

Information Memorandum for H₂ infrastructure



Fluxys Belgium

December 2021



Contents

1 H₂, a key stone towards decarbonization	2
1.1 Clear target to decarbonize	2
1.2 Fluxys Belgium developing H ₂ network in line with market needs	3
1.3 A cooperative commercial process to assess market needs	3
2 Substantiating the Belgian Federal Vision & Strategy for H₂	5
3 Regulatory framework	6
4 Commercial services	8
4.1 Key Principles	8
4.2 Commercial Model	8
4.3 Tariff methodology	10
5 Launching an Open Season to confirm requirements and start building the H₂ network	11
5.1 Non-binding Expression of Interest	11
5.2 Bilateral iterations	12
5.3 Binding commitment	12
6 Specific infrastructure proposals	12

Disclaimer

This document (the "Information Memorandum") sets forth certain information regarding the transportation of H₂ which is considered as a solution to achieve the targets of decarbonisation. The information contained in this document reflects the point of view of Fluxys at this stage and is publicly disclosed for information purposes only and without any commitment whatsoever from Fluxys, and should not be considered to give rise to any contractual relationship between Fluxys and any interested party.

1 H₂, a key stone towards decarbonization

The purpose of this document is to inform the market about Fluxys' ongoing developments of H₂ infrastructure in Belgium. Fluxys invites parties to work towards the goal of carbon neutrality by participating to the market consultation (RFI – Request for Information) or by expressing their interest for specific infrastructure proposals.

1.1 Clear target to decarbonize

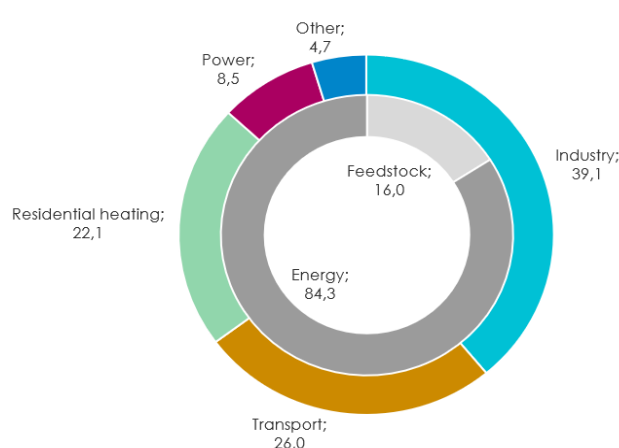
The **Green Deal for Europe** has set forward strong targets for the reduction in greenhouse-gas emissions to a minimum of -55% by 2030, and to be fully carbon neutral by 2050. As the 2050 projections by the European Commission indicate, a net-zero emissions energy system will probably be based on about 50% carbon-neutral electricity and about 50% carbon-neutral molecules such as hydrogen (H₂), biomethane, synthetic methane and other bio- and e-fuels. This means electrification with green power where possible and clean molecules where it is the greenest, most efficient clean alternative.

The electricity and gas systems have a complementary role to play, with a potential for gas-to-power production and power-to-gas conversion. Moreover, green molecules like carbon-neutral hydrogen will play an important role in the framework of a European carbon-neutral economy in 2050 to replace other molecules in many industrial processes.

Therefore, a successful energy transition will require infrastructure to produce, import, transport and store these molecules in the most appropriate and cost-efficient way. In this context, hydrogen is expected to represent an increasing share of Belgium's and Europe's future energy system.

A transmission network for hydrogen operated neutrally and with open, transparent and

non-discriminatory access conditions, is therefore a necessary step to link hydrogen supply and demand in the most economical and efficient manner. Carbon emissions in Belgium originate for almost 40%¹ from industry, either through energy use or process emissions, and for around 10% from power production. As large industrial companies are directly connected to the Fluxys network, a combination of new-build and repurposed network offers a cost-efficient solution to make industry's carbon



¹ www.climat.be – www.klimaat.be

emissions go down, hence making a key contribution to achieving the 2030 and 2050 climate targets for Belgium and its regions.

A range of industrial processes requires high temperature heat for which electrification is not an option. Connecting these industries to a hydrogen network offers them a valuable carbon-neutral alternative.

Furthermore, **governments are supporting** the transition towards hydrogen with different funding opportunities such as the EU Recovery Plan, Innovation Fund and others. The energy transition as set forward within the Green Deal, together with government support through funding, creates investment opportunities which must be seized now in order to reach the targets of 2030 and of 2050.

1.2 Fluxys Belgium developing H₂ network in line with market needs

Fluxys Belgium ('Fluxys') is a fully independent and neutral gas infrastructure company headquartered in Belgium. In this regard, the Belgian federal energy regulator has certified Fluxys Belgium as a transmission system operator of the natural gas transmission grid, the storage infrastructure and the LNG terminal infrastructure of Zeebrugge, in accordance with the full ownership unbundling model as per the European third package of legislative measures for the gas market. Fluxys is committed to bring the energy transition forward. The Fluxys assets are an essential complement to electricity network and serve as a cornerstone for secure, sustainable and affordable energy systems.

Fluxys, as neutral operator, is ready to build the open access gas network of the future. **Fluxys' plan is to progressively reconfigure parts of the natural gas network and build new infrastructure in Belgium to develop complementary systems:**

- for transporting methane (in which biomethane and synthetic methane will increasingly replace natural gas),
- **for transporting hydrogen (H₂),**
- for transporting carbon (CO₂),
- for transporting possibly also other molecules needed for the energy transition

It will be offered along with evolving markets demand. As Fluxys develops complementary systems to accommodate hydrogen, it unlocks new solutions for the industry in its efforts to achieve sustainable recovery and growth.

1.3 A cooperative commercial process to assess market needs

Together with the market, Fluxys has started a cooperative commercial process beginning 2021:

Market Consultation - Request For Information

Fluxys organised a webinar on January 26th 2021, which was the starting point for a cooperative commercial process to facilitate the development of infrastructure needed for hydrogen and carbon dioxide in Belgium.

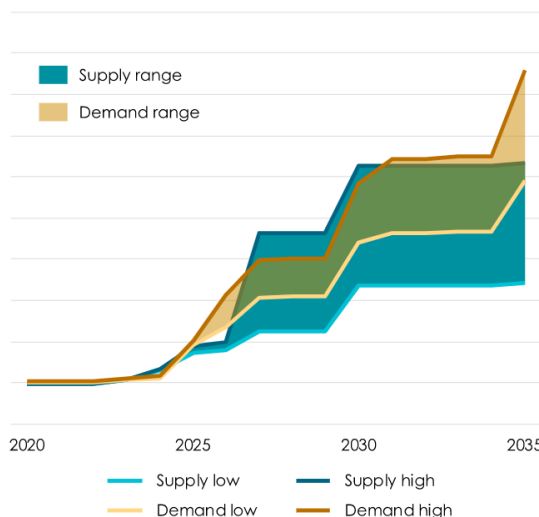
Potential users of the future hydrogen network were invited to participate at an informative market consultation and to fill out a Request For Information called “RFI”. The information gathered through the RFI gives a clear overview on how market needs develop geographically and over time, hence demonstrating interest for H₂ network. It is still possible to complete the Request for information [online](#) and Fluxys will continue to integrate the responses on a rolling basis.

Collect & aggregate through interactions with the market

The process of consolidating and aggregating the results gathered through the Request For Information responses was complemented with bilateral exchanges with the participants, which helped Fluxys to deepen its understanding of the market needs as well as to address some technical aspects.

Primary conclusions of the market consultation

The market confirmed its interest and the necessity to have access to an H₂ network, already in the short term. The H₂ volumes and timings, as well as the quality and representativeness of the data provide solid ground to move to the next steps towards developing such H₂ network:



- Overall hydrogen demand in Belgium is already strong as of now (Volumes on the graph are intentionally left blank to respect confidentiality).
- Aggregated demand over the 2025-2030 period doubles or even triples and this uptake is linked to several concrete projects among the participants with high maturity.
- The 2030-2035 period sees another significant uptake, albeit on a less mature basis as participants have limited forward visibility on hydrogen, electricity

and carbon dioxide prices.

- Aggregated supply level evolution shows a similar basic step-wise trend. Across the supply and demand ranges however, there are scenarios indicating the need for additional supply through increased local production and imports.
- Demand and supply balance at cluster level shows great variety between clusters.

Matchmaking/Matching process: Unify supply and demand in order to match H₂ needs

Fluxys is willing to develop infrastructure according to market needs and therefore approached participants that participated at the RFI, in the Antwerp, Ghent, Hainaut, Liège and Limburg areas, to facilitate mutual exchanges between off-takers and suppliers in order to match their hydrogen demand and supply needs. New participants to the RFI are as well integrated within the ongoing process of matchmaking and are put in contact straight away with existing participants of opposite role (supplier versus offtaker) within the cluster.

Confirmation by market of infrastructure needs

As outcome of bilateral matchmaking interactions between suppliers and offtakers, a non-binding indication allows Fluxys to evaluate whether there is sufficient market demand to proceed to an Open Season phase for hydrogen transmission in order to propose a specific open access hydrogen network.

This Open Season will offer all participants, even if they did not participate at the RFI or the matchmaking process, the possibility to join the commercial process for the development of the proposed hydrogen network.

2 Substantiating the Belgian Federal Vision & Strategy for H₂

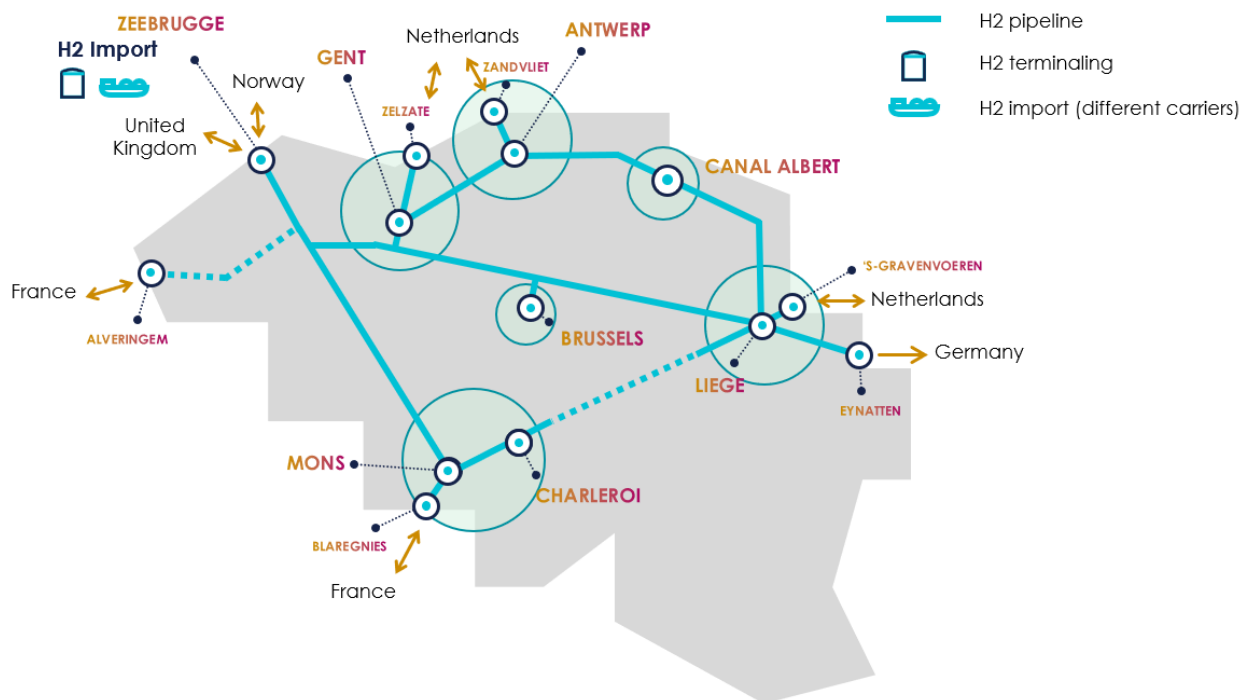
On October 28th 2021, the federal government of Belgium approved and published its hydrogen strategy. The Belgian federal strategy consists of 4 pillars and aims to position Belgium as an import and transit hub in Europe for green hydrogen, to make our country a leader in hydrogen technologies, to create a robust hydrogen market through the



implementation of a hydrogen open access backbone, and finally to encourage the different stakeholders to pool their strengths and know-how.

The creation of a robust hydrogen market requires

the ability to transport the molecules easily between the import locations such as Zeebrugge, the different industrial clusters and with neighbouring countries.



By 2030, the federal government wants an open access backbone for hydrogen connecting the ports (Zeebrugge, Ghent, Antwerpen) to the industrial zones and with our neighbouring countries. A first phase will already be realized in 2026 within the H₂ backbone project under the National Plan for Recovery and Resilience from Belgium. This requires initial investments, but these become more limited in the case of repurposing existing natural gas network.

3 Regulatory framework

The European Commission has published its *Hydrogen Strategy*² in July 2020 and is also expected to publish by the end of 2021 the first proposal of the *Hydrogen and gas market decarbonisation package*³.

The pace of introduction of this regulation is still under discussion, but a consensus has emerged on the fact that the regulatory principles should be clarified from the onset and that those principles should be inspired from the experiences of European regulation of gas and electricity markets.

² https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

³ https://ec.europa.eu/energy/topics/markets-and-consumers/market-legislation/hydrogen-and-decarbonised-gas-market-package_en

ACER (European Union Agency for the Cooperation of Energy Regulators) has published a *White Paper*⁴ on February 9th 2021, putting forward basic recommendations and principles along which the European proposal for a regulatory framework for H₂ network could be structured.

The Belgian regulator CREG has published a study⁵ on November 25th 2021, examining whether a regulatory framework is needed for the transmission of hydrogen. CREG has conducted an inquiry amongst market participants which revealed several barriers in the current hydrogen market organisation. CREG therefore advocates for the progressive introduction of a regulation of hydrogen transmission.

An early regulatory framework for hydrogen is thus key to embrace tomorrow's hydrogen economy and develop a well-functioning and sustainable internal market for hydrogen.

With the "hydrogen economy" put forward in the European Hydrogen Strategy, the role of hydrogen has significantly changed. Hydrogen infrastructure is now becoming an essential facility.

The primary drivers for regulation of the infrastructure sector in energy are to ensure:

- open access to transmission infrastructure on a non-discriminatory basis
- transparency and clear access rules
- neutrality of network operators
- proper competition - consumer protection
- well-coordinated or joint network development plans with an overall energy system perspective in mind
- overall system optimization and economic efficiency (i.e. to ensure the right scaling of new investments and to develop synergies between regulated networks);
- an optimal use of the infrastructure (including repurposing of existing assets);
- environmental protection
- social justice - universal supply

Fluxys therefore already integrates the basic principles of regulation in its process of interaction and within its initial approach of offering infrastructure services.

4

https://documents.acer.europa.eu/Official_documents/Position_Papers/Position%20papers/ACER_C_EER_WhitePaper_on_the_regulation_of_hydrogen_networks_2020-02-09_FINAL.pdf

⁵ <https://www.creg.be/nl/publicaties/studie-f2291>

4 Commercial services

4.1 Key Principles

Based upon the main principles of the European proposal for a regulatory framework for the transmission of hydrogen, as set forth in the previous chapter, Fluxys will apply the following key principles to its commercial model for transmission of H₂:

- **Unbundling** of transmission services and marketing of the commodity,
- **Non-discriminatory open access to the network** to ensure a level playing field for participation in the emerging H₂ market,
- **Cost-effectiveness** pursued to maximum extent based on Fluxys' operational pipeline expertise and with optimal reuse of existing natural gas network for the development of the H₂ network.

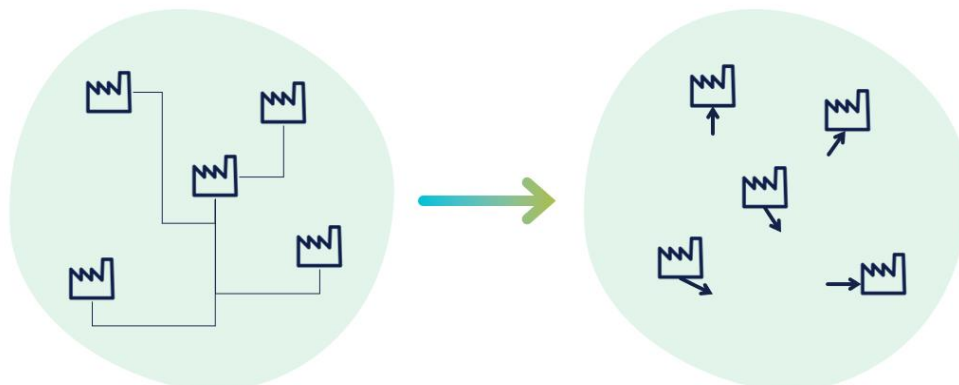
4.2 Commercial Model

The network which could be developed as a result of confirmed market interest will be operated by Fluxys under a commercial model which will be based on the natural gas model and anticipating a potential future regulation, however with a more simple and agile approach adapted to the nascent market of H₂.

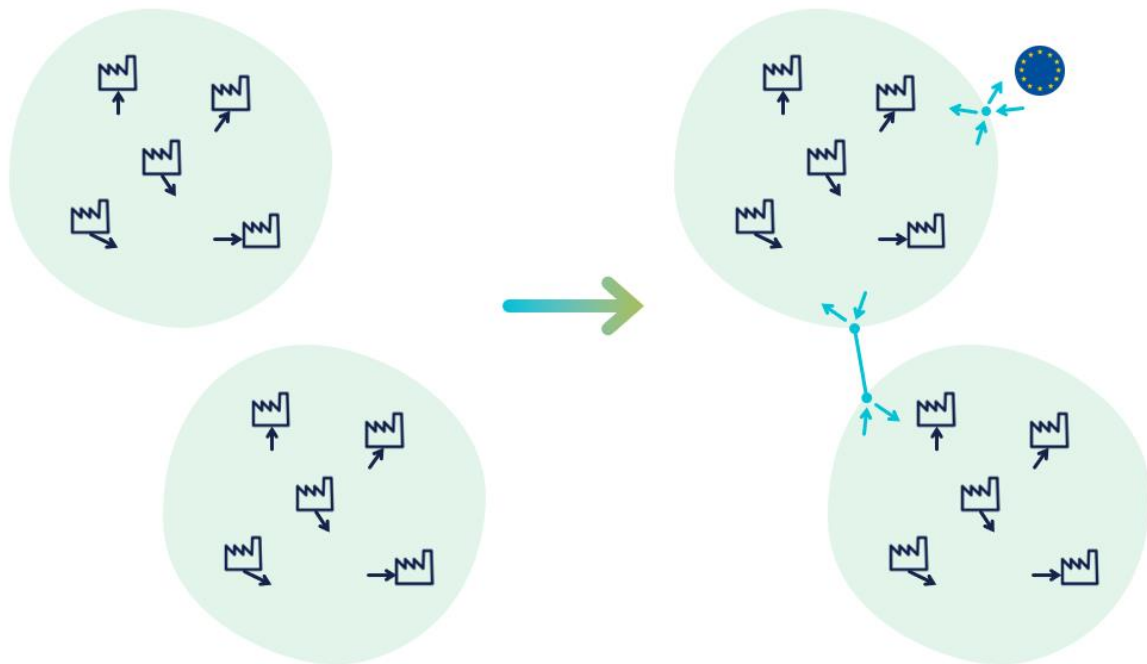
An entry-exit system allows to book transmission capacity independently at entry and exit points. Each exit point can be supplied from any entry point. It hence provides more flexibility and reduces complexity for the users in opposition to predefined transportation routes (known as point-to-point).

The independence of entry and exit capacities is additionally supported by a virtual exchange point where H₂ can easily change ownership by transfer from the seller to the buyer. This set-up facilitates trading in the wholesale H₂ market and enables the market to work flexibly and competitively.

Fluxys proposes to offer transmission services in the form of access to entry/exit within clusters. Each development of infrastructure within a cluster will deploy a local entry/exit zone.



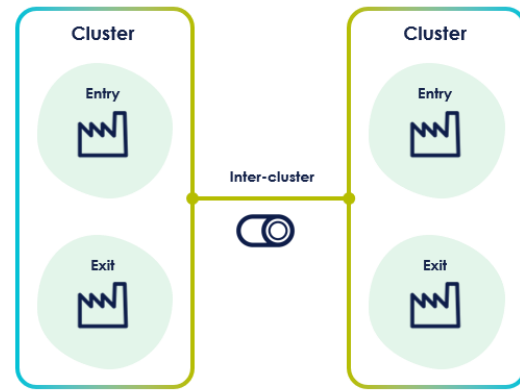
Progressively, further development of clusters and of inter-cluster connections will enable transfers within a broader area, ensuring an increase in market liquidity and an increase in security of supply and flexibility. The hydrogen clusters and inter-cluster connections development will also progressively be complemented with cross-border interconnections with neighbouring systems, allowing customers to rely on a growing European hydrogen market and to have access to green hydrogen produced far away within the shortest possible period.



The proposed commercial model offers the following opportunities:

- any consumer in a defined cluster can be supplied from any entry point in the cluster, and conversely any supplier on an entry point can supply any consumer within the same cluster,
- with growing connections of consumers or suppliers within a cluster, more possibilities develop for sourcing and supplying,
- capacity subscribed on a long term basis at entry or exit points, doesn't commit to a specific routing and hence offer liberty of changing commodity supply and sourcing routes through time
- entry capacity enables a supplier to inject a quantity of H₂ at the connection point, while exit capacity enables the consumer to withdraw a quantity of H₂ at the connection point. In contrast to a point-to-point model, the services are dissociated from each other, which facilitates optionality of supply and offtake over time

- with inter-cluster connections between clusters or cross border connections, even more possibilities develop for sourcing and supplying where suppliers or consumers will have the possibility to access a bigger market through building blocks by subscribing additional transmission components such as an inter-cluster connections component.



In order to be able to benefit from these commercial model, following conditions do apply:

- a balance between entries and exits in each cluster is required for a reliable operation of the network,
- Entry, Exit and inter-cluster services are capacity services offered with ship-or-pay charges, which are not dependent on the actual use
- the quality of the injected and redelivered H₂ must comply with agreed quality specifications
- different origins of H₂ are physically mixed within the network, while a system of certificates enables customers to additionally valorise the green or low carbon value of the H₂

4.3 Tariff methodology

Fluxys proposes a non-discriminatory tariff structure and will be able to disclose indicative tariff levels during the non-binding Expression of Interest phase for every specific cluster or inter-cluster connection proposal. By default, following tariff characteristics will apply:

- Long term subscriptions are required to be able to take final investment decision
- Capacity is expressed in kWh/h on a yearly basis, and tariffs are expressed in €/kwh/h on a yearly basis
- For cost-reflectiveness, tariffs are based on the cost for the necessary network to be built or repurposed and the operating costs
- Tariffs are subject to inflation over time, and could further evolve based on an optional market participation mechanism
- Specific conditions may apply for specific isolated infrastructure

5 Launching an Open Season to confirm requirements and start building the H₂ network

An open season is a call for subscriptions allowing transparent and non-discriminatory allocation of access capacity to infrastructures.

To guarantee an efficient development of the H₂ network, Fluxys proposes to join forces and to unite the Fluxys' RFI participants and new interested parties through an Open Season based methodology consisting of 3 steps: non-binding Expression of Interest, Bilateral Iterations and Binding Commitment.

Based on market demand and maturity level within a cluster, Fluxys will develop a specific infrastructure proposal. For every cluster or inter-cluster infrastructure proposal, Fluxys will address the market, ensuring a level playing field. With growing market maturity in different regions, several Open Seasons will hence be triggered for separate geographical proposals: industrial clusters, inter-cluster connections, border crossings and import locations.

A schematic representation of this Open Season process is depicted below.



5.1 Non-binding Expression of Interest

All market players are first invited to participate in the Expression of Interest phase, where they confirm their interest in the proposed H₂ network and are interested to exchange on a basic proposal of contractual terms and cost coverage principles. This is a non-binding phase, but a prerequisite to ensure participation through the Binding Commitment.

Following data is requested from the interested parties:

- expected operations start date
- expected date when binding commitment is possible/required
- locations of entry or exit to the H₂ network

- hourly capacities (peak) and yearly volumes of H₂ supplied/offtaken in the H₂ network
- load factor and daily/seasonal usage profile
- minimal and maximal pressure requirements
- potential future increases on capacities (peak) and yearly volumes

Above shared information will be treated as confidential in accordance with the Expression of Interest provisions.

A link to the participation form, to enter into Expression of Interest, is available within every specific proposal document and on the Fluxys website. The closure date for the participation (for every specific proposal) will be published on Fluxys' website in due time with a prior notice period.

5.2 Bilateral iterations

In the 2nd step Fluxys engages in further discussions with parties having submitted the Expression of Interest in order to finetune and align

- the technical design
- the service offering
- the terms and conditions

The necessary dimensioning of the network and the according capacity, the timing and phases, the offered services and the terms and conditions will be further elaborated based on mutual input during this phase.

5.3 Binding commitment

Finally, based on the final output of the previous phase, a binding commitment is taken for a specific technical design with associated timing for start of operations and terms and conditions. This binding commitment is the final step towards building the hydrogen network.

Binding commitments obtained in 2022 could in principle result in a commissioning phase prior to mid-2026.

6 Specific infrastructure proposals

Fluxys will publish specific infrastructure proposals ("Information Memorandum Proposal for H₂ infrastructure: *Name*") in addition to this document in order to announce the specific development of infrastructure with increased maturity. Publication will be triggered according to evolution of market needs and maturity. In those Information Memorandum Proposals you will find a detailed routing proposal of H₂ pipelines or import infrastructure reflecting actual and potential future demand.

Fluxys invites all potential users of the hydrogen infrastructure to participate to the Open Seasons. Interested parties can also share additional H₂ infrastructure needs via

info.hydrogen-carbon-transport@fluxys.com or via the Request For Information in order to trigger specific development of new proposals.

Shaping together a bright energy future!