-RISKING AT THE EUROPEAN LEVEL

1.1 HYDROGEN IS EXPECTED TO PLAY A KEY ROLE IN THE FUTURE EUROPEAN ENERGY SYSTEM – BUT THE MARKET RAMP-UP IS CURRENTLY STALLING

The European Commission's Clean Industrial Deal recognises the role of hydrogen as one of the key vectors for achieving the European Union's objective of net-zero climate neutrality by 2050, aiming to decarbonise our energy system, in particular in the hard-to-abate sectors².

The REPowerEU Strategy³ of 2022 sets out the aim of producing 10 million tonnes of renewable hydrogen in the EU and importing an additional 10 million tonnes from outside the EU. The strategy envisions that, by 2050, renewable hydrogen will account for approximately 10 % of the entire European energy demand, particularly in the industrial and transport sectors.

Cross-border hydrogen transmission infrastructure will play a structural role in developing the future market for hydrogen across three key angles:

- ▲ **Cross-border infrastructure will enable the production of hydrogen in areas where production costs are lowest, thereby fostering the development of a cost-efficient and competitive internal market for hydrogen.**

Production potentials for renewable and low-carbon hydrogen differ significantly across regions – areas with high production potential are not necessarily located near industrial demand centres. Transport infrastructure for hydrogen will enable the production of hydrogen in areas where production costs are lowest, thereby fostering the development of a cost-efficient and competitive internal market for hydrogen. Offtakers will, in turn, be provided with hydrogen at competitive prices, contributing to building a carbon-neutral and competitive EU economy.

2 European Commission. (2025). [The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation \(COM/2025/85 final, para. 3.2\)](#).

3 European Commission (2022, May 18). [REPowerEU Plan. COM\(2022\) 230 final](#).

▲ **Hydrogen infrastructure can generate substantial benefits in terms of resilience, self-sufficiency and energy diversity for the EU energy system.**

A European hydrogen network will allow Europe to diversify its energy supply through a global market for energy. Hydrogen supplies can be imported either directly through pipelines or via carrier molecules such as ammonia at port terminals and then transmitted across the continent via the emerging backbone.

A resilient and secure hydrogen system will not only enable imports from third countries but, as set out above, also leverage the European Union's own production potential, thereby reducing external energy dependence. Hydrogen can be produced domestically at scale in many European regions – particularly those with abundant resources. A combination of both – domestic hydrogen production and imports from multiple regions of the world – will make Europe more resilient and less dependent on individual supply sources, but it relies on the availability of suitable infrastructure.

▲ **Hydrogen infrastructure supports system efficiency and provides crucial flexibility**

Hydrogen can avoid significant costs in the electricity system related to congestion management and redispatch actions.

Electrolysers and hydrogen infrastructure, particularly in areas of high renewable energy supply or where the grid is generally congested, can significantly reduce these costs by improving price convergence and alleviating cross-border and internal congestion. Through sector coupling, energy systems can benefit from more affordable storage solutions including full weeks and seasonal capability, as well as more efficient transport via pipelines (often repurposed) compared to increasingly congested electrical lines. The hydrogen infrastructure system also enables the maximisation of renewable electricity production, which would otherwise be limited by the characteristics of the power grid and market.

De-risking investments in hydrogen infrastructure is thus a crucial enabler for the success not only of the hydrogen market ramp-up but for achieving the Union's ambitious climate targets.

To fully leverage the benefits of hydrogen infrastructure, investments need to be planned in an anticipatory manner – fully reflecting the future decarbonised energy system. Limiting capacities at an early stage would not only create unnecessary costs in the future but also create bottlenecks for the decarbonisation of the continent.

Significant up-front investments are thus necessary to create the hydrogen transportation infrastructure the future energy system requires. According to the report commissioned by DG Energy on the investment needs of European energy infrastructure to enable a decarbonised economy, investment needs up to 2034 can be estimated at **EUR 107 billion** for up to 38,000 km of pipelines.⁴

Securing capital remains a persistent challenge for cross-border hydrogen project promoters, particularly during the current transitory period.

ENTSO-G and ENNOH were therefore tasked with exploring potential de-risking mechanisms that could encourage investments and contribute to the ramp-up of hydrogen infrastructure.

⁴ Trinomics, Artelys, & LBST. (2025). [Investment needs of European energy infrastructure to enable a decarbonised economy \(Final report, p. 67\)](#). European Commission.

1.2 ELABORATION PROCESS

The content of this report has been extensively discussed with members of ENTSOG and ENNOH. It has also been fed by the Commission's EU grids package (see our responses to the consultation⁵). ENTSOG and ENNOH have further exchanged views with stakeholders on several occasions (e.g. ENNOH presentation at the 6th Working Group meeting of the Southern Hydrogen Corridor, Vienna on 23 October 2025; ENTSOG and ENNOH public workshop, 4 March 2026).

The more formal stakeholder engagement process is summarised in Figure 1:

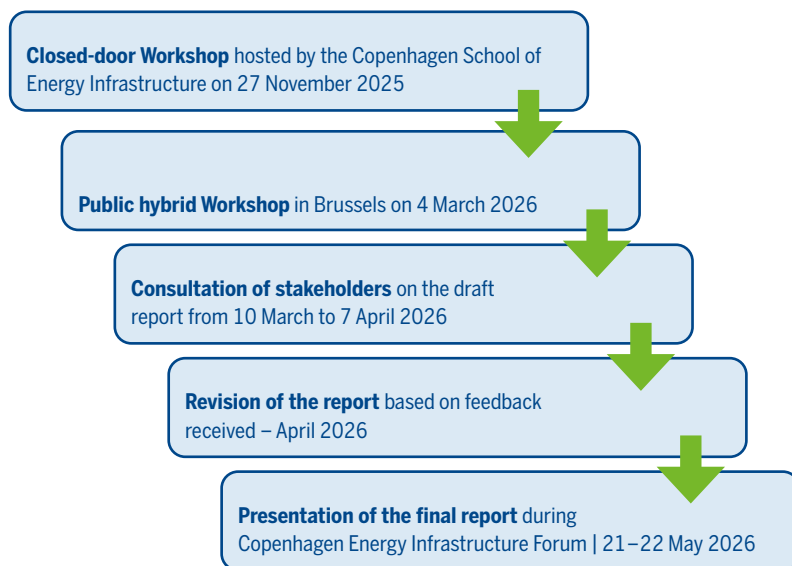


Figure 1 – Elaboration Process

Twelve answers were received during the public consultation period from 10 March to 7 April 2026. These generally support the views expressed in the draft report. In particular, there is general agreement that additional action on the EU side to support investment in building hydrogen infrastructure is necessary. Most of the responses stress the uncertainties and barriers to taking investment decisions. Some responses refer to Contracts for Differences (CfD), while others underline the need for an EU guarantee covering also investment in hydrogen storage.

With regard to the first point, production and demand are essential to kick-start the hydrogen economy. However, they fall outside the scope of this report, which focuses on de-risking investment in hydrogen transport infrastructure. One response proposed applying CfD to infrastructure. This approach is comparable to an ICA-based mechanism, which provides for a stable tariff, combined with a Special Purpose Vehicle (SPV) and amortisation account. On storage, this proposal should be further elaborated at a later stage, once the need for an EU guarantee for hydrogen transmission has been fully recognised.

Following one response, changes have been introduced to provide a more specific description of the Exempted project and dedicated charge instruments.

Finally, following several remarks, the explanation of the EU mechanism 2, “Long-term bookings” was improved to avoid misunderstandings.

⁵ [ENNOH Position Paper on Grids package, July 2025](#) and [ENTSOG Position Paper on Grids package](#)



2 HYDROGEN INFRASTRUCTURE OPERATORS CURRENTLY FACE A NUMBER OF RISKS HINDERING INVESTMENTS

Hydrogen infrastructure operators are faced with a wide range of potential risks which currently hinder investments, as highlighted in Figure 2.

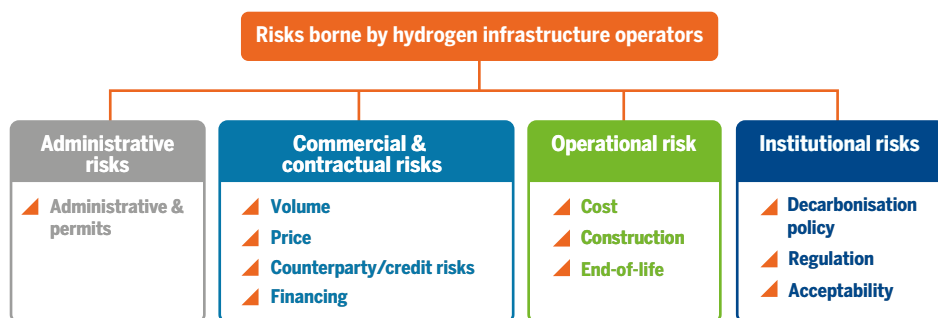


Figure 2 – Risks borne by hydrogen infrastructure operators

While these risks are shared among energy infrastructure operators and have always been prevalent, they are particularly pronounced in the newly emerging hydrogen market. Although the EU remains committed to its decarbonisation targets, and hydrogen is expected to play a key role in achieving these ambitions, the market ramp-up remains highly uncertain. Recent years have been marked by modifications and delays, making it challenging for Hydrogen Transmission Network Operators (HTNOs) to find reliable and viable business cases. This, in turn, creates a hold-up problem: without reliable infrastructure, other actors across the value chain will continue to remain reluctant to progress projects.



2.1 RISKS HINDERING THE COMMERCIAL CASES OF HTNO PROJECTS

Enabling the development of hydrogen transport infrastructure has the potential to accelerate the overall market ramp-up. However, investors currently struggle to secure sufficient funding for projects, as particularly commercial and contractual risks remain intolerably high.

▲ Volume risk

Transmission of hydrogen is a service that depends on sufficient volumes of hydrogen being produced, transported and consumed, which is not yet the case at the time of drafting this report.

As long as there is no large-scale production of clean hydrogen and significant trading activity, there is no possibility for asset owners to bring their utilisation ratio to meaningful levels. However, maximising utilisation is one of the key success factors for infrastructure projects – below a certain minimum capacity, investments cannot be economically viable. As outlined above, there is nonetheless a crucial need for hydrogen infrastructure. While the exact timing depends on the speed of the market ramp-up – further delays in investments are likely to limit the overall market ramp-up even further. Nonetheless, the incentives to invest remain limited.

The Agency for the Cooperation of Energy Regulators (ACER) acknowledges that, if volume risk is borne by HTNOs, this would prevent investments, as set out in its Recommendation No 02/2025 on ICAs⁶:

“HTNOs cannot rely on a stable base of future network users to safeguard their investments. At the same time, relying only on limited binding capacity bookings, that may be currently available, can lead to underinvestment in hydrogen networks, thereby undermining the market ramp-up.”

To facilitate anticipatory investments, bridging mechanisms are required to address the gap between the current status quo and the full utilisation of the hydrogen infrastructure assets.

⁶ Agency for the Cooperation of Energy Regulators (2025, July 29). [Recommendation No 02/2025 on Inter-temporal Cost Allocation Mechanisms for Financing Hydrogen Infrastructure](#).

▲ Price Risk

As the hydrogen market is still in its very initial phase, green and low-carbon hydrogen is not yet traded as a commodity and market-based price formation mechanisms are not yet in place. Prices are currently observed as either cost-based or derived from initial contracts – with limited explanatory power to how future prices may act.

HTNOs thus have very limited visibility on future customers' willingness to pay for hydrogen and, consequently, hydrogen transport.

The uncertainty is further reinforced by the regulatory framework: the willingness to pay of (future) hydrogen offtakers will depend, inter alia, on the level of penalties in place for the continued use of fossil resources. Based on current price expectations, end-users are likely to shift to renewable alternatives if premia such as from the EU Emission Trading System (EU ETS), or penalties under schemes such as ReFuelEU Aviation Initiative are sufficiently high.

Changes in political priorities or decarbonisation policies may therefore have significant implications for the commercial case of hydrogen infrastructure projects.

CONCLUSION NO. 1

Hydrogen infrastructure is a crucial puzzle piece to enable the overall market ramp-up. However, the current environment exposes operators to a range of risks. It is essential that regulated operators do not face undue risks, i.e. risks that HTNOs have no leverage to control. To this end, protection from volume and price risks is to be guaranteed.



Picture courtesy of GAZ-SYSTEM

2.2 PARTICULAR RISKS FOR CROSS-BORDER INFRASTRUCTURE

Cross-border hydrogen infrastructure projects, including the main transport corridors currently envisioned as part of the European Hydrogen Backbone, are particularly exposed to the risks discussed above:

▲ **Increased coordination efforts among various parties:**

Cross-border hydrogen transport projects are developed by at least two, and often more HTNOs. Projects therefore need to be designed to meet the requirements of several parties and attract a larger group of investors, making financing challenging and increasing financial risk.

▲ **Higher degree of uncertainty:**

Cross-border projects are typically designed to transport substantial volumes, serving a large number of users – both upstream and downstream. Ensuring sufficient utilisation of the projects is therefore inherently more uncertain, as developers cannot rely on a small number of “anchor clients”. This challenge is particularly pronounced for projects involving “transit” countries, where benefits primarily depend on volumes transported between production and offtake centres. Unlike developers in exporting or importing countries, HTNOs in transit countries have limited ability to influence their projects’ success. Instead, they are subject to the ramp-up of the hydrogen economy in markets outside of their area of influence.

▲ **Increased regulatory burden:**

By definition, cross-border projects are subject to at least two regulatory regimes, which increases both administrative and regulatory risks. This increased risk will commonly induce investors to be hesitant and expect higher rates of return on their investments.

Given the elevated risk profile, there is a particularly high need for de-risking in cross-border projects, especially given the crucial role that cross-border infrastructure is expected to play in the ramp-up of the European hydrogen market.

While national governments may carry risks from domestic projects, cross-border infrastructure requires a shared EU-level approach. EU targets and benefits – market integration, decarbonisation and energy supply resilience – are Union-wide, and so should be the financial responsibility.⁷

States with a higher transit profile will bear the investment costs of the corridors, but their use depends on demand in other countries. If the market in the target country does not develop, the transit HTNOs will be left with an under-utilised asset.

Furthermore, to assure a level playing field between cross-border projects, there should be an EU solution accessible to all.

⁷ Baltic Sea Hydrogen Collector. (2026, February). [Enabling a resilient European hydrogen economy: EU-level de-risking tools for European hydrogen transport infrastructure \[White paper\]](#).

CONCLUSION NO. 2

Cross-border projects are particularly exposed to risks and therefore in need of dedicated de-risking mechanisms to appropriately address the challenges they face.

The EU is best placed to aid in addressing these risks, as benefits are reaped Union-wide.

▲ Historical context – De-risking in natural gas market

It will not be possible for hydrogen transmission networks to follow the path used by natural gas networks from the 1960s in Europe, due to the different regulatory framework applicable to hydrogen networks and different market characteristics.

Construction of gas infrastructure was the result of political and commercial negotiations between consuming countries and possible producers that could supply their gas through dedicated pipelines. Bouzarovski et al. (2015)⁸ observe that *'the first gas transmission agreement between Western and Eastern Europe'* took place in 1968, when Austria (and then, downstream, Germany and Italy) connected to the Czechoslovak gas network.

In the gas sector, the commodity was available in large volumes from the beginning. This made business models and value chains easier to build. Right from the beginning, natural gas was also an economically advantageous commodity (relative to competing energy carriers such as coal and oil). Customers and intermediaries were therefore willing to commit to long-term contracts, not just for the commodity itself but also transport. In comparison to this, the hydrogen market is still a nascent market. Production and demand are not established yet on a large scale and its value chain is not in place. Commodity production, transport and demand all need to be established at the same time, incentivised primarily by political targets rather than commercial rationale (i.e. low prices). That is why hydrogen infrastructure investments are anticipatory investments and will not be able to count on large long-term bookings of transport capacity and/or benefit from an integrated project (commodity + infrastructure) when starting preparations.

At the time cross-border gas infrastructure was first established, Vertically Integrated Undertakings (VIUs) were the norm, and the gas producer was integrated with the transmission network into the same company. The Third Energy Package of 2009⁹ put an end to this possibility for gas, by requiring *'the removal of pipeline ownership from vertically integrated energy companies, thus allowing for the entrance of transnational corporate actors into the transmission sector'* (Bouzarovski et al. (2015)). This is the unbundling principle.

8 Bouzarovski, S., Bradshaw, M. J., & Wochnik, A. (2015). [Making territory through infrastructure: The governance of natural gas transit in Europe](#). *Geoforum*, 64, 217–228.

9 European Parliament and Council of the European Union. (2009, July 13). [Directive 2009/73/EC concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC](#). *Official Journal of the European Union*, L 211, 94–136.

With the Hydrogen and Decarbonised Gas Market Package (2024), the rules applied to gas, based on the Third Energy Package, are now transposed to hydrogen, including the unbundling principle. More specifically, the 2024 Directive stipulates¹⁰ that, by default, the same person is entitled neither *'directly or indirectly to exercise control over an undertaking performing any of the functions of production or supply, and directly or indirectly to exercise control or exercise any right over a transmission system operator or over a transmission system.'* By making it impossible for hydrogen networks to take the path used by gas transmission networks in the 1960s, this means that producers and transmission networks which are not part of the same industrial group need to coordinate and plan scenarios closely to estimate the market needs when such market reaches maturity.

Possibilities of downstream integration to hydrogen networks for hydrogen producers are not permitted. This is to protect third-party access for hydrogen network users and to prevent the network owner or operator from discriminating among producers and suppliers for access to the network. Meanwhile, it also implies the impossibility for VIUs to cross-subsidise the production, transmission, or supply block of the value chain.

VIUs created the bulk of natural gas infrastructure ahead of EU liberalisation packages. This option is not available for hydrogen infrastructure operators, called to create capacity without the possibility to recover their costs through commodity trading.

In a post-liberalisation gas market, incremental investment in gas infrastructure was performed using the following mechanisms alone or in combination:

- ▲ Long-term bookings during open season/incremental process (de-risking the Transmission System Operators' (TSOs') investment and, therefore, allowing easy and cheap financing).
- ▲ Exemptions for integrated projects (allowing to mitigate the risks between producers, end-users and the infrastructure – generally in the context of a Liquefied Natural Gas (LNG) terminal).
- ▲ Connecting Europe Facility (CEF) funds + Important Project of Common European Interest (IPCEI) funds (i.e. EU or national subsidies that reduce the size of the investment and, consequently, the size of the remaining risk).

Long-term bookings and exemptions for integrated projects are also available to hydrogen infrastructure. Similarly, hydrogen infrastructure can still benefit from EU and/or national subsidies via the CEF and IPCEI funds. Furthermore, the Hydrogen and Decarbonised Gas Market Package (2024) introduced two new de-risking/financing mechanisms: the dedicated charge and the Inter-temporal Cost Allocation backed by a State guarantee, see sections hereafter for more details.

However, hydrogen infrastructure operators continue to face significant high-volume risk, with limited ability to actively manage it. HTNOs should be shielded from this kind of risk to take the FID and get infrastructure commissioned.

¹⁰ European Parliament and Council of the European Union. (2024, June 13). [Directive \(EU\) 2024/1788 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive \(EU\) 2023/1791 and repealing Directive 2009/73/EC](#). Official Journal of the European Union.

3 EXISTING DE-RISKING/ FINANCING/RISK-SHARING MECHANISMS

Without third-party de-risking support, the risks of investing into hydrogen infrastructure – in particular at cross-border intersections – will likely remain prohibitively high. The current market environment presents a number of challenges that HTNOs are unable to overcome on their own – strategies previously applied in the natural gas market cannot be transferred. There is thus a clear need for governmental intervention to ensure that hydrogen transport infrastructure does not hinder the ramp-up of the hydrogen economy and ultimately the Union’s decarbonisation targets.

3.1 DIFFERENCE BETWEEN DE-RISKING, FINANCING AND FUNDING

Support for HTNOs to attract investments and enable projects to materialise can follow a range of approaches. In particular, it is crucial to differentiate between de-risking, financing and funding:

- ▲ **“De-risking” refers to the process of minimising or eliminating potential risks to attract private investments.**

“Financial de-risking [...] deploys financial measures to avoid or reduce the risk associated with projects. Typically, this involves public entities such as donor governments, multilateral development banks, development financial institutions and climate funds encouraging private investors to deploy capital by offering to bear a share of the risk. De-risking can be achieved through a range of measures such as debt, equity and guarantees, spreading the risk between participating parties or transferring the risk to a third party. Public financial institutions play a critical role in de-risking, as they provide the de-risking capital, instrument or mechanism. When public resources are deployed strategically, a previously unbankable project can attract and mobilise capital from commercial and institutional investors.”¹¹

In comparison to de-risking, **“risk-sharing”** means dividing the risk among multiple parties, each bearing a portion of the risk with the aim to dilute the impact of the materialisation of the risk. The risk itself is not decreased, but rather the implications for each party involved are altered.

¹¹ World Resources Institute: [De-risking Climate-smart Investments](#)

▲ **“Financing” means the process of acquiring and structuring capital.**

“Finance, the process of raising funds or capital for any kind of expenditure. [...] Finance is the process of channeling these funds in the form of credit, loans, or invested capital to those economic entities that most need them or can put them to the most productive use.”¹²

▲ **“Funding” means the money given for a specific goal.¹³**

*“Funding is the act of providing resources to finance a need, program, or project. While this is usually in the form of money, it can also take the form of effort or time from an organization or company. Generally, this word is used when a firm uses its internal reserves to satisfy its necessity for cash, while the term **financing** is used when the firm acquires capital from external sources.”¹⁴*

De-risking and financing are interrelated and, sometimes, rightly or wrongly, mingled. This report will try to avoid this misinterpretation. Some measures discussed hereinafter may address both de-risking and financing – in these cases, we will specify the main objective of a specific measure: de-risking or financing.

3.2 MAIN CHARACTERISTICS OF EXISTING MECHANISMS

A range of mechanisms may be considered to de-risk hydrogen infrastructure projects, differing across a range of features, notably including the degree of governmental intervention, budgetary implications and also the impact on HTNOs.

This report aims to provide a cohesive overview across a wide range of mechanisms:

- ▲ **A.** Inter-temporal Cost Allocation (ICA) + Amortisation account
- ▲ **B.** Long-term capacity bookings
- ▲ **C.** Exempted projects
- ▲ **D.** Dedicated charge
- ▲ **E.** Cross-Border Cost Allocation (CBCA)
- ▲ **F.** State guarantee
- ▲ **G.** Direct EU-level grants
- ▲ **H.** National State subsidies

In the following, each of the mechanisms will be briefly characterised before evaluating their suitability to help overcome the obstacles HTNOs currently face.

¹² [Finance | Definition, Types, & Facts | Britannica Money](#)

¹³ As funding refers to the actual money provided while financing is the process of acquiring that money, this report will not discuss funding (e.g. yearly collection of allowed revenues coming from capacity bookings or from other financing mechanisms).

¹⁴ [Funding – Wikipedia \(version on 24 April 2026\)](#)

▲ A. Inter-temporal Cost Allocation + Amortisation Account

“**Inter-temporal Cost Allocation (ICA)**” describes a mechanism allowing hydrogen network operators to spread network development costs over time by enabling future users to pay part of the initial costs. This helps prevent the application of prohibitively high network tariffs for early hydrogen network users and addresses one of the key obstacles HTNOs currently face.

In this context, an “**amortisation account**” can be a mechanism designed to manage the differences between – on the one hand – the necessary network revenue to cover the costs of building and operating a hydrogen network, and – on the other hand – the network fee set by the regulatory authority to attract capacity bookings. Annual compensation payments to the hydrogen network operators covering the gap between costs and (regulated) tariffs are drawn from the amortisation account. The mechanism foresees that any additional revenues arising later will be reimbursed to the amortisation account in order to offset the initial shortfall, restoring the balance by a certain predefined date.

ICA is commonly combined with a financing instrument to bridge the time gap between an initial period of lower revenues and later periods with increasing revenues, as well as measures to mitigate the financial risk of hydrogen network operators in case the hydrogen market and respectively revenues do not develop as planned.

In these combined cases, the different mechanisms serve different purposes, and the respective de-risking and financing elements can clearly be distinguished:

- ▲ The amortisation account in combination with compensatory payments is the **financing vehicle** which makes it possible for funds (e.g. of a public financial institution) to be transferred to HTNOs as revenues.
- ▲ The availability of such funds is ensured through backing by a State guarantee, which **covers the risk** of insufficient market development (i.e. the de-risking measure). In this case, one can identify what refers to de-risking and what is about financing.

As ICAs address one of the key hurdles of the market – namely lower demand and utilisation during the ramp-up phase – and increase in efficiency when combined with other instruments, this report will evaluate the following mechanisms with regard to their compatibility with an ICA scheme.

A.	Inter-temporal Cost Allocation – ICA + Amortisation Account
Aim	<p>De-risking</p> <p>Through the ICA, the HTNOs will be able to offer lower prices during the ramp-up while still ensuring projects can be “in the money” in the longer term.</p> <p>The amortisation account creates a dedicated vehicle which enables HTNOs to separate the inter-temporal mechanism from their bookkeeping, further contributing to de-risking and lowering the cost of capital.</p>
Features	<ul style="list-style-type: none"> ▲ Level of the regulated tariff ▲ Duration of the mechanism and compensating payments ▲ Timeline for reimbursing payments ▲ Design of the entity managing the amortisation account
Legislative frame	<p>Articles 5(3) and 5(6) of Regulation 2024/1789 for ICA.</p> <p>Article 72(1)(g) of Regulation (EU) 2024/1789 for a possible network code on ‘rules for determining the inter-temporal cost allocation’ that ENNOH should develop per Article 59(1)(a).</p> <p>Article 6(9a) of Regulation (EU) 2019/942 stipulates that ‘ACER shall issue recommendations to transmission system operators, distribution system operators, hydrogen network operators and regulatory authorities, with regard to the methodologies for setting the inter-temporal cost allocation’.</p> <p>After launching a Public Consultation in March 2025, ACER published its ICA Recommendation in July 2025. ACER proposed not to harmonise ICA practices at this stage: ‘ACER at this stage of the hydrogen market development prefers not to issue recommendations that attempt to prematurely harmonise the detailed design elements of inter-temporal cost allocation methodologies.’</p> <p>However, ACER endorsed several principles, such as the need for ICA rules to stay consistent with tariff rules per Regulation (EU) 2024/1789.</p> <p>ACER’s recommendations must be updated at least every 2 years.</p> <p>A State guarantee is mentioned only as an example of measures to cover the financial risk of Hydrogen Network Operators (HNOs) in recital (10) and Article 5(3) of Regulation (EU) 2024/1789.</p>

Table 1 – Overview of the ICA and the amortisation account



Picture courtesy of Gasunie

▲ B. Long-term capacity bookings

Long-term (LT) bookings are contractual arrangements under which parties, by underwriting binding commitments, secure access to hydrogen transport infrastructure for a longer period of time, in exchange for a predefined payment obligation.

Bookings could be made by the users themselves or by a government institution or other reliable entities which book capacity and then market it via a dedicated platform or other arrangements.

Long-term bookings, when sufficiently available, allow HTNOs to finance projects, since investors know that risks are reduced to a minimum (i.e. no volume risk on the HTNOs, only risk components manageable by HTNOs, such as execution and operation). The payment of the booked capacity will be used to cover allowed revenues, covering costs and remunerating investors.

B.	Long-term capacity bookings
Aim	De-risking
Features	HTNO calls for bookings (e.g. via a platform) and, if the level of bookings is sufficient, proceeds with the investment.
Legislative frame	Article 10 Principles of capacity-allocation mechanisms [...] of Regulation (EU) 2024/1789
Variant	Possibility to couple the mechanism with other tools, such as mandatory minimal shippers' commitment (like in Denmark), State/EU fundings or commitments (e.g. CEF or future tools envisaged by revised TEN-E), ICAs etc.
Compatibility with ICA	Yes

Table 2 – Overview of long-term capacity bookings

▲ C. Exempted project

Hydrogen infrastructure is granted an exemption from some provisions of the Hydrogen and Decarbonised Gas Market Package (2024) to allow for a more Exempted project which reduces the overall risks – in particular, it enhances operational flexibility and reduces the counterparty risk. However, it does not (fully) address the uncertainty regarding future demand.

C.	Exempted project
Aim	De-risking
Features	Major new hydrogen infrastructure, namely interconnectors, hydrogen terminals and underground hydrogen storage facilities can be exempted for a set period from some provisions of the Regulation if it can be demonstrated that the projects enhance competition, that the level of risk is too high and that they meet other conditions.
Legislative frame	Article 78 New natural gas and hydrogen infrastructure of Regulation (EU) 2024/1789
Compatibility with ICA	No – Exempted project does not require additional ICA

Table 3 – Overview of Exempted project

▲ D. Dedicated charge

The dedicated charge introduces financial transfers from gas TSOs users (who will pay an additional dedicated charge to the regular transport cost) to HTNOs.

Using these “cross-subsidies”, HTNOs would then be able to lower their hydrogen network users’ tariffs.

D.	Dedicated charge
Aim	De-risking (and financing)
Features	<p>Derogation is only possible if the regulatory authority has established that the financing of networks through network access tariffs paid by its network users alone is not viable. The dedicated charge is collected only from exit points to final customers located within the same Member State. Approval of the dedicated charge by the National Regulatory Authority (NRA) is mandatory, and publication of its amount or methodology is required no later than 30 days prior to its implementation. The Member State must notify the European Commission (EC) and ACER of the financial transfer.</p> <p>Conditions apply for the NRA to approve the dedicated charge:</p> <ol style="list-style-type: none"> 1. First, hydrogen tariffs should also be charged. 2. The sum of transfers from the dedicated charge and hydrogen network tariffs should not be greater than the HTNO’s regulated revenue. 3. This financial transfer through the dedicated charge is allowed for a limited period, which should not exceed one third of the remaining depreciation period of the infrastructure concerned. <p>The size and maximum duration of the transfer are referred to in Article 5(6) of Regulation (EU) 2024/1789.</p> <p>Contrary to the ICA recommendations, it is only optional for ACER to issue recommendations on the methodology of the dedicated charge. Such a methodology could cover the calculation of the size and maximum duration of the financial transfer and dedicated charge, as well as criteria for allocating the dedicated charge among final customers.</p>
Legislative frame	<p>Articles 5(4), 5(5) and 5(6) of Regulation (EU) 2024/1789.</p> <p>A network code on ‘rules for determining the value of transferred assets and the dedicated charge’ may be jointly developed by ENNOH and ENTSOG per Articles 59(1)(b), 72(1)(f), and 71(2)(e) of Regulation (EU) 2024/1789.</p>
Compatibility with ICA	The shift of willingness to pay from natural gas to hydrogen is likely to replace in practice a dedicated ICA mechanism.

Table 4 – Overview of the dedicated charge

▲ E. Guarantees

Guarantees represent one of the categories covered by existing EU funding programmes related to energy infrastructure development for the period 2021–2027 and are recognised as effective tools to support energy infrastructure projects by improving access to debt financing.¹⁵ A guarantee represents a written commitment by a guarantor – a national government, or, in the case of a guarantee backed by the EU budget, an EU institution – to assume responsibility for a borrower’s debt in cases of default or other specified events. By mitigating financial risks for lenders, guarantees encourage commercial banks and other financing entities to extend credit to projects they might otherwise deem too risky.

A guarantee could be paired with other mechanisms, notably the ICA and an amortisation account as set out at the national level in Germany. If the amortisation account is not balanced once the hydrogen market has fully developed and reached a steady state, the State guarantee is used to restore the balance.

E.	Guarantees (e.g. State guarantee + potential ICA)
Aim	De-risking
Features	<ul style="list-style-type: none"> ▲ Institution to act as the guarantor ▲ Way to engage the guarantee
Legislative frame	<p>Articles 5(3) and 5(6) of Regulation (EU) 2024/1789 for ICA.</p> <p>Article 72(1)(g) of Regulation (EU) 2024/1789 for a possible network code on ‘rules for determining the inter-temporal cost allocation’ that ENNOH should develop per Art. 59(1)(a).</p> <p>Article 6(9a) of Regulation (EU) 2019/942 stipulates that ‘ACER shall issue recommendations to transmission system operators, distribution system operators, hydrogen network operators and regulatory authorities, with regard to the methodologies for setting the inter-temporal cost allocation’.</p> <p>After launching a Public Consultation in March 2025, ACER published its ICA Recommendation in July 2025. ACER proposed not to harmonise ICA practices at this stage: ‘ACER at this stage of the hydrogen market development prefers not to issue recommendations that attempt to prematurely harmonise the detailed design elements of inter-temporal cost allocation methodologies.’</p> <p>However, ACER endorsed several principles, such as the need for ICA rules to stay consistent with tariff rules per Regulation (EU) 2024/1789. ACER’s recommendations must be updated at least every 2 years.</p> <p>The State guarantee is only mentioned as an example of measures to cover the financial risk of HNOs in recital (10) and Article 5(3) of Regulation (EU) 2024/1789.</p>
Compatibility with ICA	Yes

Table 5 – Overview of the case of a State guarantee combined with an ICA

¹⁵ Investment needs report 2025, pages 118, 153, Trinomics – Artelys – LBST report (2025) for the EC: https://www.artelys.com/app/uploads/2025/02/Artelys_investment-needs-of-european-energy-infrastructure.pdf

Example I: Germany – ICA + State guarantee

The Inter-temporal Cost Allocation (ICA) mechanism in Germany is specified in the German Energy Industry Law (EnWG). It is also described in Decision GBK-24-01-2# 1 issued by the German National Regulatory Authority (Bundesnetzagentur or BNetzA) concerning the determination of provisions on the setting of network tariffs to be charged for access to the hydrogen core network ('Kernnetz' by its German name) and on the establishment of an amortisation mechanism effective for a certain period (WANDA).

Approved hydrogen core network

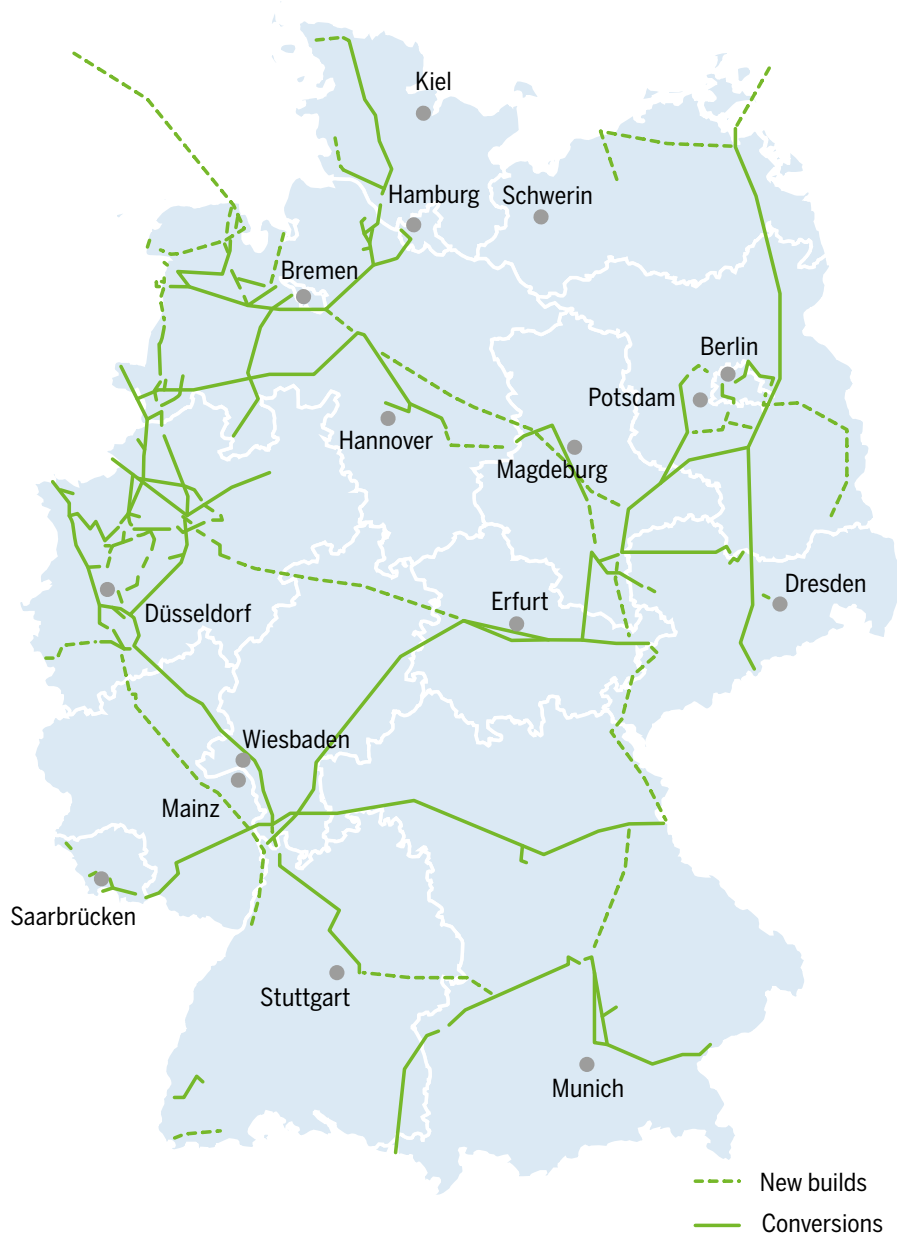


Figure 3 – Source: BNetzA (2024)

The mechanism applicable in Germany is based on three core elements: the flexibility to deviate from strictly cost-based tariffs to avoid prohibitively high tariffs; an amortisation account (by a private Special Purpose Vehicle) to cover the gap between actual and regulated revenues; and, finally, a State guarantee covering (a portion of) the long-term risks.¹⁶ The aim of this solution is to find a balance between avoiding prohibitive network tariffs and avoiding placing the entire market risk upon the network operators.

- ▲ 1. **“Ramp-up tariff”:** The tariff set by the BNetzA at a level intended to attract capacity bookings – but which does not allow the network operators to recover their full costs (ramp-up tariff) – would, on a stand-alone basis, generate deficits and create liquidity challenges for network operators.
- ▲ 2. **“Amortisation account”:** The amortisation account is financed by the public development bank KfW and managed by a company established and existing exclusively for the purpose of account-keeping – a Special Purpose Vehicle (SPV). This SPV makes regular payments to the participating network operators to cover their short-term funding needs until demand for hydrogen transport infrastructure (and thus tariff revenues) increases. In this way, the SPV managing the amortisation account acts as “shipper of last resort”, providing cash to network operators virtually booking unused capacity.¹⁷ As the market matures, network operators are expected to repay these advance payments to the SPV, which in turn repays the loan to KfW.
- ▲ 3. **“State guarantee”:** An important element of this mechanism is a guarantee issued by the German State to the financing bank, “as the commercial rationale behind the funding is not yet there”.¹⁸ If demand growth falls short of expectations, the ramp-up mechanism may not achieve full cost recovery. In that case, the financial risk is shared between the German State (76 %) and the participating network operators (24 %), incentivising prudent investment decisions. Should it become evident by 2038 that demand will not reach the required levels, the government may terminate the mechanism, assume control of the network, and cover accumulated losses subject to a deductible borne by the network operators (varying between 16 % and 24 %, depending on the timing of the termination).¹⁹

The following illustration provides an overview of the concept of Germany’s amortisation account²⁰:

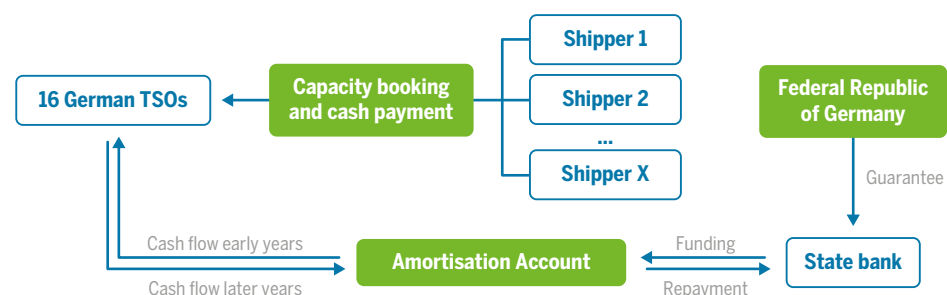


Figure 4 – Overview of Germany’s amortisation account

16 Agency for the Cooperation of Energy Regulators. (2025, December 2). [Monitoring report on European hydrogen markets](#) (p. 20).

17 European Clean Hydrogen Alliance. (2024). [Learnbook on financing of hydrogen infrastructure \(European Clean Hydrogen Alliance Financing Learnbook\)](#), p. 17.

18 European Clean Hydrogen Alliance, Transmission & Distribution Roundtable. (2024). [Learnbook on financing of hydrogen infrastructure](#) (p. 17). ENTSOG.

19 Agency for the Cooperation of Energy Regulators. (2025, December 2). [Monitoring report on European hydrogen markets](#) (p. 20).

20 European Clean Hydrogen Alliance, Transmission & Distribution Roundtable. (2024). [Learnbook on financing of hydrogen infrastructure](#) (p. 17). ENTSOG.

▲ F. Cross-Border Cost Allocation (CBCA)

“Cross-Border Cost Allocation” or “CBCA” is a cost- and thus risk-sharing mechanism described in Article 16 of the TEN-E Regulation, which implicitly reallocates investment risks. It results from an agreement between national systems, for instance along a supply corridor, that may transfer investment cost – and thus parts of the associated risk – from a “transit” country to supply and/or destination countries. It reduces risk/de-risks the investment in the transit country while increasing risk in supply or destination countries. In this way, the risk is shared among additional national systems. However, it only transfers risks between countries; it does not reduce the overall risk that investors have to bear and therefore does not represent a de-risking measure.

The current CBCA methodology, originally developed for the existing and already mature electricity and gas sectors, is designed for incremental infrastructure developments in mature markets with a large number of existing network users. However, hydrogen is still a nascent market. Thus, any estimation of the future distribution of benefits as a basis for cost allocation is uncertain and, potentially, of little value as linked to forward-looking variable assumptions such as flows or asset utilisation.

Additionally, CBCA was designed with the intention to correct skewed allocations of costs and benefits, rather than facilitate the ramp-up in a market where benefits are not just skewed between geographies but particularly over time.

F.	Cross-Border Cost Allocation – CBCA
Aim	Cost-Sharing + Risk-Sharing
Features	CBCA agreement between NRAs.
Legislative frame	Article 16 of TEN-E (Regulation (EU) 2022/869) or Article 17 Enabling investments with a cross-border impact of EC proposal for TEN-E revision (2025/0399/COD)
Compatibility with ICA	Yes

Table 6 – Overview of the CBCA

▲ G. Direct EU-level grants

Energy infrastructure projects can be supported through direct EU-level grants. Notably, Projects of Common Interest (PCIs) and Projects of Mutual Interest (PMIs) can apply for CEF grants for studies and for works. The funding is intended to fill gaps in the projects' business cases, with funding rates averaging 50 %. In order to be eligible, projects need to demonstrate that, without such support, they would not progress.

G.	Direct EU-level grants through CEF funds (available to PCIs and PMIs)
Aim	Financing By definition, the risk on the subsidised amount is fully eliminated. As a result, the average level of risk borne by other capital providers (debt, equity) is reduced.
Features	Project Promoters have to follow the process established in the TEN-E Regulation to be selected as a PCI or PMI.
Legislative frame	Mainly Chapter VII Financing of EC proposal for TEN-E revision (2025/0399/COD)
Variant	IPCEI funds at national level subject to Directorate-General for Competition (DG COMP) agreement.
Compatibility with ICA	Yes

Table 7 – Overview of direct EU-level grants



Picture courtesy of Gasunie

▲ H. Direct national grants

Similar to European funding, Member States can choose to support infrastructure projects with direct grants from national budgets. The exact design would be up to each Member State – by way of example, the Netherlands chose to allocate a dedicated budget to hydrogen networks to compensate for loss-making.

Example II: Netherlands – National subsidies

Hynetwork was appointed by Climate and Energy Minister Rob Jetten to build and develop the transmission system for hydrogen in the Netherlands as a so-called Service of General Economic Interest (SGEI) in 2022. The task of the SGEI is to

- ▲ Construct and operate the national hydrogen network (including interconnectors) under economic conditions, while ensuring safety, reliability, and efficiency.
- ▲ Ensure that the hydrogen network meets the demand for hydrogen transport in both the short term and the long term.
- ▲ Provide hydrogen transport services to network users on non-discriminatory, transparent, and reasonable terms and tariffs, including supporting, supplementary, and connection services.

The minister allocated a budget of up to EUR 750 million to Hynetwork to finance this task. The subsidy budget is used as loss compensation. It compensates for the yearly cost of building and developing the network while revenues are still scarce or non-existent. This means that the annual difference between allowed revenues (i.e. efficient costs) and actual revenues from transport services (transport contracts) is supplemented with subsidies.

The SGEI will last until the end of 2030. From 2031 (ultimately 2033) onwards, costs must be recovered through regulated tariffs. The expected revenue gap at the end of the SGEI period would cause a spike in the regulated tariff level. Various potential solutions are currently under investigation for the period after the SGEI (e.g. continuation of the subsidy, ICA in combination with an amortisation mechanism and State guarantee).

Direct national grants can also be paired with additional measures, focusing on de-risking the projects in addition to financing. As for the guarantee, the national subsidies can be paired with an ICA to maximise the impact of both instruments as is currently foreseen in Denmark at the national level.

H.	Direct national grants
Aim	Financing By definition, the risk on the subsidised amount is fully eliminated. As a result, the average level of risk borne by other capital providers (debt, equity) is reduced.
Features	Allocates a budget to the HTNO, which can then be used yearly as a loss compensation mechanism, which compensates for the yearly cost of building and developing the network, while revenues are still scarce or non-existent.
Legislative frame	State aid legislation
Variant	Could be used as a mechanism to kick-start investments in the network. However, initial funding is insufficient to create sustainable business cases in the long-term and would need to be followed up by other mechanisms (such as ICA) to establish commercial viability.
Compatibility with ICA	Yes

Table 8 – Overview of direct national grants

Example III: Denmark – ICA + State subsidies + Minimal commitment

The mechanism existing in Denmark is based on three pillars²¹: Inter-temporal Cost Allocation (ICA), State subsidy and minimal shippers' commitment. The application of the ICA principle leads to setting lower yearly tariffs (initial target level at about 24 EUR/(kWh/h)/year) in a start-up phase compared to the tariffs which would apply in regular market conditions. The purpose of this setting is to prevent high tariffs acting as a barrier to capacity bookings by the market participants.

The State subsidy is aimed at reducing the market risk for the network operators for 30 years. It is conditional upon a yearly pre-booking requirement of 0.5 (GWh/h)/year for 10 years. This requirement should reflect 12–17% of the capacity of the prioritised so-called 'Seven network'^{22,23}

If the booked capacity exceeds the minimum amount, the yearly subsidy is reduced proportionally. Subsidies are to be paid back to the State, if the average unsupported tariff becomes lower than the target tariff, thus representing a conditional loan. If the market develops faster and more than expected the tariff could decrease at a level under the target tariff/the tariff set by the ICA mechanism. In that case, the tariff is not decreased and stays at the target/ICA tariff, thus providing additional revenues to the HTNO that will be used to reimburse the state subsidy. The amount of the subsidy is calculated at the date of the final investment decision and remains stable irrespective of the cost changes. In the operating phase the network users will cover the cost increases; in the construction phase the risk of cost increases is shared between the users and the network operators.



Figure 5 – The Seven hydrogen network in Denmark, Source: [Energinet \(2025\)](#)

21 [Energinet publishes details on the expected tariff structure for DHB1](#)

22 According to Danish website [State of the Green](#), this Seven ('Syvttallet' in Danish) hydrogen network – developed by national TSO Energinet – will connect Denmark to German TSO Gasunie Deutschland. Its name derives from the shape of the network, which resembles the number seven: a West-East branch connects the Danish city of Esbjerg to the village of Veerst, then moving South-West to the village of Frøslev near the German border.

23 Agency for the Cooperation of Energy Regulators. (2025, December 2). [European hydrogen markets: 2025 monitoring report](#) (p. 21).

CONCLUSION NO. 3

A range of instruments – which could potentially address the hurdles cross-border hydrogen infrastructure projects currently face – are available and could potentially be applied.

3.3 ANALYSIS OF THESE MECHANISMS

As set out in detail in Chapter 2, the main issue of the nascent hydrogen market is the uncertainty regarding production and demand. This translates into a strong hesitancy to commit to long-term bookings (i.e. volume risk), resulting in a revenue gap in case infrastructure is realised notwithstanding the lack of commitments. Uncertainty regarding hydrogen price dynamics, in the absence of market-based price formation mechanisms (i.e. price risk), further adds to this problem, limiting clarity on the willingness to pay of users for the transmission service. However, efficient long-term infrastructure design should be based on anticipatory investment (i.e. embedding future demand and production evolutions, not only the current ones). Public intervention is thus needed to overcome the hurdles currently hindering the ramp-up. The previous section explored a range of mechanisms that can contribute to de-risking and financing investments – which all come with different advantages and limitations.

Table 9 provides a detailed overview of the advantages and limitations of the mechanisms discussed in Chapter 3.2.

- ▲ An ICA mechanism (Mechanism A) targets the key challenge HTNOs are currently faced with low utilisation during the ramp-up phase of the hydrogen market. As such, it is an ideal tool given the current environment and helps create a level playing field among developers. On its own, the ICA does not, however, shield HTNOs from possibly facing revenue risks, should the ramp-up not materialise as anticipated. Additionally, de-risking of cross-border projects through national ICA mechanisms could be challenging, due to coordination and governance issues.
- ▲ Long-Term Capacity Bookings (Mechanism B) alone may face difficulties to materialise and therefore may not lead to an investment decision.
- ▲ Exempted projects (Mechanism C): Integrated projects are exemptions that are suitable to develop local projects but are insufficient by themselves to address the challenge of the revenues gap at EU scale.
- ▲ Dedicated charge (Mechanism D) directly addresses the revenue gap and can therefore help facilitate the ramp-up. However, it will be challenging to implement for cross-border infrastructure projects across jurisdictions and volumes will likely be insufficient to fully cover the revenue gap of HTNOs. In addition, implementation would require changes to European law, impeding practicability.
- ▲ A Guarantee (Mechanism E) itself does not cover the revenue risk directly, however it does substantially de-risk investments. Investors can rely on a government entity to cover a share of any outstanding capital should the HTNO be unable to do so. Without any immediate budgetary implications, the guarantee is also practical to implement.

- ▲ The Cross-Border Cost Allocation (Mechanism F) is not a de-risking but rather a risk-sharing mechanism. As such, it is not suited (nor intended) to facilitate the ramp-up of the hydrogen economy, but rather to distribute costs proportionately to benefits in an established system. It is further unlikely that the country experiencing an increase in risks following the CBCA will be able to bear them.
- ▲ Direct grants at the national (Mechanism H) and EU levels (Mechanism G) are fit for purpose to support financing and (to an extent) de-risking of projects but will not be sufficient due to national and EU budget limitations. Additionally, neither of these two mechanisms fully addresses the revenue gap.

	Advantages	Limitations
A. ICA + Amortisation Account	<ul style="list-style-type: none"> ▲ Addresses the volume risk during the ramp-up phase. ▲ Directly addresses the revenue gap. ▲ Duration can be calibrated to be suitable for the ramp-up period and amended if necessary. ▲ Experience from national setups in Germany and Denmark can be used as blueprints for European mechanisms. ▲ No immediate budgetary implications at the European level. 	<ul style="list-style-type: none"> ▲ Without further financing support, HTNOs continue to face the risk of not being able to fully recover their costs.
B. LT Bookings	<ul style="list-style-type: none"> ▲ Full coverage of HTNOs' costs as powerful trigger to investment realisation. ▲ Certainty for users to have booked capacity allocated for the whole subscription period and along a whole route/corridor, if HTNOs coordinate booking procedures. ▲ Once capacity needs for the different systems are adequately/upfront identified and cost-reflective tariffs designed (i.e. under NRAs supervision), guarantee of balanced allocation of cross-border costs. ▲ Well established market mechanism ("open season", incremental auctions in gas). ▲ No immediate budgetary implications at the European level. 	<ul style="list-style-type: none"> ▲ Uncertainties at this early stage of the hydrogen economy²⁴ could leave market players in a wait-and-see mindset, resulting in delayed investment. ▲ Duration of long-term bookings is limited to 15 or 20 years by default according to Art. 7(3) of the Gas Regulation, depending on the completion date of hydrogen network infrastructure; therefore, a significant uncertainty remains towards the asset depreciation period. Equally, depreciating the asset over the duration of the contract may result in prohibitively high tariffs.
C. Exempted project	<ul style="list-style-type: none"> ▲ Efficient de-risking tool similar to option B. Long-Term (LT) Bookings but with only a few or one network user(s). ▲ Reduction of counterparty risks due to limited number of partners. ▲ No immediate budgetary implications at the European level. 	<ul style="list-style-type: none"> ▲ Only the regulatory risk is reduced. Will not solve the lack of hydrogen market at this early stage of the hydrogen economy, i.e. market risk and volume risk for a specific project/supply corridor. ▲ Does not immediately address the initial revenue gap on its own.

²⁴ Including, but not limited to, a lack of market design rules on capacity allocation, a lack of standard contracts, prohibitive tariffs, a more concentrated credit risk if only a few shippers booked capacity, etc.

	Advantages	Limitations
D. Dedicated Charge	<ul style="list-style-type: none"> ▲ Directly addresses the revenue gap. ▲ No immediate budgetary implications at the European level. 	<ul style="list-style-type: none"> ▲ Limitation of period and cost covered. ▲ Potential opposition by affected systems, in case benefits not perceived. ▲ Challenging to apply at a European level. ▲ Would require a derogation from another default principle prohibiting financial transfers between separate regulated services.²⁵ ▲ Not adapted to cross-border projects.
E. State Guarantee	<ul style="list-style-type: none"> ▲ Can effectively de-risk (a portion of) the investment. ▲ Can be combined with other instruments to maximise impact. ▲ No immediate budgetary implications at the European level. 	<ul style="list-style-type: none"> ▲ Does not immediately address the initial revenue gap on its own. ▲ Not adapted to cross-border projects.
F. CBCA	<ul style="list-style-type: none"> ▲ Transfer of costs proportionately to expected benefits and therefore remuneration potential. ▲ No immediate budgetary implications at the European level. ▲ Adapted to cross-border projects. 	<ul style="list-style-type: none"> ▲ Addresses neither the revenue gap nor effectively the de-risking of projects as it just transfers risks. ▲ Not designed for a nascent market. ▲ Difficulty to find agreements, especially if Member States requested to cover costs extend beyond the ones involved in infrastructure/corridor developments (as proposed in the current TEN-E revision).
G. Direct EU-Level Grants	<ul style="list-style-type: none"> ▲ Reduction in the amount of private capital required to fund the investment. ▲ Increases affordability to infrastructure users (tariffs). ▲ Reduction of risks and tariffs for the part of the project costs covered. ▲ Could also be used as an interim mechanism, to facilitate the start of developing the network. 	<ul style="list-style-type: none"> ▲ Has immediate implications on the European budget.²⁶ ▲ Does not address the revenue gap driven by operating expenditure (OPEX) during operation, nor the changes in the anticipated ramp-up relative to the time when the subsidy was granted.
H. Direct national grants	<ul style="list-style-type: none"> ▲ Reduction in the amount of private capital required to fund the investment. ▲ Increases affordability to infrastructure users (tariffs). ▲ Reduction of risks and tariffs for the part of the project costs covered. ▲ Could also be used as an interim mechanism, to facilitate the start of developing the network. 	<ul style="list-style-type: none"> ▲ Has immediate implications on the national budgets. ▲ Does not address the revenue gap driven by OPEX during operation, nor changes in the anticipated ramp-up relative to the time when the subsidy was granted.

Table 9 – Advantages and limitations of different de-risking mechanisms

25 Art. 5(2) via Art. 7(9) REG: The NRA would have to assess in advance the pros and cons of this dedicated charge, by considering its impact in terms of cross-subsidies and cost-efficiency, and then approve the whole mechanism before its application (Art. 5(4) via Art. 7(9))

26 While an enhanced budget is in discussion in the CEF revision, it is unlikely that it will be sufficient for all the eligible categories (electricity, hydrogen, CO₂ infrastructure + electrolysers).

On its own, none of the mechanisms discussed in Chapter 3.2 is fully suitable to de-risk and finance anticipatory investments in cross-border hydrogen infrastructure, as Table 10 points out. A combination of individual instruments is thus needed to efficiently support it.

Mechanisms	Fit for anticipatory investment	Fit for cross-border projects	Limitations
A. ICA + Amortisation Account	✓	≈	Currently only existing at national level
B. LT bookings	≈	✓	Not enough capacity bookings to take Final Investment Decision.
C. Exempted project	X	✓	Removes or reduces only the regulatory risk.
D. Dedicated charge	✓	X	Not applicable to cross-border projects.
E. State Guarantee	✓	X	National guarantee not applied across borders.
F. CBCA	X	✓	Not designed for anticipatory investment.
G. Direct EU-level grants	X	✓	Limited budget shared with investments in electricity, electrolyzers and CO ₂ projects. Does not cover the revenues gap.
H. Direct national grants	≈	X	Not applied for cross-border projects.

Table 10 – Evaluation of mechanisms



Picture courtesy of Gasunie

4 AN EU-LEVEL DE-RISKING MECHANISM

As previous chapters have established, there is a need for an explicit European de-risking mechanism for cross-border hydrogen infrastructure, filling the gap currently created by the slow market ramp-up and a patchwork of national support mechanisms for domestic infrastructure.

Across all these mechanisms, it will be crucial to design and calibrate them in a way that ensures they act synergically with other schemes, e.g. avoiding EU public support crowding out national or market commitments. Indeed, in developing this EU mechanism, care must be taken that national de-risking mechanisms are compatible with any EU mechanism and across Member States.

The EU mechanism needs to address two key needs:

- ▲ the need to ensure non-prohibitive network tariffs in order to attract initial bookings of cross-border hydrogen transportation capacity, as well as
- ▲ the need to allow network operators to close the gap between actual revenues (based on bookings) and the revenues needed to cover the costs connected with the network operation (allowed revenues).

Different mechanisms could be implemented to “close the revenue gap” while still ensuring non-prohibitive tariffs. Table 11 sketches out three approaches which could be implemented at the European level.

	A. ICA and EU guarantee	B. Long-term bookings and EU guarantee	C. Operating EU Subsidy
Aim	De-risk investment by filling the HTNO yearly allowed revenues gap.		
Concept	An SPV pays the missing revenues to the HTNO.	An SPV books capacity and pays for it.	An EU Subsidy fills the revenue gap on an annual basis.
	When bookings develop, part of the revenues goes to reimburse the SPV or the EU subsidy.		
	If the SPV is not fully balanced, the remainder is covered by a guarantee.	The open balance fully remains with the SPV/the EU entity	

Table 11 – Comparison of different potential mechanisms

Across all three options, the EU takes on (part of) the risk of “closing the revenue gap”. Options A – combining ICA with an SPV and a European guarantee – and B – Long-term bookings through a European SPV and a European guarantee – will be discussed in detail below. While Option C would also fulfil the core needs set out above, it would have substantial implications for the European budget which make implementation practically challenging. **It will therefore not be explored in further detail.** An ICA will lower the tariffs in the first years of the investment to attract shippers. The missing allowed revenues due to that tariff reduction will be compensated by payments coming from a SPV fed by private and/or public investors.

4.1 EU MECHANISM 1: ICA COMBINED WITH AN EU GUARANTEE

The first mechanism to de-risk hydrogen infrastructure cross-border projects combines Inter-temporal Cost Allocation (ICA) with an EU-level guarantee, mirroring the national scheme currently implemented in Germany.

An ICA will lower the tariffs in the first years of the investment to attract shippers. The missing allowed revenues due to that tariff reduction are compensated by payments coming from an SPV – Special Purpose Vehicle – fed by private and/or public investors.

Investments into the SPV will be covered by an EU-level guarantee. EU-backed guarantees, such as those offered under the InvestEU programme, have proven instrumental in de-risking high capital expenditure (CAPEX) and high-risk projects.²⁷ Similar to the national ICA schemes, the EU guarantee should be conceived as a “safety net” for a case that the development of the hydrogen market does not reach the state of maturity required by EU targets by a certain deadline (which can be measured by fulfilment of certain predefined criteria).

Private capital will be attracted by the EU guarantee, by enhancing confidence in the project and it will also secure HTNOs regarding the possibility to cover allowed revenues. The financial features of the loan to the SPV are not usual in the commercial banking industry (very long tenor, very long commitment/availability period with no or limited commitment fees, repayment conditional on surplus), hence there could be a need to complement the EU guarantee with a loan granted to the SPV by a promotional lender such as the European Investment Bank (EIB). In this case the promotional lender would have its credit risk mitigated by the guarantee.

The EIB and/or other implementing partners will collect this private capital and/or put in place the financial architecture, i.e. the SPV. In addition to managing payments to and from HTNOs, the SPV is needed to deconsolidate the debt of the HTNOs, otherwise HTNOs would borrow money at a higher interest rate or will not be able to borrow money at all²⁸.

²⁷ [Investment needs report 2025](#), page 153, Trinomics – Artelys – LBST report (2025) for the EC

²⁸ Financing Offshore Interconnectors across the North Sea, Elia group, November 2025, page 16: “Indeed, Moody’s estimates that TSOs can maintain key credit metrics with annual investments of up to ~10 % of their Regulatory Asset Base. Beyond this, equity injections or quasi-equity instruments are required to preserve credit quality. Broader market signals, such as Moody’s April 2025 negative outlook on European regulated electricity networks, indicate that rising debt may translate into higher borrowing costs, further constraining TSOs’ financial flexibility and their capacity to fund critical infrastructure efficiently through debt”.

NRAs will set the initial tariffs and the level of the missing allowed revenues, based on ACER recommendations²⁹, as foreseen in Articles 5(3) and 5(6) of Regulation (EU) 2024/1789 as well as other applicable national and European legislation on tariff-setting methodologies.

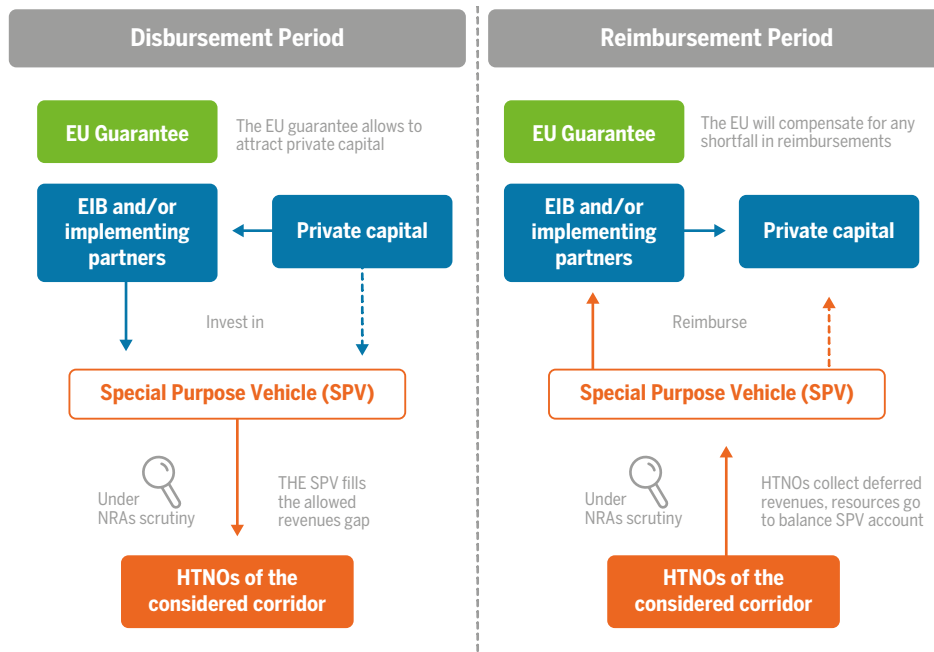


Figure 6 – Schematic overview of the design of option A

Then, once the market is developed enough, HTNOs will collect deferred revenues to reimburse the SPV. If they cannot fully manage to do it, the EU guarantee would compensate as a last resort.

The key features which need to be defined for this EU mechanism are:

1. SPV structure and operating funds
2. The adjustment of the capacity tariffs in line with applicable legislation
3. The guarantee

²⁹ [ACER Recommendation 02-2025 on inter-temporal cost-allocation](#)

▲ SPV structure and operating funds

The SPV would be an entity at European level, operated either as a private or public entity in charge of handling payments to and from the HTNOs.

Payments made by the SPV would complement national de-risking or other mechanisms (e.g. the ones listed in the previous chapter) and users' capacity bookings in order to fill the revenue gap, as illustrated in the graph below.

The revenue gap will be different across Member States or even across HTNOs depending on shippers' bookings, project PCI funds, national support like ICA + State guarantee, and CBCA agreement.

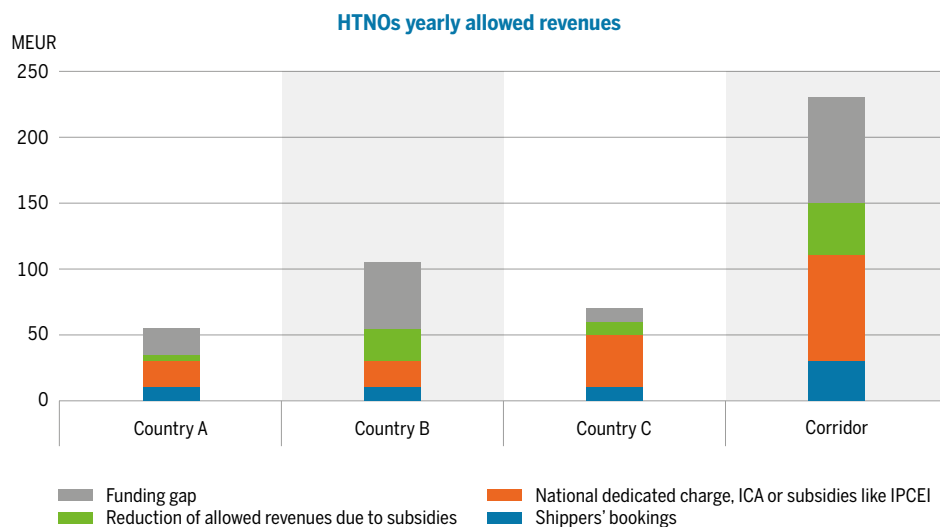


Figure 7 – Illustrative financing structure of allowed revenues with an ICA scheme

The duration of the scheme and the deadline to reimburse it or to activate the guarantee are key parameters of the EU mechanism. Being capital intensive and for anticipatory investment, the duration of the scheme covering missing allowed revenues should at least be 25–30 years.

▲ The adjustment of the capacity tariffs in line with applicable legislation

The initial setting of the capacity tariffs is a trade-off between lowering the tariffs to attract network users and keeping the amount of the payments that compensate the missing allowed revenues acceptable. Then, as mentioned in the ACER recommendations on ICA, NRAs should be flexible in revising the tariffs and have in mind the following contradictory injunctions:

1. Keeping tariffs stable to enable network users to sustainably and reliably plan their projects.
2. Adapt the tariffs to changing market conditions (e.g. if the market develops quicker than anticipated, one could think about adequate tariffs).

Calibrations of the tariffs must be made in close coordination with the EU mechanism to ensure consistency and avoid unwanted adverse effects.

▲ The guarantee

ENTSO-G and ENNOH propose that the EU guarantee should be covered by the EU budget.

The EU guarantee will not cover all payments made to HTNOs as there is a leverage factor, i.e. the whole project will not need to use the guarantee, and if it does, it will not cover 100 % of the payments. Budgetary implications can therefore be minimised, in particular compared to “simple” subsidies.

Following the termination of the mechanism, either the anticipated allowed revenues are reimbursed before the deadline or not.

- ▲ In the first case, there are no further actions to be taken.
- ▲ In the second case, the EU guarantee would be activated. **It is very important that the EU guarantee is comprehensive enough to ensure the project’s bankability.**

4.2 EU MECHANISM 2: LONG-TERM BOOKINGS

Instead of immediately covering the revenue gap HTNOs face by way of ICA coupled to an EU guarantee, a European Special Purpose Vehicle (EU SPV) could also be created to book long-term capacities and support HTNOs through mimicking the market environment during the ramp-up of the natural gas networks several decades ago.

Investment decisions for the natural gas grid were taken when sufficient capacity of the considered project was booked long-term during an open season or incremental capacity process, meeting an economic test.

The EU SPV would book capacity over the long-term on top of shippers’ LT commitments to create sufficient operating revenue for the projects to be economically viable, effectively covering missing allowed revenues for e.g. 25–30 years.

The additional bookings purchased by the EU SPV would make the unit tariff affordable for hydrogen producers, shippers and consumers.³⁰ Tariff levels will continue to stay under the scrutiny of NRAs.

HTNOs would continue to sell both types of capacity (i.e. the one held by the EU SPV and the one available for shippers). The capacities booked through the EU SPV would still be resold preferentially by the HTNOs on behalf of the EU SPV on a secondary market platform, so that the EU SPV can progressively recover the capital invested in early capacity bookings. An EU guarantee will also be needed in this case to allow for capital recovery if the market does not develop.

³⁰ The HTNOs’ allowed revenues are recovered via booked capacities sold at certain unit tariffs. Keeping allowed revenues unchanged, unit tariffs can decrease as total booked capacity increases.

Figure 8 illustrates the composition of capacity bookings including long-term bookings through an SPV. 85 % of the capacity has been booked for 25 years. The EU SPV booking is reduced by initial shipper bookings, e.g. 10 % for 10 years. In the example below, the EU SPV sells back the entire booked capacity at the regulated tariffs.

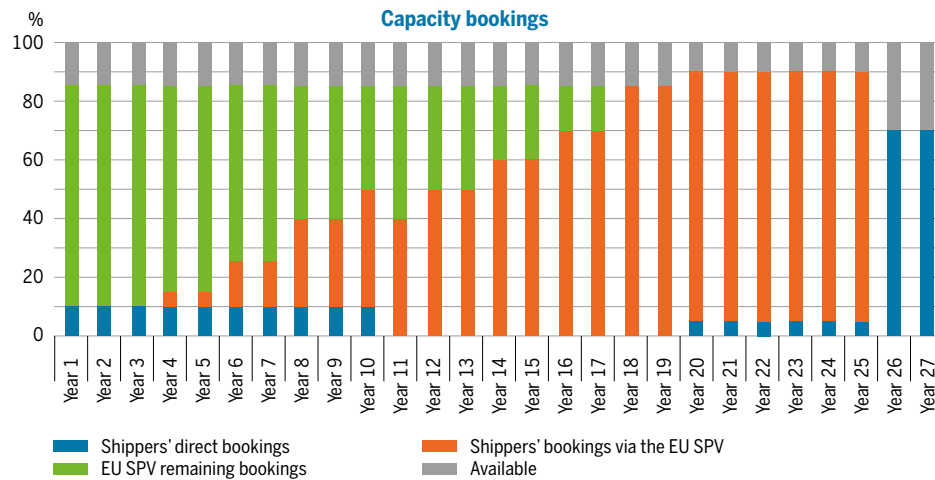


Figure 8 – Illustrative capacity bookings including LT bookings through an SPV

The EU SPV would be an entity at the European level, operated either as a private or public entity in charge of the handling payments to and from the HTNOs. The EU SPV would pay HTNOs for the booked capacity. HTNOs would pay back the EU SPV once the market develops through the revenues recovered by capacity sold on behalf of the SPV. The EU guarantee may be activated in case the market did not develop enough like for the first mechanism: ICA combined with an EU guarantee.

4.3 ELIGIBILITY OF THE EU MECHANISM

The EU de-risking mechanism should be targeted specifically at cross-border hydrogen infrastructure projects. As set out in Chapter 2.2, the benefits created by these projects are reaped at the European level, making EU-level support appropriate.

With the selection of PCI and PMI projects, there is already an existing mechanism in place to select the most promising and beneficial projects of the Union. ENNOH and ENTSOG therefore propose to make a newly established European de-risking mechanism available to all projects with PCI or PMI status.

4.4 LEGAL FRAMEWORK OF AN EU GUARANTEE

An EU guarantee currently has no existing legal foundation. The hydrogen industry cannot rely on the Clean Energy Investment Strategy published on 10 March 2026 (COM(2026) 116 final), which is not focused on the hydrogen market and its needs. This Commission communication does not address the specific issue of anticipatory investment in hydrogen transmission. The hydrogen industry needs a clear de-risking legislative framework as soon as possible, because the current absence of an EU legal basis for a financial guarantee for market launch is a critical point.

That is why an EU guarantee should be introduced within pieces of legislation currently under discussion:

- ▲ TEN-E
- ▲ CEF
- ▲ The European Competitiveness Fund – ECF

The regulatory framework would further need to set out the specific features of the European guarantee, in particular the source of funding needed if the guarantee is called upon. Several potential sources could be considered, such as the CEF envelope or the newly established ECF.

5 CONCLUSIONS AND WAY FORWARD

This report demonstrates that the investment challenge for hydrogen infrastructure is fundamentally different from the historical development of natural gas networks.

Hydrogen infrastructure must be built ahead of market maturity. Unlike the early gas market, hydrogen transmission operators cannot rely on vertically integrated structures, large anchor producers, or robust long-term commodity demand. Instead, they are required to undertake anticipatory investments in an environment characterised by structural volume risk, price uncertainty, and evolving regulation.

The analysis leads to four core conclusions.

1. Hydrogen infrastructure is a necessary precondition for market ramp-up. Delaying infrastructure investment until demand fully materialises would perpetuate the existing coordination failure between production, transport and offtake.
2. Cross-border hydrogen corridors generate Union-wide benefits in terms of market integration, resilience, and decarbonisation. It is therefore economically and institutionally coherent that part of the associated risk is addressed at EU level.

3. National mechanisms such as ICA combined with State guarantees or operating subsidies can address domestic investment needs. However, they are not designed to manage the elevated and distributed risks of cross-border infrastructure.
4. No single de-risking or financing instrument is sufficient to support cross-border anticipatory investments. Effective frameworks combine tariff flexibility, financing vehicles and risk-sharing mechanisms over long time horizons.

An additional European-level de-risking instrument is therefore required to complement national measures and existing EU funding tools.

Two potential mechanisms could be suitable to overcome the barriers HTNOs are currently facing and to accelerate the ramp-up of hydrogen networks:

- ▲ A European ICA mechanism combined with a guarantee
- ▲ Long-term bookings through a dedicated European SPV

To operationalise an EU-level de-risking mechanism, the following steps are recommended:

- ▲ **Establish a legal basis.** A clear legislative foundation is required. This could be incorporated into the ongoing revision of TEN-E, the Connecting Europe Facility (CEF) framework, or the proposed European Competitiveness Fund (ECF). The legal framework should define eligibility criteria, governance arrangements, and budgetary backstopping of the guarantee.
- ▲ **Define governance and risk-sharing parameters.** Key design parameters must be specified, including duration of the mechanism aligned with asset lifetimes, calibration of tariff adjustments under ICA, structure and mandate of the SPV, scope and triggering conditions of the EU guarantee, and interaction with national mechanisms and CBCA arrangements.
- ▲ **Ensure compatibility with national frameworks.** The EU mechanism should be designed to complement, not crowd out, national ICA schemes, State guarantees, or subsidies. Clear coordination principles will be required to avoid regulatory fragmentation.

Timely action is critical. Without a credible and coordinated de-risking framework, there is a substantial risk that cross-border hydrogen infrastructure investment will lag behind policy ambition, thereby slowing market integration and jeopardising the Union's decarbonisation trajectory.



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