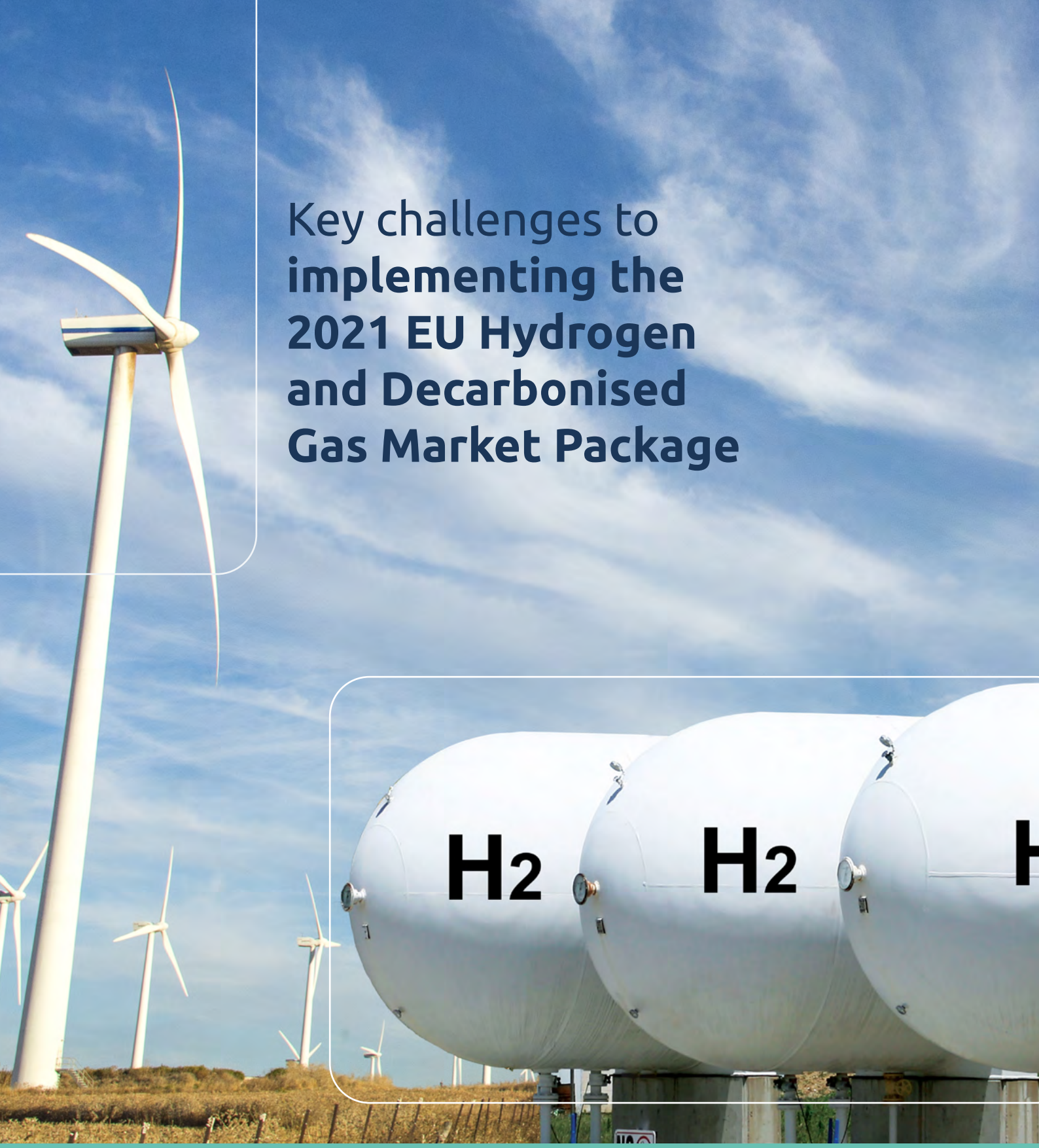
Key challenges to **implementing the 2021 EU Hydrogen and Decarbonised Gas Market Package**



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MAGNUS energy

Key Insights

With the announcement of the Hydrogen and Decarbonised Gas Market Package in December 2021, the European gas sector is headed for a serious transformation. The strategy behind the package has been well-studied and many positions have been shared. Now is the time to start working on concrete implementation projects. What are the key implementation challenges to achieving all obligations stemming from the package?

How to prepare for the transition in the gas market?
We believe that cooperation between organisations is key to achieving the ambitious goals set for the natural gas and hydrogen markets in the energy transition. TSOs will need to:

- Organise themselves on a regional level in order to set standards for future operational rules and to ensure regional interests are reflected in the new European Network of Network Operators for Hydrogen (ENNOH) activities and deliverables
- Cooperate on network codes and on interconnection agreements to minimise revenue losses
- Collaborate to develop a certification and administrative system for renewable and low-carbon gases
- Work together to manage the impacts of hydrogen blending
- Decide on how to unbundle Hydrogen Network Operators from their gas activities.
- Adapt to a new role in the (renewable) gas and hydrogen system and manage the transition of gas transmission assets to hydrogen transmission assets
- Prepare their organisations to deal with uncertainties in gas, hydrogen, and biomethane markets
- Cooperate with many stakeholders in order to manage regional, cross-border repurposing projects

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1. The gas sector in transition

To meet the EU goal to be climate-neutral by 2050, significant changes and large efforts will be required from all parties in the European gas sector.

The significance of gas

The gas network is an important element in the daily lives of almost every EU citizen: natural gas is used for heating and cooking, for generating power, as feedstock, as source for heat and as a source for industrial processes. To support these activities, there are about 200.000 km of high-pressure pipes [1], 21 large-scale LNG terminals [2], 42 TSOs [3] and more than 1.000 Distribution System Operators (DSOs) [4]. The European gas system currently transports up to 5000 TWh per year of energy to industries and consumers throughout Europe [1]. At the same time, consuming natural gas is responsible for approximately 30% of greenhouse gas emissions in the EU [6].

Natural gas consumption 2019

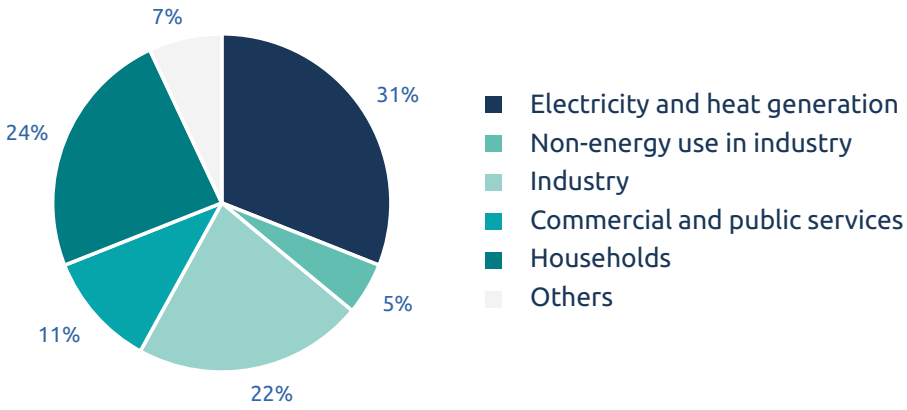


Figure 1: EU Natural gas consumption by end usage [5]

Here to stay

To meet the goal of climate-neutrality by 2050, the EU is set to decarbonise the gas sector. Through the Green Deals and the Fitfor55 package, the EU is commited to two broad strategies:

- widespread electrification [7]
- using renewable and low-carbon gases

Keeping gas in the energy mix has significant advantages, since gas can be stored at scale and be transported more easily across intercontinental distances. Moreover it allows natural gas infrastructure to be repurposed. Biogas can be refined into biomethane, which can be directly injected into the natural gas grid, whereas pure hydrogen requires retrofitted natural gas pipelines.

> *To put things in perspective: the current gas network transmits up to 5.000 TWh per year, while the current electricity network transmits only 2.000 TWh per year [1].*

The big pivot to renewable gases

The transition from natural to low-carbon and renewable gases will pose significant changes. Due to electrification, gas demand is expected to decrease significantly by 2050, as seen in the table below. Hydrogen is foreseen to become the prime gaseous energy carrier by 2050. It is far from certain that this transition will take place in the projected timeline, as this depends on many and uncertain factors. The pace of technology, the global energy landscape, geo-political developments, and national policies all have major influences on the rate of adoption of hydrogen and biomethane. Thus, gaseous energy carriers will continue to play a key role in the European energy system.

	2020	2030	2040	2050
Hydrogen use (EU)	250	340	1350	2300
Biomethane use (EU)	32	350	...	920
Gas demand	450	3000-5000	...	1900

Figure 2 European gaseous energy demand and projections indicating the scale of the energy transition from natural gas to hydrogen and biomethane. Hydrogen projections are from [8] [9], biomethane projections from Gas for Climate [10]. F in TWh/yr.

Repurposing gas transmission assets

Naturally, parties in the gas sector look at repurposing natural gas infracture. The costs of repurposing the gas network is about one third of the costs of developing a newly built dedicated hydrogen infrastructure [9]. This figure has major implications for the role of TSOs in the development of hydrogen infrastructure, yet the technical feasibility that underlies the repurposing cost assumptions has not been conclusive.

Today, two technical issues challenge the feasibility of repurposing gas pipelines for hydrogen transmission:

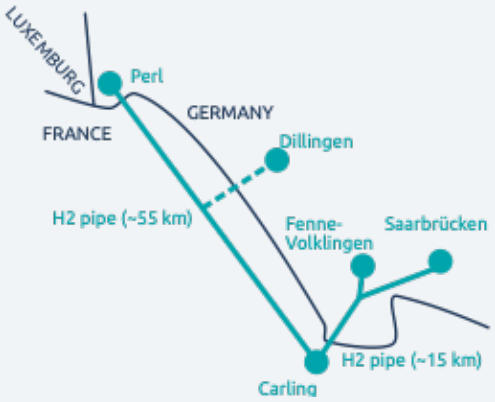
- **Hydrogen could cause steel pipes to become more brittle.** Embrittlement is especially foreseen as an issue for the high-strength types of steel typically used by TSOs [12]. Altough this effect is not yet sufficiently studied, it could have major consequences for the repurposing of pipelines. Embrittlement could be limited by conscientious pipeline inspection, hydrogen-resistant liners, or specific coatings.

- **Current centrifugal compressors are not suitable for hydrogen.** The current state of technology does not permit the use of existing gas compressors, which are often gas-driven turbo-compressors. There's a need for hydrogen-resistant impeller materials, but they are not yet developed. Experts think this could happen as early as 2030 [13]. In the meantime, reciprocal compressors can be used for smaller hydrogen pipelines. However, for larger pipelines these are less efficient. Extra compression is necessary to achieve the full potential of a pipeline. This can be accomplished with booster stations at every 100 km. Boosting is not expected to be needed until 2040 or 2050.

In conclusion, repurposing is a real, viable and affordable option, but uncertainties remain. This will affect the speed of implementation, as some of the necessary technology is still to be developed.

Example of regional cooperation: mosaHYc

Discussions about hydrogen and renewable gases may appear theoretical exercises: goals for 2050, entire industries to be converted to hydrogen, international hydrogen networks replacing natural gas. It can be difficult to fully grasp the practical implications.



Repurposing 70km of pipelines

However, the first regional implementation projects in hydrogen infrastructure have already started. MosaHYc (Moselle Saar Hydrogen Conversion) is such a project. It was launched in March 2020 and is the first cross-border hydrogen pipeline project in Europe. The infrastructure will be operational from 2026 onwards with a total length of 100 km, of which 70 km will be repurposed gas pipeline infrastructure. The infrastructure will have a capacity of 20.000 m3/h and is estimated to reduce CO2 emissions by 980.000 tCO2e per year until 2030 [14].

MosaHYc connects many different stakeholders across the hydrogen value chain: hydrogen producers (GazelEnergie, Steag), users (such as SHS), and network operators (CREOS Luxembourg, CREOS Germany, and GRTGAZ).

MosaHYc timeline

Date	Milestone
2021 Q1	Expression of interest
2021 Q3	Starting of planning, EU (pre-)notification
2023	Signing of network agreements, funding notice
2024 Q1	Service provider selection, public permits available
2025 Q1	Construction start
2026 Q1	Completion, commissioning

Figure 3 MosaHYc timeline and graphical representation of network

Kickstarting a hydrogen region

When mosaHYc succeeds it will show that making a hydrogen network from existing gas infrastructure is possible. It will also kick-start the hydrogen use and production in the region. So that it is possible for the region to transition from gas and other fossil fuels to low-carbon and renewable hydrogen. For the Grande Region, mosaHYc is the nucleus that enables the connection to the European Hydrogen Backbone network. It is the start of a regional hydrogen economy.

2. Understanding the legislative context

The context for the Hydrogen and Decarbonised Gas Market Package is shaped by the intersection of two ongoing European legislative projects.

One internal energy market

The first is the project of creating optimally functioning transmission networks in the energy sector. Transmission grids that contribute to fair markets and security of supply, and with sufficient capacity for energy demand. In the past, the EU and the European Commission have tried to achieve these goals through unbundling, privatisation and regulation of the transmission assets. With the Renewable Energy Directive packages (REDI and REDII), the establishment of the European Network for Transmission System Operators for Gas (ENTSOG), and the development of network codes, the EU gas market and transmission network have now been restructured.

Towards net-zero

The second legislative project is achieving the climate goals that the EU and Member States have set for themselves. With the UN Paris Agreement (2015), the European Green Deal (2020, which includes the EU hydrogen strategy [11]), EU Fit for 55 (2021), and the UN Global Methane Pledge (2021), the EU and its Member States have committed to ambitious decarbonisation targets. Achieving a 55% reduction of CO2-emissions by 2030 and net-zero emissions by 2050 requires a significant transition of the energy landscape. Deeply affecting the gas sector, as well as, the sectors it serves (heavy) industry, small business, residential, and power generation. This is where the EU Hydrogen and Decarbonised Gas Market Package comes in (2021) comes in.

The Hydrogen and Decarbonised Gas Market Package

Its two main goals are to (I) increase the adoption of low-carbon and renewable gases, and (II) establish a functioning hydrogen network. The package consists of a (binding) regulation as well as a directive.

It provides for measures in key EU policy areas:

- Develop a **dedicated hydrogen infrastructure and market**
- Facilitate the **access of renewable and low-carbon gases into the existing gas network**
- Foster more **integrated network planning** between electricity, gas and hydrogen networks
- Promote consumer engagement in the renewable and low-carbon gas market
- Improve the security of gas supply and energy security

In this study, we will deep-dive into the key topics from the package affecting TSOs, and related parties, the most.

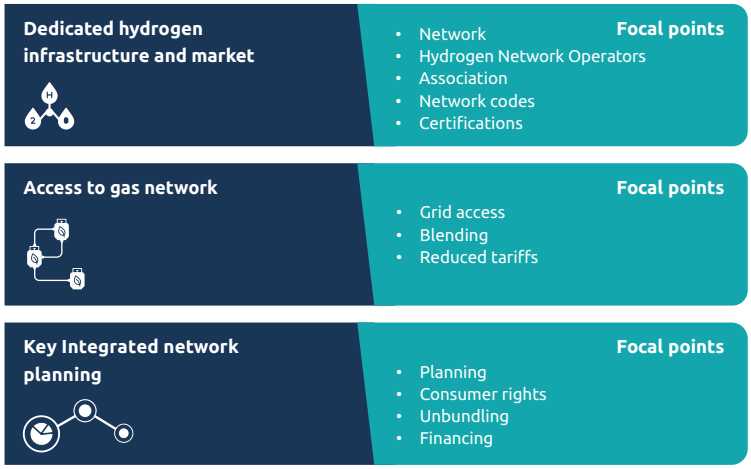


Figure 4: Key topics of the Hydrogen and Decarbonised Gas Market Package

3. Deep-dive into the package

Let's deep-dive into the Hydrogen and Decarbonised Gas Market Package. What are the key implementation challenges to achieving all obligations stemming from the package? TSOs, in particular, face many risks and uncertainties around market size, rate of hydrogen adoption, and availability of price subsidies.

1. Setting up a hydrogen transmission network

The policies in the regulation and directive aim to set up the hydrogen transmission network in a similar way as the gas network:

- Transmission assets are owned by operators, who are under supervision by the national regulatory authorities (NRAs) and its European counterpart (ACER). These operators are referred to as hydrogen network operators (HNOs), separate from transmission system operators (TSOs)
- The HNOs are regulated and unbundled from other market participants
- The rules that concern cross-border issues will be set in network codes
- The network is paid for with tariffs that are set in network codes
- Hydrogen network operators will form an association, The European Network of Network Operators for Hydrogen (ENNOH). Similar to ENTSOG (for gas) and ENTSO-E (for electricity) and with identical tasks, see also below.

Repurposing gas pipes

A major component of the hydrogen strategy is the repurposing of existing gas pipes, which means many of the future hydrogen transmission assets are currently owned by gas TSOs. When the time comes to retrofit pipelines, there are two options:

- A gas TSO can form a hydrogen network operator (HNO) and sell its transmission assets to the HNO
- A gas TSO can sell its assets to a third party that acts as an HNO

> *TSOs will need to adapt to a new role in the (renewable) gas and hydrogen system*

2. Creating new Hydrogen Network Operators

Hydrogen Network Operators (HNOs) are foreseen as the hydrogen equivalent of TSOs. HNOs operate the hydrogen network, are responsible for transmission and are allowed to act in storage and balancing of the hydrogen network.

The definition of an HNO is presented in the directive as follows:

"'hydrogen network operator" means a natural or legal person who carries out the function of hydrogen transport and is responsible for operating, ensuring the maintenance of, and, if necessary, developing the hydrogen network in a given area and, where applicable, its interconnections with other hydrogen networks, and for ensuring the long-term ability of the system to meet reasonable demands for the transport of hydrogen"

Transition period

After a transition period (from the passing of the package to 2030) transmission assets and their operators can no longer be part of a company that has other activities in the gas market. After 2030 only two models of unbundling are allowed: (I) ownership unbundling (OU) and (II) independent

system operators (ISO). The model of independent transmission operator (ITO) will no longer be allowed. The HNO will need to be its own legal entity, which can still be owned by a company with activities in the gas market. This is unlike the gas sector, where existing undertakings can keep using the ITO model if they are already structured that way.

Overview of key activities and phasing in the transion period

2023	ENTSO-G Infrastructure planning and development under current TEN-E	Hydrogen platform Scoping/development on: market cooperation, technical issues, network codes, security of supply
2024	ENTSO-G Infrastructure planning and development under current TEN-E	ENNOH Network codes and technical specifications on market cooperation, outlooks monitoring/reporting, cooperation, security of supply.
2026	ENNOH Infrastructure planning and development under revised TEN-E, TYNDP for H2, network codes and technical specifications on market cooperation, outlooks monitoring/reporting, cooperation, security of supply.	

Figure 6 Overview of key activities and phasing in the transition period between 2022 and 2030 [18]

Please note that the TEN-E Regulation, as proposed by the Commission in December 2020, aims to better support the modernisation of Europe's cross-border energy infrastructure. It introduces hydrogen as a new infrastructure. The present initiative is complementary to the proposed TEN-E Regulation as it focuses on alignment of the national plans with the requirements of the European wide Ten-Year Network Development Plan. See more details below.

> *One of the challenges is that TSOs will need to decide on setting up HNOs as separate companies from their gas activities*

3. Establishing an association of network operators

Like the gas network and the electricity grid, an association of network operators has to be established for the hydrogen network as well. The European Network of Network Operators for Hydrogen (ENNOH) is meant to promote the development and functioning of the internal market in hydrogen. It will also stimulate cross-border trade and ensure the optimal management, coordinated operation, and technical evolution of the European hydrogen network. As outlined in article 40 of the regulation, the ENNOH is an association of member network operators.

ENNOH's tasks

The proposed tasks that will be the responsibility of ENNOH are (amongts others):

- The development of network codes, see also below
- Adopting and publishing a non-binding Union-wide Ten-Year Network Development Plan (TYNDP), which includes an outlook on supply adequacy in Europe
- Adopting an annual work program, report, and outlook for the supply of hydrogen covering Member States where hydrogen is used in electricity generation or for supplying households
- Publishing a hydrogen quality monitoring report
- Promoting cyber security and data protection in cooperation with relevant authorities and regulated entities

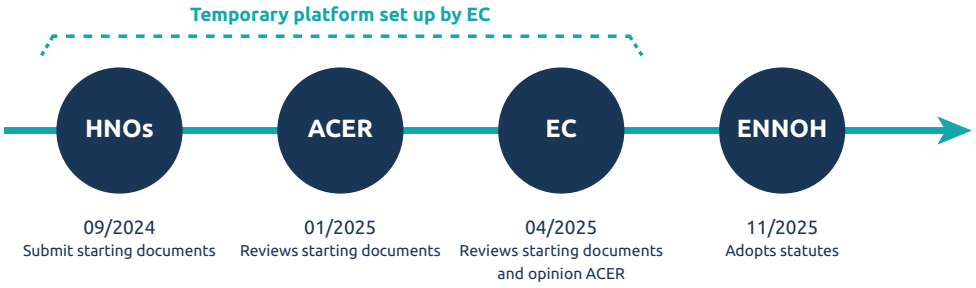


Figure 5 Timeline of the initiation of ENNOH. Dates refer to the latest possible date. The starting documents consist of the draft statutes, list of members, and rules of procedure.

Temporary platform

Before the establishment of ENNOH, the European Commission will set up a temporary platform, involving ACER and market participants including ENTSOG, ENTSO-E, and the EU's DSO entity. This platform will promote work on scoping and developing issues relevant for building of the hydrogen network and markets. In the transition period, the ENTSO for Gas will be responsible for the development of Union-wide network development plans.

> *TSOs need to ensure regional interests are reflected in ENNOH's activities and deliverables*

4. Developing hydrogen network codes

Network codes set the rules of the game for players in the (cross-border) energy sector. For hydrogen, the process of developing network codes is similar to those used in the gas sector. The intermediary hydrogen platform will scope the needed specifications of the network codes. Once ENNOH is established, the association together with its members will draft network codes that will be examined by ACER and the European Commission. If this examination is favourable, the Commission will adopt the network codes as a delegated act. If this process fails, ACER can propose network codes. As a last resort, the EC is also able to write network codes directly.

ENNOH is expected to develop, implement, and monitor the following network codes for hydrogen:

- Energy efficiency of the network
- Interoperability rules for the hydrogen network
- Rules for the system of financial compensation for cross-border infrastructure

- Capacity-allocation and congestion-management rules
- Rules regarding harmonised tariff structures for hydrogen network access
- Rules for determining the value of transferred assets and the dedicated charge
- Balancing rules including network-related rules on nominations procedure, rules for imbalance charges and rules for operational balancing between hydrogen network operators' networks
- Cyber security aspects of cross-border hydrogen flows

5. Providing for certifications

A crucial part of any market of low-carbon gases or low-carbon hydrogen is a well-functioning certification system. This is acknowledged by the Hydrogen and Decarbonised Gas Market Package. The basis of the certification scheme to be used in future markets is the Renewable Energy Directive (RED), specifically Articles 29 and 30.

In general, two systems of certification are considered for markets of renewable energy: (I) book-and-claim and (II) mass-balance system. The package favours a mass-balance system, in which a the origins of a renewable system can be traced back to its generation, as opposed to a book-and-claim system.

In a book-and-claim system, the market for certificates is separated from the market for the physical product. This system is generally favoured by operators of exchanges and (some) other parties as it does not require documentation of the origin of the gas throughout the supply and distribution chain.

Work in progress

The exact working of the certification system is to be worked out later, in a delegated act. This includes the exact definition of "low-carbon"; the Directive notes that a low-carbon gas should have a lifetime carbon emission at least 70% lower than its fossil equivalent, but does not specify a concrete methodology.

> *TSOs will have to wait for the certification system to take shape.*

6. Providing for grid access

The European Commission differentiates three categories of gas: (I) renewable (RES) gas, (II) low-carbon (L-C) gas, and (III) ('traditional') high-carbon gas. Renewable gases have a non-fossil origin. In the directive this explicitly includes biogas and biomethane, as well as Renewable Fuels of Non-Biological Origins (RFNBOs). Low-carbon gases are gases that have significantly lower greenhouse gas emissions (at least 70% emission reduction compared to fossil fuels). Although these definitions are conceptually clear, the exact methodology of calculating the emission reduction of a gas is not determined yet. This will happen in a delegated act.

Stimulating adoption and use

A major aim is to ensure equal access of RES and L-C gases to the grid and to promote the usage of the gas network by lowering tariffs. This will stimulate the adoption and use of these gases. Some of the key policies proposed to achieve this are:

- Ensure access to the grid: TSOs will have to provide firm capacity for the access of production facilities of RES and L-C gases connected to their grid. For this purpose, they will have to

work with Distribution System Operators (DSOs) to enable and ensure reverse flows from the distribution network to the transmission network.
- A reduction of 70% for tariffs on RES and L-C gases entering the grid, as well as entering and exiting storage facilities, see below.
- A reduction of 100% for tariffs on border crossings for RES and L-C gases, see below.
- Updates on gas quality network codes: new rules for managing cross-border restrictions due to gas quality differences, communication procedures, oxygen content, and so on.
- Gas blends containing up to 5% hydrogen will be permitted across the network, see below.

> *TSOs will need to collaborate to develop a certification and administrative system for renewable and low-carbon gases*

7. Facilitating blending of gases

Hydrogen can be blended directly with natural gas in the natural gas network. This combines two objectives: (I) it provides a demand for hydrogen and (II) it replaces some fossil gas with a low-carbon gas. However, the amount of hydrogen that is acceptable differs amongst users. For example, when used as a feedstock, any molecules other than hydrogen are basically a contamination, whereas when gas is used for heating, a large percentage of hydrogen is acceptable.

Rules for blending

To allow for hydrogen blending without disrupting users, the proposed regulation contains the following rules for blending:
- A TSO has to accept natural gas with any hydrogen content between 0% and 5% by volume at interconnection points. Therefore, TSOs are explicitly not allowed to restrict cross-border gas flows because of hydrogen contents if the hydrogen content is below 5%
- If TSOs do restrict cross-border gas flows because of hydrogen blends, they will automatically enter a procedure where authorities and TSOs work to remove the blockage as fast as possible
- TSOs are free to allow blending above 5%, however, bordering TSOs are allowed to block cross-border flows in this case.

With these rules, it is possible that regions will form. Member States that have users who can handle a high hydrogen blending (more than 5%) can form a region with a common blending standard. For example, they can choose to blend up to 15% hydrogen.

> *TSOs will need to collaborate in order to manage the impacts of hydrogen blending*

8. Reduced tariffs for low-carbon gases

There are two tariff reductions for renewable (RES) and low-carbon (L-C) gases. The first is meant to encourage usage of biomethane and other L-C and RES gases in the general grid, offering a discount for entering the grid and for entry/exit of storage, (I) capacity-based tariffs at entry points from RES and L-C production facilities, (II) capacity-based transmission tariffs at entry points from and exit points to storage facilities, with some limitations. The second tariff reduction, provides a 100% reduction in tariffs for cross-border flows of RES and L-C gases. For this discount, a certificate of origin needs to be provided.

Revenue losses for TSOs

Obviously, these discounts cannot continue in perpetuity. If RES and L-C gases scale up as expected, revenues of TSOs would drop significantly. This discount is to be reviewed after five years. The second has a more complicated wind-down mechanism. First, the transmission operators have to keep track how much revenue is lost due to the discount. When this exceeds 10% of the expected revenue from the specific tariffs covered by the discount, a process is started to phase out the tariff. Within three years, the operator with the declined revenues must negotiate new interconnection agreements with its neighbouring countries. Details of this will have to be worked out in network codes.

> *TSOs will need to collaborate on network codes and on interconnection agreements in order to minimise revenue losses*

9. Ensuring a smooth transition

To ensure that the transition of the gas sector is fair, secure and quick, the European Commission proposes a broad array of provisions. Some of the key proposals are:

- Integrated planning between the three (future) components of the European energy system, see also below.
- Consumer rights protections in the gas sector, following similar consumer rights protections in the electricity market
- Cyber security at every point in the gas grid. For this, there is an update to the network codes for natural gas. Cyber security is also added to the risk assessment of ENTSOG
- Updated rules on security of supply, especially regarding storage

The provisions on storage are updates to regulation 2017/1938 and give Member States the opportunity to coordinate storage and withdrawals from storage, especially when the risk assessment by ENTSOG indicates that Member States or regions are at risk. This risk assessment, also originally specified in regulation 2017/1938, is updated to include risks related to storage of natural gas.

Integrated network planning

Currently, the Ten-Year Network Development Plans (TYNDPs), at both national and EU level, are developed in parallel for gas and electricity by TSOs. The Hydrogen and Decarbonised Gas Market Package foresees an integrated network planning. This includes a holistic approach for both large-scale and local infrastructure planning, the promotion of low-temperature district heating systems, the expansion of the electricity grid (and making it smarter), as well as the repurposing of the existing gas infrastructure for hydrogen transmission, blending, and injection of renewable gas. For this, the package proposes that:

- ENNOH, ENTSOG, and ENTSO-E cooperate in their TYNDPs
- TSOs for gas, electricity and hydrogen (HNOs) cooperate to produce one national TYNDP per Member State
- This national TYNDP is based on a joint scenario framework and in line with the integrated national energy and climate plan. The joint scenario framework includes all relevant actors, including DSOs.

We observe three main challenges for developing an integrated planning: (I) network planning varies between Member States and TSOs, separate planning for electricity and gas; (II) no transparency on potential of existing infrastructure for repurposing or decommissioning; (III) DSOs not explicitly included in TSO planning.

> *Integrated planning will require coordination with an expanding set of stakeholders across the energy markets.*

4. Similarities to the electricity sector

It is no coincidence that many of the provisions for the new hydrogen networks are copied from the rules for the natural gas grid — hydrogen is a gas after all. However, there are key differences between natural gas and hydrogen. Differences that make it worthwhile to look at the electricity sector. One key difference is that hydrogen production is expected to be distributed broadly across Europe. Where natural gas is mostly imported, hydrogen can be produced at many locations across the EU. The same applies to biomethane, where a geographically distributed biomethane production is foreseen with strongholds in rural areas.

This distributed production of hydrogen and biomethane is similar to electrical power generation. It is both geographically distributed and season (or weather) dependent. For now, many of the operational rules for hydrogen networks are still in line with those of the gas sector. This is open to change in the future. It appears likely that the operational rules for the hydrogen network are closer to those of the electricity sector than to those of natural gas [15].

Lessons from working in regions

Even before this becomes a reality, there are things that can be learned from the organisation of the electricity sector. Regional cooperation on operational issues and regional markets is common in the electricity sector and important in dealing with distributed and weather-dependent supply. Many of these cooperations started on a voluntary basis. When these projects proved useful and possible, and more stringent rules and regulations were developed, these turned into more top-down organised cooperations. We foresee a similar development for the nascent hydrogen sector.

> *TSOs will need to organise themselves on a regional level early in order to set standards for future operational rules.*

5. Way forward: tackling the challenges

In this report we described some of the main implications for TSOs resulting from the EU Hydrogen and Decarbonised Gas Market Package. These implications present challenges to TSOs in the implementation of the package.

Regional cooperation is key

We expect that regional cooperation will be essential in shaping the future of the European hydrogen and gas sector, as it was in shaping the operational rules with European electricity TSOs. Gas TSOs should be proactive in forming regional collaborations, together with other TSOs and other organisations. We advise them to explore repurposing (unused) gas infrastructure and opportunities to develop dedicated new hydrogen transmission infrastructure. Creating hydrogen or biomethane regions.

In undertaking these projects, TSO and other parties involved will be able to test and shape the rules (codes) of the future hydrogen and decarbonised energy transmission system. This will allow gas TSOs to expand their practical experience with hydrogen and low carbon gases, influence the position of ENTSOG, and play an important role in the creation of ENNOH.

In these regional projects, TSO will likely face all the different challenges as identified in this report, however, by starting small, it will be at a manageable scale. Taking it step-by-step.

We're here to guide you.

About this report

The European gas market is quickly evolving: there is a steep increase in hydrogen and biomethane investment, increased usage of LNG, and major uncertainty in imports. To understand this changing market, Magnus Energy studied one of the fundamental pieces of European legislation for the decade to come: the Hydrogen and Decarbonised Gas Market Package.

We studied all proposed regulations and strategy papers related to the package. Tapping into our 15+ years experience in the European Electricity Market integration, we propose key recommendations. We verified our insights by interviewing experts from TSOs CREOS (Luxembourg and Germany), Energinet, and Tennet, as well as experts from energy exchange EEX and energy supplier EWE.

With this study, we aim to shine a light on the implementation challenges ahead. To help gas TSOs, electricity TSOs, and other interested parties prepare for the transition in the gas market.

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Maurits has a technical background in systems engineering and renewable energy. He is experienced in hydrogen projects and cross-border cooperation. Maurits excels in analysing and solving complex problems. He is valued for his excellent communication skills and team spirit.

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Tom has a background in Theoretical Physics. He brings along in-depth knowledge of hydrogen and gas markets. Tom is known to be a patient and skilled project manager with strong analytical and organisational skills. He excels in gathering and structuring complex information to guide decision-making.

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