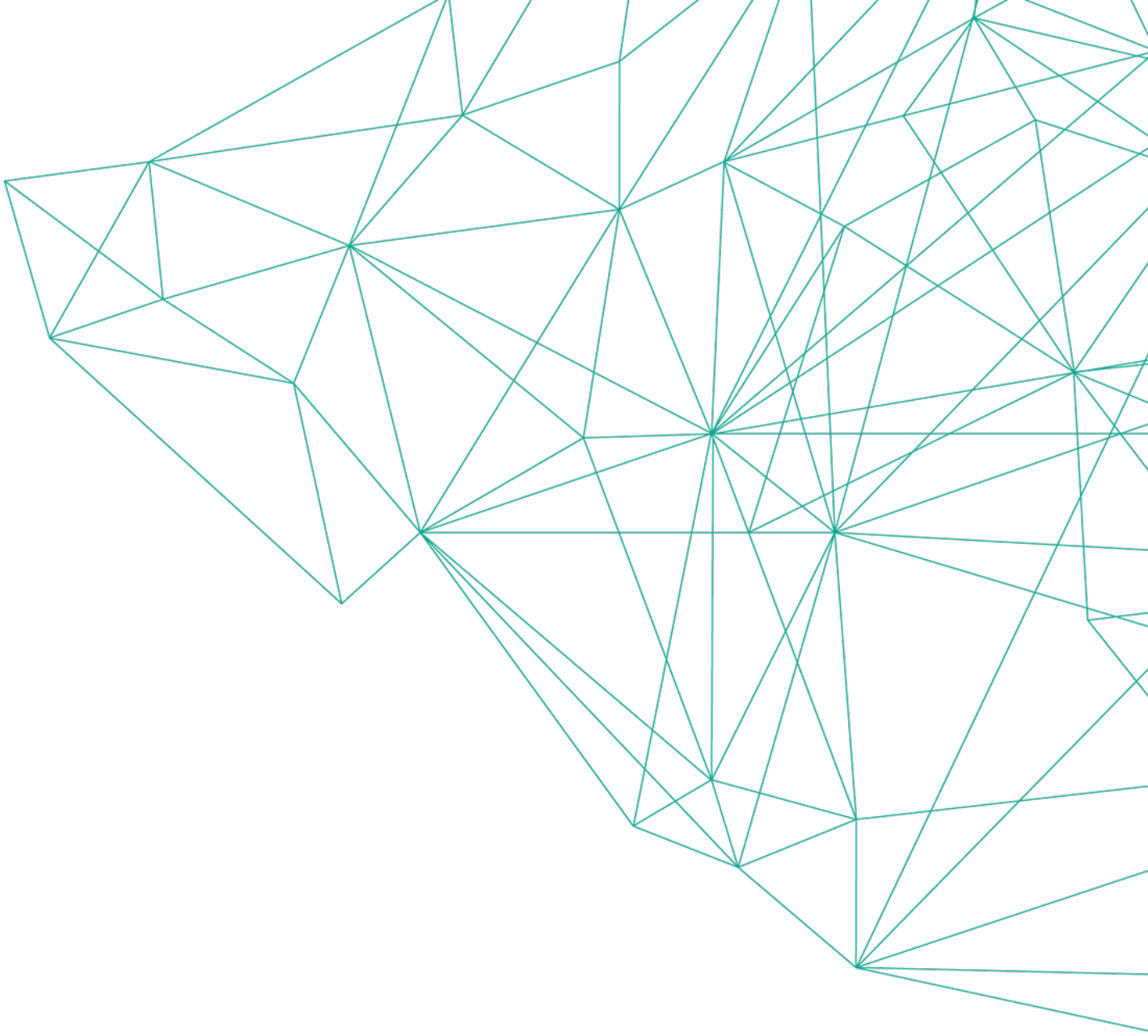


INFORMATION PACKAGE 2 SEPTEMBER 2024

Danish Hydrogen Backbone

ENERGINET

Content

SECTION 4 – NEXT STEPS

1. Introduction

In order to accommodate the general knowledge sharing between Energinet and the market regarding the development of the Danish Hydrogen Backbone (DHB) and the framework for the future utilisation of a Danish Hydrogen Transmission Network, Energinet will publish information packages to the market on relevant subjects. This is the second of two planned information packages in 2024. Energinet expects to release further Information packages during 2025, to support the market in the user commitment process.

The information is based on Energinet's best available knowledge on the subjects at this point in time.

The information provided in this paper is dependent on the development of both a national and European legal framework. The current status on the regulatory framework can be found in Section 3 of this paper Therefore, the information provided is not final and may be subject to changes in coming information packages.

This information package presents Energinet's regulatory thinking about the principal design features of the future terms and conditions for connection and access to the hydrogen infrastructure and the future design of a hydrogen market model in Denmark. The principal design features are based on Energinet's current expectations to the development of the emerging hydrogen market as well as the concerns expressed by investors and market participants.

The envisioned terms and conditions are based on Energinet's understanding of the present EU-regulation and Energinet's expectations to the transposition of Directive 2024/1788/EU on common rules for the internal markets for renewable gas, natural gas and hydrogen into Danish national law, as suggested in the Danish political agreement on financial conditions for hydrogen infrastructure of 4 April 2024[1].

Based on dialogue with investors and market participants, developments in EU and national law as well as up-dated data about the expected development of a hydrogen infrastructure and a hydrogen market in Denmark and other European countries, Energinet will in the coming years develop the terms and conditions for submission to the Danish Utility Regulator (DUR) and methodologies for regulatory approval pursuant to national and EU regulation.

Energinet will strive to follow the principal design features as laid out in this information package. Energinet is, however, also committed to develop the terms and conditions to address the development of the emerging hydrogen market and the concerns of investors and markets players going forwards.

The information package has been discussed with DUR.

The information package is divided into four Sections. The first Section provides **general information** on various topics regarding hydrogen infrastructure. The second Section delves into the **market model for hydrogen transport** addressing topics that in time will be translated into "Terms and conditions for hydrogen transport". The third Section outlines the **regulatory framework**, detailing the legal and regulatory considerations relevant for hydrogen transport. Finally, the fourth Section presents the **next steps**, describing the expected timeline for methodologies to DUR, step two of the user commitment process and Energinets expectations for further information packages.

[1] Økonomiske rammevilkår for brintinfrastruktur -2. delaftale om rørbunden brintinfrastruktur_ april 2024.pdf (kefm.dk)

SECTION 1 – GENERAL INFORMATION

2. Information on German project and process

2.1 Information on German hydrogen outlook and projects

Energinet has been working together with Gasunie since 2020 looking into the feasibility of a cross-border hydrogen interconnector. In November 2023, Gasunie and Energinet signed a cooperation agreement committing ourselves to working towards realising this cross-border interconnector between Denmark and Germany. The driving forces has been that Denmark expects to become a large-scale producer and a net exporter of green hydrogen and that Germany expects to become a net importer of green hydrogen.

Below is an update from Gasunie on the national German ambitions for hydrogen and on their activities for realising the hydrogen infrastructure.

2.2 German (import) strategy on hydrogen

Germany launched their hydrogen strategy in 2020[2] with an update in 2023[3]. With this update the German ambitions for usage of hydrogen are even more significant. The expectation is that around 1/3 of the hydrogen production will be domestic, the rest coming from neighbouring countries or far distances. The strategy estimates a total hydrogen need of between 95-130 TWh in 2030.

Furthermore, the Federal Cabinet published an import strategy for hydrogen in July 2024[4]. The paper confirms the previous demand estimate for 2030 to be 95 - 130 TWh and for 2045 to be 360 - 500 TWh. The strategy paper also estimates that the import quota will be in the range of 50 - 70 %.

A few highlights from the two strategies:

- Towards 2037, approximately 9.600 km of hydrogen pipelines will be established/repurposed in Germany, connecting Germany to other European countries and being part of the European Hydrogen Backbone.
- The strategy has an industrial objective as it expects to support the development of a significant German hydrogen-related industry. The use of hydrogen in a wide range of sectors is foreseen, from steel and chemical industries to mobility, the heating sector and as power supply backup through the establishment of power plants that can be powered by hydrogen.
- The North Sea area and in particular Denmark is explicitly named as one of the first and most important import corridors for green hydrogen.

2.3 Core Grid

In Germany, there is a total of 15 Gas-TSOs (methane) who are all organised in FNB Gas (Vereinigung der Fernleitungsnetzbetreiber Gas). FNB Gas is responsible for hydrogen network planning and establishing of core grid (Kernnetz).

On 22.7.2024 FNB Gas submitted a joint application for a hydrogen core grid to the Federal Network Agency (BNetzA). It concerns a Germany-wide, expandable, efficient and quickly realizable hydrogen network which can accommodate 278 TWh (87 GW) market demand. The core grid will, following market development, gradually connect central consumption and production hubs as well as storage and import centres by 2032/37. It lays the foundation for the ramp-up of the hydrogen economy in Germany.

The hydrogen core grid has a planned investment size of around 20 billion euros. Initially, only a few Network Users will use the pipelines and therefore comparatively low capacities will be booked. In order to prevent prohibitively high grid

[2] National Hydrogen Strategy: Green hydrogen as energy source of the future - BMBF

[3] Markthochlauf für Wasserstoff beschleunigen – Bundeskabinett beschließt Fortschreibung der Nationalen Wasserstoffstrategie | BMZ

[4] Importstrategie für Wasserstoff und Wasserstoffderivate (bmwk.de)

fees during the ramp-up phase, the first grid users will benefit from a transportation fee determined by the BNetzA that is significantly lower than needed to cover actual grid costs. This delta is equalized by an intertemporal cost allocation mechanism, that allows for renumeration of these uncovered costs in future years. However, this mechanism comes with a significant risk for network operators since – depending on market development - there is no guarantee of full cost recovery. The tariff level for the next three years is expected to be determined and published by BNetzA at the end of 2024.

All projects with a commissioning date before 31 December 2027, for which work has begun by 2025 at the latest, will be confirmed with the final review of the core grid application by the Federal Network Agency in autumn 2024. All other projects listed in the core grid will be reviewed through the German Network Development Plan (NDP) process. The market therefore has a clear trigger mechanism in place: the realisation of these projects is triggered by reliable capacity requirements and commitments by the market.

2.4 Gasunies hydrogen projects

Over the last few years, based on Gasunie`s current natural gas transport asset position, Gasunie developed multiple hydrogen transport opportunities under the umbrella project name Hyperlink. Hyperlink (approx. 1000 km, >60% repurposed) connects key entry points of the Northwest European energy system (Netherlands, offshore pipeline/terminal import, Denmark) with German demand centres (e.g. Brünsbuttel, Hamburg, Bremen, Salzgitter, Ruhr area) and storages. The Hyperlink projects are in the Northwest part of Germany, the region which will be on stream the earliest (2027/28 onwards).

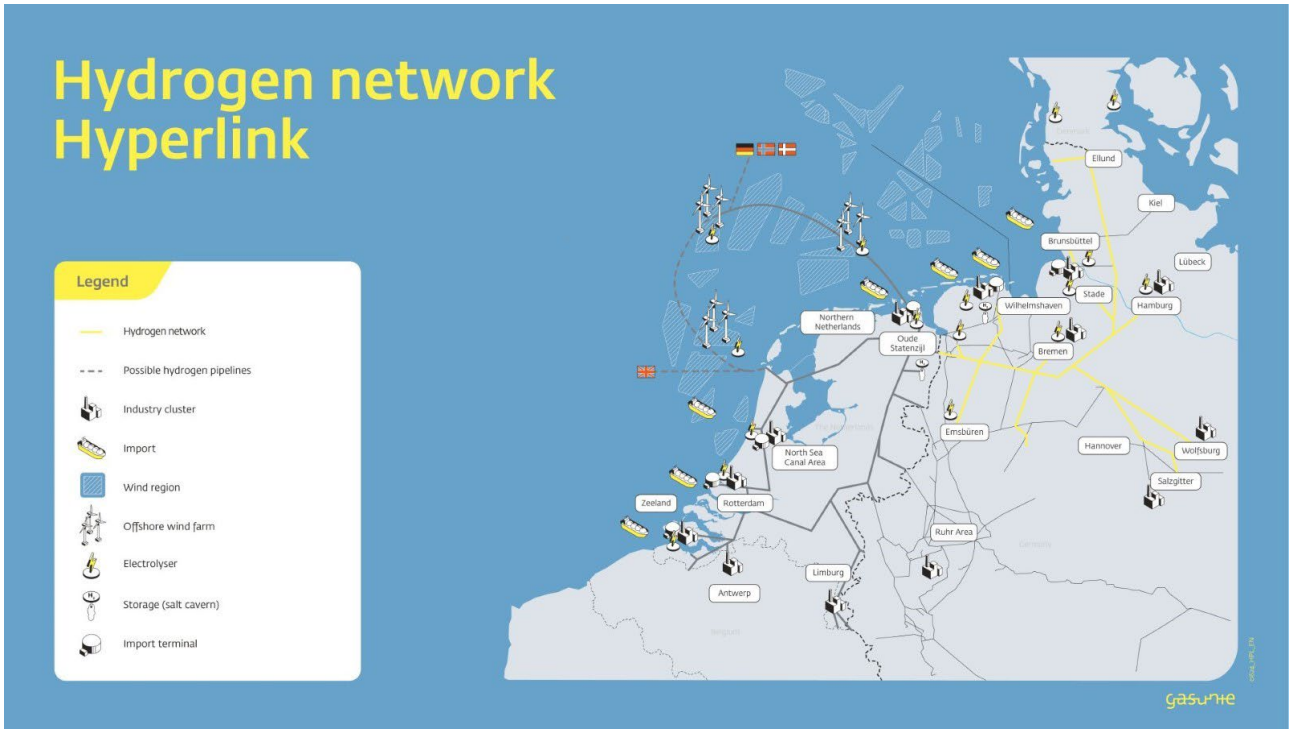


Figure 1: Hydrogen Network Hyperlink

Hyperlink consists of multiple stretches of pipeline, where Hyperlink 3 (HPL3) is the connection towards Denmark, see Figure 1. It stretches from the Danish border to Heidenau, south of Hamburg and consists of about 200 km primarily

repurposed methane pipeline. In Heidenau, the Hyperlink 3 will be connected to the remaining Hyperlink system of Gasunie and become an integral part of the national German core grid and European Hydrogen Backbone.

In the cooperation between Energinet and Gasunie, it is currently being looked into how to proceed with coordinated and potentially joint capacity sales for long term capacity bookings in both systems and with a focus on the cross-border interconnection point. The realisation timeline of HPL3 will depend on reliable capacity requirements and commitments by the market.

The coming NDP for methane and hydrogen is in progress. The NDP will provide a scenario-based outlook on possible demand scenarios and thus create the basis for implementing further pipeline projects in the core networks for both methane and hydrogen. The scenario framework which is the basis for the NDP has been finalised by FNB and is currently in consultation through BNetzA until end of September. A draft NDP will be published in 2025, and the approved version in 2026. This process is repeated every two years.

With the regulation “WANDA” (tariffs) BNetzA e.g. set up the principal of a fixed ramp-up tariff for the core grid and a principal of cooperation between the hydrogen TSOs. The framework will be based on an Entry/Exit model. It is expected that in the initial phase, when the network consists of slowly growing clusters, the Entry/Exit principle will only be applied to a limited extent. The first tariff setting by the regulator is scheduled for the end of 2024. The tariffs will be reviewed every three years and adjusted if necessary. Several regulations are currently under market consultation such as “WaKanDa” (capacity model and network access) and “WasAbi” (balancing regime).

3. Information on first filling of the pipeline

Before the Danish Hydrogen Backbone (DHB) goes into commercial operation, the pipeline network will need to be filled with hydrogen, to reach operational pressure. This hydrogen will be part of the asset and will therefore not be re-supplied to any end-consumers.

Even though the final scope for the first backbone project is not yet decided, it is expected that it will be the lower part of the network that will come into operation first, so the maximum scope for the first filling will be the "lower-T", meaning the connection from Esbjerg and Fredericia to the German border. Under the assumption that the existing 30" methane pipeline between Egtved and the German border is repurposed for hydrogen, and depending on the exact minimum pressure level, Energinet expects to source between 150-300 tons of hydrogen, to reach the minimum pressure level for the lower T. For filling of an additional 36" backbone all the way to Lille Torup an additional 500 tons of hydrogen is approximately needed.

Energinet considers three different options for filling:

1. The filling of the backbone is done from the first hydrogen producer(s) coming on stream.
2. The backbone is filled via a temporary reverse flow from Germany.
3. The backbone is filled via trucks.

The filling could be based on a mix of one, two or all three options, however Energinet will primarily investigate option one and two, whereas option three is considered as a backup solution. Option two would depend on availability of hydrogen producers on Hyperlink. It should be mentioned that in normal operation, physical reverse flow from Germany will not be possible due to the technical design, whereas it is possible to make a temporary technical solution before going into commercial operation.

It is uncertain how long it will take to fill the backbone; this will depend on how much hydrogen can be produced from the first projects connected to the infrastructure. Energinet estimates that it could take between a few days and up to a month, to the extent that such amounts are available within the planned time frame.

Energinet will procure the hydrogen volumes in due time before the filling is required, to reach the commercial operational date. The legal definition of the filling period is expected to be included in the terms and conditions for binding commitments, including any direct relation between the long-term capacity contract and the filling period.

Depending on the configuration of a complete, initial hydrogen network (transmission and distribution), Energinet and Evida[5] will make the necessary technical and commercial coordination.

[5] Evida is the other hydrogen network operator in Denmark. Further information can be found here.

SECTION 2 – MARKET MODEL FOR HYDROGEN TRANSPORT

4. Expected overall market model

The overall principles for a market model as described in this chapter are a precursor to what will later be translated into "Terms and Conditions for Hydrogen Transport". The market model for hydrogen transport includes subjects as market access, roles, a balancing model, capacity products and tariff design. The market model for hydrogen transport is deemed necessary as it is seen as a prerequisite for the market to be able to enter long-term capacity contracts as part of step two of the user commitment process.

This chapter contains the preliminary thoughts on the market model. The paper is being published to minimise the market uncertainty as much as possible and to accommodate the market's need for information on Energinet's expectation on how the market model will be developed.

5. Conditions and approach to the market model

The characteristics of the hydrogen market are expected to develop over time. When hydrogen infrastructure is first established, few market participants are expected to utilise it. Most of the hydrogen transported in the infrastructure is expected to be exported to Germany for consumption, as a national demand for hydrogen has not yet developed. Over time, more market participants will be connected to the infrastructure and the volumes transported will increase together with a national demand for hydrogen. However, the main part of the hydrogen transported in the infrastructure is still expected to be exported to the German market.

Therefore, the market model must be designed in a way so that it embraces both the early phases and a more mature market. This means that the market model must be scalable and configurable, but also that it will be subject to change as the market characteristics change and as both Energinet and the market participants gain a better understanding of how the market will function in practice.

As the hydrogen market evolves throughout Europe and network codes are developed, the Danish market might need to be adjusted to align with the European legislation and the markets in the neighbouring countries.

6. Entry-exit model

This chapter is mostly a repetition from the information package published in June. There has been minor corrections to the text and clarification of wording etc., which is why it has been included in this information package as well.

In terms of market access model, Energinet expects to organise a future Danish Hydrogen Transmission Network as a so-called entry-exit model from the commercial operation date (COD). This is also in line with the EU hydrogen and decarbonised gas market package stating that hydrogen networks shall be organised as entry-exit systems (from 1 January 2033).

What is an entry-exit model?

An entry-exit model is a market access model which allows Network Users to book capacity in any entry- and exit-points in the market area independent of each other. Hydrogen can thus be injected at the entry points and made available for off take at the exit points. It is a commercial model designed and based on the physical conditions of the network in the market area.

Typically, a so-called virtual trading point in the entry-exit model is used as a point in which the Network Users can trade hydrogen bilaterally. It is not connected to a physical point in the network. The virtual trading point is designed to

make sure that hydrogen can be exchanged independently of its location in the entry-exit model. In the EU hydrogen and decarbonised gas market package, it is a condition that undertakings active in the same entry-exit system shall exchange hydrogen at the virtual trading point (from 2033 at the latest)[6].

Design of the entry-exit model

The expected entry-exit model is illustrated in Figure 2 below. Please note that the proposed points in the entry-exit model may be subject for approval by the Danish Utility Regulator (DUR).

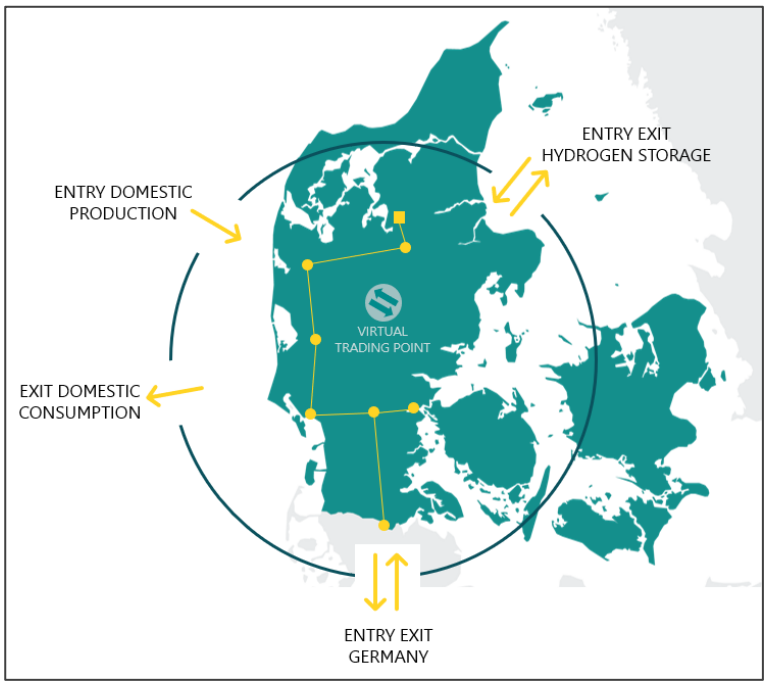


Figure 2: Illustration of the entry-exit model for the Danish Hydrogen Transmission Network (COD).

The entry-exit model consists of the following points:

- **Interconnection point DK-DE – Exit**: Export of hydrogen from Denmark to Germany via Ellund.
- **Interconnection point DK-DE – Entry**: Commercial import of hydrogen from Germany to Denmark via Ellund[7].
- **Domestic production – Entry**: Supply of hydrogen to the market area from Danish production sites. This point is anticipated not to be strictly limited to one physical location in Denmark, as hydrogen producers should be able to supply hydrogen to the market area irrespective of their connection to the distribution or transmission network in Denmark.
- **Domestic consumption – Exit**: Withdrawal of hydrogen for consumption. As with the point above this point is anticipated not to be strictly limited to one physical location in Denmark.
- **Hydrogen storage – Entry and Exit**: In the Storage Exit point from transmission to storage, injection of hydrogen from the network to storage is made possible; in the Storage Entry point, from storage to transmission, withdrawal from storage to the network is made possible[8].

[6] See Article 3 point (d) in the The EU hydrogen and decarbonised gas market package

[7] It will only be possible to physically export hydrogen from Denmark to Germany. However, there can evolve commercial or balancing reasons over time, where market participants would have an interest in importing hydrogen virtually to Denmark(as a counter flow to the dominant flow direction). Thus, having an entry point from Germany increases the possibilities for the market participants.

[8] Here shown as a part of the entry-exit model – but capacity can of course not be booked before the transmission infrastructure is physically connected to the storage facility etc.

- **Virtual trading point:** A virtual trading point for the bilateral exchange of hydrogen. This point includes both trades executed on a possible future hydrogen exchange and for bilateral Over-The-Counter trades between Network Users.

7. Roles in the market model

This chapter is mostly a repetition from the information package published in June. There has been minor corrections and additions to the text related to the legal background, clarification of wording etc., why it has been included in this information package as well.

Background

It is a fundamental regulatory principle that Hydrogen Transmission Network Operators (HTNO) shall offer their services on a non-discriminatory basis to all Network Users. In the newly adopted EU hydrogen and decarbonised gas market package, it is stated in the Directive (Article 35 and Article 37) and in the Regulation (e.g. Article 7 and Article 8) regarding third-party access that services in the Hydrogen Transmission Network and hydrogen storage shall be offered on a non-discriminatory basis to all Network Users, subject to equivalent contractual terms and conditions for the same services.

Hence, it is important for Energinet to outline how market participants can get access to the different parts of a Danish Hydrogen Transmission Network and storage facilities. Furthermore, a description of the market participants is a prerequisite for a clear understanding of legal responsibilities, terms of invoicing etc.

In the same way the terms and conditions governing the use of the methane transmission network and storage facilities are described today, Energinet will establish a 'Terms and Conditions for Hydrogen Transport' for the use of a Danish Hydrogen Transmission Network and a Terms and Conditions-document for using the hydrogen storage facilities. These documents will consist of a set of conditions which together with the Framework Agreements[9] and other relevant appendices govern the market participant's cooperation with Energinet regarding transport of hydrogen through the Danish Hydrogen Transmission Network and regarding the storage services.

To establish the conditions for cooperation between the market participants and Energinet, first it is vital to outline which roles define the market participants. The description of the market participants is important as it clarifies how the market participant can act and get access to different parts of the transmission network, thus increasing transparency and securing a level playing field.

The purpose of this chapter is to outline a possible description and distinction between the different market participants which can function as the basis for future work on the detailed rules for cooperation between the market participants and Energinet.

Roles for the market participants

From the Danish political agreement on establishing hydrogen infrastructure of May 2023[10], the Danish hydrogen network is expected to consist of a transmission network developed and operated by Energinet and a distribution network developed and operated by Evida. Some of the roles of the market participants are relevant for the use of the infra-

[9] Agreement between Energinet and the market participants regulating the framework conditions which must be fulfilled in order to act in a Danish Hydrogen Transmission Network.

[10] Aftaletekst - mulighed for etablering af brintinfrastruktur.pdf (kefm.dk)

structure owned and operated by Energinet and some are relevant for the use of the infrastructure owned and operated by Evida. This chapter only describes the roles related to the infrastructure owned and operated by Energinet (roles in the Danish Hydrogen Transmission Network and in the hydrogen storage facilities).

For the services in the Danish Hydrogen Transmission Network, following roles in the market setup is foreseen:

Table 1: Roles foreseen in the Danish Hydrogen Transmission Network and storage facilities.

Market player role	Market player category description
Network User	Market player transporting hydrogen in the Danish Hydrogen Backbone. Responsible for balancing their deliveries and offtakes.
System User - Direct Hydrogen Consumer	Hydrogen consumers directly connected to the Danish Hydrogen Backbone.
System User - Direct Hydrogen Producer	Hydrogen producers directly connected to the Danish Hydrogen Backbone.
Hydrogen Storage Customer	Market players needing access to the hydrogen storage facilities (injection and withdrawal).

The market participant roles are visually showed in Figure 3 below.

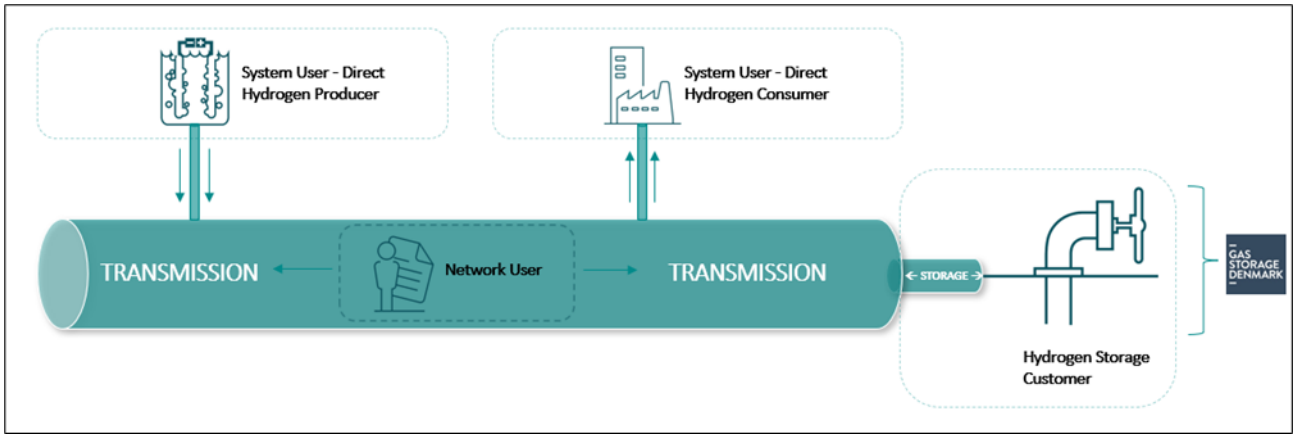


Figure 3: Market participant roles in the Danish Hydrogen Transmission Network and storage facilities.

It is important to note that a natural or legal person can act in multiple roles at the same time. A natural or legal person producing hydrogen in Denmark who are directly connected to the hydrogen transmission network and engaged in transporting hydrogen via the network, will be acting as both 'System User – Direct Hydrogen Producer' and 'Network User' at the same time. Trading of hydrogen before the connection point to the DHB (that is, in the direct connection pipeline from the System User facilities to the infrastructure with third party access) will not be possible, as only one entity can be active in a direct connection pipeline. Pipelines with third-party access are always owned by Hydrogen network Operators. Energinet's usage of the terminology of connection pipeline and the prerequisite of a need to make sure there's no trading within such (because that would stipulate third party access) is done under the notion, that the proposed amendment of the Danish Gas Supply Act as proposed by the Danish Energy Agency in May 2024, will pass Parliament.

Energinet will adjust the roles as the market develops over time.

8. Capacity products and allocation

In chapter 6 above, it is described which points are anticipated in the entry-exit model. In the following chapter, Energinet will define the capacity products and how these are expected to be offered and allocated to market participants under normal operational conditions.

Capacity products are relevant for the domestic entry-exit point(s) and for the interconnection point (entry-exit) towards Germany, whereas capacity products will not be relevant on the Hydrogen Transmission Network Operator (HTNO) side of the storage and at the virtual point(s).

8.1 Capacity product description

A capacity product gives the Network User the right (but not the obligation), to enter or take out a certain amount of hydrogen per hour (expressed in energy units, here MWh/h) over a defined duration at a certain point in the entry-exit model.

If e.g. a Network User buys an annual entry capacity product of 100 MWh/h (domestic production), this gives the Network User the right to enter hydrogen corresponding to between 0 and 100 MWh in every hour during a year. So, in total such a contract gives the Network User the possibility to enter a total amount of up to 876,000 MWh (878,400 in leap years) during the year if the capacity contract is fully utilised every hour.

If the same Network User wants to transport the hydrogen towards Germany, then the Network User must also buy an exit capacity at the interconnection point towards Germany, and an entry capacity in the German network. There is no requirement for the entry and exit capacities to match, as they may be utilised differently, depending on how other points in the network are utilised, e.g. storage. However, the actual utilisation of all entries vs. exits in the network must be balanced within a given timeframe, see the paper on balancing for more information regarding the balancing model.

This means that buying capacity and signalling the utilisation is a 2-step process for the Network User:

1. First, the Network User buys capacity at the relevant points. This process might be years in advance (e.g. through the user commitment process) and down to months, weeks, days or even hours before the relevant hour.
2. Before and/or within the relevant day, the Network User should then express how much of the capacity he/she wishes to utilize per hour at each relevant entry-exit point via nominations. Nominations are messages forwarded to Energinet, that expresses how much of the capacity a Network User wants to utilise at each relevant point, each hour during the relevant day.

Thus, the capacity product itself includes a large degree of flexibility for the Network User, as it gives the Network User the possibility to transport between 0 and 100 pct. of the capacity e.g. every hour, with a short lead-time to change the actual nomination. Capacity that is not (re)nominated before the relevant lead-time deadline cannot be nominated by the Network User later ("use-it-or-lose-it" principle) in order to optimize the utilisation of the network.

- In a simple example, a Network User has an entry capacity contract at the domestic entry point of 100 MWh/h and an exit capacity contract of also 100 MWh/h.
- Initially, the Network User expects a production of 70 MWh/h and thus nominates 70 MWh/h each hour during the given day and sends in a message with these values to the HTNO the day before the relevant day.
- During the day, the hydrogen production is reduced to 10 MWh/h for the five last hours of the day, due to an increased price level on the electricity market. The Network User sends in a message to the HTNO that they want to reduce their exit volumes correspondingly from 70 to 10 MWh/h for the given five hours.

- In this example the Network User is fully balanced, as the nominated values for the exit capacity is equal to the production. In total, the Network User flows a total of 1,380 MWh entry and exit during the given day (19 hours at 70 MWh/h and five hours of 10 MWh/h).

It is not yet clear at which lead times the initial nomination message and the messages to change nomination should be forwarded. For the Danish methane network, the initial nomination must be forwarded before 14:00 CET on the (gas)day before the relevant (gas)day, and changes during the (gas)day (re-nominations) must be forwarded latest two hours before the first relevant hour (1 hour before for storage). Energinet will work to reduce the lead-times as much as possible, to give the market as much flexibility as possible.

To promote the synergies between the electricity markets and the hydrogen market, the time unit of nominations and renominations are expected to always follow the prevailing Market Time Unit (MTU) in the Danish electricity markets. Today, the MTU is one hour, but will be 15 minutes at the time of commissioning of the DHB.

8.2 Types of capacity products

In general, Energinet expects to offer two overall types of capacity products, firm capacity and interruptible capacity.

Firm capacity

Firm capacity is the main standard capacity product, which is considered as firm and uninterruptible in all normal operational situations.

Interruptible capacity

Interruptible capacity is a special type of capacity product, which cannot be guaranteed in all normal operational situations, and is typically priced with rebate in comparison to firm capacity, based on either the statistical likelihood of interruption, and/or on empiric data.

In general, interruptible capacity products has most value during periods where firm capacity contracts are sold out, as it is a way of optimising the utilisation of the network.

Interruptible capacity can be based on three different conditions (alone or in combination):

1. Statistical flow scenarios: parts of a total capacity at a certain point might rely on special flow scenarios occurring (typically with a relatively low level of probability) which means that not all capacity at this point can be offered as firm capacity.
2. Counter flow: if there is a more or less constant flow in one direction at a certain point, it may be possible for the HTNO to offer interruptible capacity in the counter flow direction. In the future Danish Hydrogen Transmission Network, such a product could possibly be relevant at the interconnection point towards Germany in the northbound direction.
3. "Use-it-or-lend-it" principle: not all firm capacity holders are expected to always fully utilise their capacity contracts. This opens the opportunity for other Network Users to utilise the capacity that the firm capacity holders are not utilising at a certain point, via interruptible capacity. This principle is especially useful if all firm capacity at a point has been sold, where the interruptible capacity helps optimising the utilisation of the specific point.

As a supplement to interruptible capacity products, Energinet also expects to offer the possibility to utilise capacity that has not been booked, or capacity that has been booked but has not been utilised by others, via a possibility to nominate

higher values than a Network User 's booked capacity. This will ensure that the utilisation of the network can be fully optimised, and that Network Users have access to most short-term options, up to the nomination deadline.

Secondary capacity market

Energinet expects to offer Network Users the opportunity to resell booked capacity to other network users, giving the opportunity for Network Users to both sell full capacity contracts, or part hereof, on the secondary capacity market. Energinet will consider offering both the possibility to transfer only the right to utilise the capacity (transfer-of-use) and the possibility to transfer the full contract obligation (assignment).

Energinet will consider also to include a possibility for Network Users to "return" their capacity to Energinet, where Energinet then will try to resell the capacity via the normal capacity booking procedures. If the capacity is not resold, it will return to the original Network User, including all original contract obligations, hereunder the original payment obligations.

8.3 Capacity product durations

Energinet has not yet defined all specific capacity product durations, however, here are the current thoughts and expectations:

- Long-term capacity will be annual or a multiple of annual capacity contracts. This means that if a Network User books capacity for e.g. 15 years, the capacity contract will consist of 15 annual capacity contracts. This also gives the Network User the flexibility to book different capacity units for different years, e.g. supporting building up a portfolio year by year. This will apply both in terms of user commitments and in normal operation.
- Different short-term products will be defined. It is not yet clear exactly which types of short-term product will be relevant for the hydrogen market. There are various possibilities, such as quarterly, monthly, weekly, and daily products, and the possibility to book various types and durations.
- Within-day products should be designed to accommodate the balancing model. Energinet expects that there will be a need for very short-term products such as single hours, to give Network Users as much possibility to react on short-term price signals.

In terms of pricing, the general principle will be that the unit cost for capacity will increase, the shorter the product duration. Seasonal variations may also be considered; however, this is not anticipated at this point in time.

8.4 Offer and allocation of capacity

In general, Energinet expect to offer and allocate capacity contracts via auctions, to ensure the most efficient allocation of capacity, in situations where capacity demand exceeds the offer. Without over-demand, it is expected that the auction mechanism will be designed to ensure that capacity will be allocated at the basic regulated tariff for all participants, if there is no over-demand.

Depending on the general market conditions, first-come-first-served may also be considered as a simple start-up tool, especially if the risk of over-demand is considered as low or non-existing.

Energinet expects that the general allocation methodologies for hydrogen will be inspired by the methods known from methane, described in the Network Code for Capacity Allocation Methodology (NC CAM): Regulation - 2017/459 - EN - EUR-Lex (europa.eu).

9. Balancing

With the implementation of a future hydrogen transmission network in Denmark, it is vital to outline and describe how to effectively balance the network. Physical limitations and legal framework conditions set the boundaries and/or opportunities for the design of the hydrogen balancing model. The objective of the hydrogen balancing model is to allow for large quantities of hydrogen transportation, while accommodating the demand from the Network Users for a flexible utilization of the Danish Hydrogen Transmission Network.

Please note the balancing model must be approved by the Danish Utility Regulator (DUR) before it can enter into force. The paper on balancing the Danish Hydrogen Transmission Network can be found here.

9.1 Availability of Linepack Flexibility for balancing

In the paper on balancing the Danish Hydrogen Transmission Network it is described that the infrastructure can provide linepack flexibility which can be considered as a short-term storage that can be utilised by Network Users and as a tool for system operation to ensure stable operation of the Danish Hydrogen Transmission Network. The final configuration of the Danish Hydrogen Backbone (DHB) has not been finalised yet, but Energinet aims for 10 to 20 GWh of total linepack flexibility in the fully developed DHB. However, the DHB is expected to be developed in steps (also in case of building the full backbone) and during the initial steps the available flexibility will be considerably less. Less flexibility means stricter requirements for keeping balance between entry and exit.

To give an illustration of this consider the development of DHB based on conversion of the Egtved-Germany pipeline and a new 36" backbone along the Danish west coast in four possible steps.

Table 2: Flexibility in the Danish Hydrogen Backbone

	Lower 7	Lower T	Backbone to Holstebro	The fully developed Danish Hydrogen Backbone
				
Approximate availability of System linepack flexibility[11]	< 1 GWh	3 GWh	7 GWh	11 GWh

The repurposed pipeline from Egtved to Germany is expected to be operated with lower pressure and less allowable pressure fluctuations than the rest of the network. Customers connected to the repurposed pipeline (between Egtved and Germany) will be able to utilise the System Linepack Flexibility in the other parts of the network in most cases.

[11] Illustration based on current estimate of pressure and system reserve requirements.

10. Tariffs

The hydrogen tariff methodology is based on the methane methodology

The market model for third party-access to the emerging hydrogen transmission infrastructure is initially based on the third party-access regime developed for the methane sector. Associated rules are regulated and harmonised across Member States to promote cross-border transportation and trading and to foster competition within natural transportation monopolies.

The guideline for Energinet's development of a tariff methodology for the Danish Hydrogen Transmission Network is, that it to a large extend will come to resemble the current Danish methane tariffs applicable in the Danish methane transmission network. The European network codes has not yet been developed for hydrogen by the European Commission. However, if the network codes for hydrogen tariffs are structured similar to the existing methane network codes for tariffs, basing future hydrogen tariff methods on the current methane tariff framework will help mitigate regulatory risks by ensuring compatibility. Additionally, aligning with the current methane tariff framework enhances recognisability and transparency for users of the network, allowing them to rely on a familiar and tested regime.

However, the tariff framework and methodology for hydrogen require approval from the Danish Utility Regulator (DUR) and can be subject to change. Approval of the final tariff method will be finalized prior to the commissioning of the Danish Hydrogen Backbone (DHB).

Tariffs in the Danish methane transmission network

Energinet is responsible for operating the Danish methane transmission network. Users of the network pay, via tariffs, for the access to transport gas through the network. The economic regulation of the methane network, set by DUR, determines the overall tariff revenue Energinet is allowed to collect, whereas the tariff method determines how the revenue is allocated to different network entry and exit points, and the regulated capacity products.

Energinet's current approved market model on methane consists of an exit-entry model, where tariffs are charged by users of the network as uniform capacity tariffs. This payment is independent of actual volumes transported through the network as users solely pay for booked capacity. The network is built upon a uniform cost allocation method, where costs are allocated uniformly via capacity tariffs, hence tariffs are the same across all the network's entry and exit points.

To calculate the capacity tariffs, Energinet makes use of a so-called entry-exit split. The entry-exit split defines the share of the total costs that can be related to entry capacity and exit capacity, respectively. To obtain uniform tariffs in all entry and exit points these costs must be allocated ex-post. This ex-post entry exit cost allocation, leading to uniform capacity tariffs, fosters a streamlined and transparent tariff regime, which Energinet considers advantageous for the hydrogen system, as it reduces the uncertainties for Network Users associated with committing to capacity bookings in advance.

Capacity products:

It is Energinet's expectation that the different capacity products offered in the Danish Hydrogen Transmission Network will, to a degree, resemble the capacity products being offered in the methane transmission network. For further information on capacity products, see chapter 8. In the methane network, the baseline product is yearly capacity contracts. Further, shorter products are offered with a price mark up, i.e. a sum of 365 daily products is higher than an annual capacity tariff. This to ensure a price setup, reflecting a fair risk and cost allocation among the Network Users.

A major part of the expected socioeconomic gains from hydrogen in Denmark stems from the possible synergy between the electrical market and the hydrogen market. As such, shorter capacity products shall, as a minimum ensure, that actors in the market has the flexibility to act on supply and demand signals from both energy markets.
The electricity market is a highly volatile market, with hourly based price fluctuations, and even shorter balancing windows. To accommodate this, it is Energinet's expectation to offer short capacity products with a corresponding multiplier. The exact design and length of the products and multipliers will be developed in close dialogue with the market, to ensure that Energinet accommodates the markets needs as far as possible.

Further process:

It is important to acknowledge that the specific tariff methodology is dependent upon DUR's approval from DUR. Energinet will, in close dialog with System and Network Users, develop a tariff methodology, and submit the methodology to DUR with an associated public consultation.

The general principles for the tariff methods and an estimation of transportation costs are expected to be published before the market is asked to give a binding commitment. However, the final method approval by DUR will be made following the final investment decision and before the commissioning of the DHB. Once the decision is reached, DUR will establish the economic regulation governing Energinet in relation to the Danish Hydrogen Transmission Network, including the allowed revenue Energinet may derive from tariffs overall.

Intertemporal cost allocation mechanism

DUR has prepared a paper on the economic regulation of hydrogen, which is published in an unofficial translated version on Energinet's webpage, as an appendix to this information package: Hydrogen market dialogue (energinet.dk)

11. Connections

As a follow up on the proposed revision of the Gas Supply Act published earlier this year, the Danish Energy Agency (DEA) will in near future publish the Regulation for hydrogen connections. This will include the conditions for e.g. responsibility for infrastructure companies to decide a connection point, ownership by the producers and offtakers of connection facility, and thus a split in what costs infrastructure companies such as Energinet is carrying.

In the last information package, it was stated that the possible connection points at the Danish Hydrogen Backbone (DHB) will be at the valve stations positioned every 15-30 km along the pipeline. The valve stations will allow for potential future expansion of the DHB, connections of adjacent hydrogen systems or construction of additional connection points for production or offtake. The location of valve stations is outlined in the ongoing FEED study. For deciding on connection point(s), the two infrastructure companies – Energinet & Evida - will mutually coordinate according to objective, non-discriminatory and transparent criteria. In cases where an expansion of the network can be foreseen to be economically efficient for both the infrastructure company and the producer/offtaker, an expansion of Energinet's infrastructure with third party access can be established, thus changing the initial foreseen connection points.

For connecting either producers/offtakers or adjacent hydrogen systems, the valve station needs to be converted to a hydrogen metering and regulation station (HMR-station). The HMR-stations will include valve arrangements for quality control and pressure regulations for ensuring the integrity (e.g. hydrogen quality, check valve etc.) and assisting the market model (e.g. metering, cut-off valve etc.) in balancing the network. The ownership boundaries will be split at the connection point between the producer/offtaker connection facility and Energinet's HMR-station.

The technical connection condition for the interoperability between the DHB and System User connection facility are currently under development. The technical conditions include input and output of capacity, pressure, temperature, hydrogen quality, operational ramp-up and -down pressure, cut-off conditions etc. All these technical parameters are dependent on system design and operation. Therefore, the final connection conditions can be developed when this is in place. Furthermore, the technical conditions should also enable the market model in balancing the system. Energinet expects to publish more information on this subject before step two of the user commitment process. The expectation is to publish a paper that outlines the principles of the connection conditions, reflecting Energinets best available estimate on the conditions, subject to method being approved by the Danish Utility Regulator (DUR) later in time and the further technical work.

The connection conditions will be objective, non-discriminatory and transparent, and only when it is not technical feasible, the conditions will diverge if regulatory justified. This will be the case e.g. for connection points on repurposed methane pipelines vs. the new constructed hydrogen pipelines. E.g. as is, the operational pressure will be different between such two types of pipelines and, thereby the connection agreements may differ. In the end, the conditions will be developed and subject to regulatory supervision, and methods will be subject to regulatory approval by DUR.

SECTION 3 – REGULATORY FRAMEWORK

12. General introduction to the regulatory framework

Energinet's approach to understanding the regulatory framework is a combination of the newly official EU legislation and the national framework regulation in the Danish Gas Supply Act. Where the EU hydrogen and decarbonised gas market package sets the overall updated framework, the national Danish Gas Supply Act has been the guiding principle for Energinet until now. In general, Energinet considers that the overall approach in both regulatory sets of legislation is to encompass the usable and well-known principles from the methane sector (natural gas), but with a hydrogen approach.

Energinet is aware of the timing of this Information package. Its publication takes place in the time gap between the new EU legislation entering into force, but not yet transposed into national Danish legislation. Thus, this Information package must be read and understood with a broad regulatory framework in mind. Wording, legal descriptions etc. might be updated when the EU hydrogen and decarbonised gas market package will be transposed. Further, the regulatory framework might also be updated when network codes at EU level will be formulated.

Furthermore, network codes (Commission Regulations) for the hydrogen market will be developed in the coming years. The process for developing network codes is expected to be initiated in 2025 with the official establishment of ENNOH[12]. Energinet will, as a founding member of ENNOH, be a part of developing the network codes. Therefore, parts of the described market model can be subject to change due to the outcome of the network codes.

12.1 Introduction to national legislation

In Denmark, Energinet must set the tariffs, based on a beforehand approved methodology by the Danish Utility Regulator (DUR), as the National Regulatory Authority. This follows from the Danish Gas Supply Act's Article 36 a(1) and 40(1) No 1.

Energinet must also have a set of terms and conditions for the usage of Energinet's transmission infrastructure. This follows from the Danish Gas Supply Act's Article 23 and Article 5 of the Danish Regulation on System Responsibility and use of the Gas System.

In order to make sure there's transparency with both Energinet's methodologies for tariffs and the terms and conditions which users must follow, Energinet is obliged to consult the market. This follows from Article 5 of the Danish Regulation on System Responsibility and use of the Gas System. This means Energinet through information packages such as this makes sure information available is disclosed non-discriminatory to the market, and all relevant information is published on Energinet's website.

When Energinet is consulting the market, Energinet does it non-discriminatory. If a market participant is not satisfied with a methodology set by Energinet or the terms and conditions set by Energinet, the market participant is entitled to state their case initially during the market consultation to Energinet, but ultimately to DUR. DUR will decide on how to address the issue raised by the market participant.

[12] European Network of Network Operators for Hydrogen: ENNOH

In Denmark, DUR is responsible for approving the methodologies set by Energinet and monitoring Energinet's terms and conditions. When deciding on approval or not on a methodology set by Energinet, DUR conducts a public consultation on their intended decision regarding the methodology. All decisions by DUR are published on their website. This follows from the Danish Gas Supply Act's Article 42 b.

If a market participant is not satisfied with a methodology set by Energinet or the set of terms and conditions set by Energinet and has stated their case for DUR, and is still not satisfied, the market participant is entitled to make a formal complaint over the decision made by DUR to the Danish Energy Board of Appeal. This follows from the Danish Gas Supply Act Article 51.

Since DUR does not decide on approval of the terms and conditions for use of Energinet's transmission infrastructure (only the specific methodologies behind relevant parts of the terms and conditions, described above), there's no formal way of complaining. However, market participants are always entitled to raise issues on Energinet's general terms and conditions to Energinet and to DUR. It is in this incident relevant to state why a term and condition might be market distortive. DUR will under their discretion of competences decide on the further handling of an issue raised by one or more market participants.

12.2 Expectations to national legislation when transposed

Energinet expects that the procedural rules and obligation today under the Danish Gas Supply Act will stay the same after the transposition of the new EU hydrogen and decarbonised gas market package. The structural rules on governing transparency, public consultation, role of DUR etc. are thus expected to remain unchanged.

Under the rules in the Danish Gas Supply Act, third party access to Energinet's transmission infrastructure is through the regulated access regime. Despite the potential use in the EU hydrogen and decarbonised gas market package rules for negotiated access until 31 December 2032, the Danish political agreement on financial conditions for hydrogen infrastructure stipulates that there is to be regulated third party access in Denmark on hydrogen from the beginning. Energinet thus expects the current regulated third party-access scheme in the Danish Gas Supply Act to remain more or less unchanged.

13. Legal basis – Capacity allocation

13.1 Directive

The EU hydrogen and decarbonised gas market package focuses on cross-border relevance of capacity allocation. Thus, under the principle of the Danish Utility Regulator (DUR) approving methodologies, the Directive sets out a requirement of regulatory approval of the methodology (procedure) of cross-border allocation and congestion management before it is put into effect. This follows from Article 78(7), cf. Article 78(7) point (e) in the Directive.

The methodology and affiliated terms and conditions for the cross-border allocation and congestion management must be published. This follows from Article 78(8) in the Directive.

Regarding national allocation and congestion management, Energinet must submit congestion management and capacity allocation mechanisms to DUR. This follows from Article 78(10) in the Directive.

13.2 Regulation

Where the Directive is focused on the overall functioning, it can be stipulated that the Regulation is more detailed. Its general aim in relation to capacity allocation is to promote harmonised principles for capacity allocation and congestion management. This follows from Article 1 second section point (b) in the Regulation.

Further, the Regulation entails several relevant directly applicable definitions in Article 2. A non-exhaustive list of relevant EU-definitions, which are relevant bearing in mind Energinet's market model:

»*Congestion management*« is defined in the Regulation's Article 2, No 6 as: »management of the capacity portfolio of the transmission system operator with a view to optimal and maximum use of the technical capacity and the timely detection of future congestion and saturation points«.

»*Contractual congestion*« is defined in the Regulation's Article 2, No 22 as: »a situation where the level of firm capacity demand exceeds the technical capacity«.

»*Physical congestion*« is defined in the Regulation's Article 2, No 24 as: »a situation where the level of demand for actual deliveries exceeds the technical capacity at a particular moment«.

Energinet generally follows a regime of maximisation of transparency in line with the Regulation's Article 66 for hydrogen network operators. This also means, that Energinet considers the principles listed in the Regulation's Article 10 on capacity-allocation and congestion-management procedures relevant for inspirational purposes, despite not applying to hydrogen infrastructure.

This means, Energinet strives to make the maximum capacity at all relevant points available to market participants, considering the system integrity and efficiency of the infrastructure's operation. This is also the preliminary assumption in Energinet's proposed market model and the Balancing Model.

It also follows from the Regulation's Article 12, that capacity rights must be allowed to be freely traded. In practise this is foreseen to happen on a secondary capacity market. Energinet strives to help facilitate such a platform to be, but also makes sure there's no constraints in Energinet's terms and conditions.

13.3 National legislation

In relation to Energinet's obligations above, under the Danish Gas Supply Act Energinet must set a methodology for capacity allocation and congestion management in general. This follows from Article 36 a, in the Danish Gas Supply Act. The methodology must be approved by DUR before entering into force.

Affiliated terms and conditions on management of congestion and capacity allocation must be set by Energinet and submitted to DUR. This follows from the Danish Gas Supply Act's Article 23 and Article 5 of the Danish Regulation on System Responsibility and use of the Gas System.

14. Legal basis – Balancing

14.1 Directive

The EU hydrogen and decarbonised gas market package retains rules on balancing services and a presumption on the Network Users' ability to balance their own portfolio. The governance of the balancing regime must be objective, transparent and non-discriminatory. This follows from among other things from the principles in Article 50(4) on the roles of hydrogen network operators. Thus, under the principle of the Danish Utility Regulator (DUR) approving methodologies, the Directive sets out a requirement of regulatory approval of the methodology for balancing services with incentives for users to balance their input and off-takes (portfolio) before they are operationalised. This follows from Article 78(7), cf. Article 78(7) point (c) in the Directive.

The methodology and affiliated terms and conditions for balancing services must be published. This follows from Article 78(8) in the Directive.

14.2 Regulation

Where the Directive is focused on the overall functioning, it can be stipulated that the Regulations is more detailed. As mentioned, the EU hydrogen and decarbonised gas market package retains rules on balancing services and a presumption on the Network User's ability to balance their own portfolio, but it follows directly from Article 3 point (e) in the Regulation.

The Regulation's general aim in that relation is to establish transparency for balancing and imbalance charges. This follows from Article 1 second section 2 point (c), cf. Article 3 point (f), cf. Article 13 (only legally binding for methane) in the Regulation.

Further, the Regulation entails several relevant directly applicable definitions in Article 2. A non-exhaustive list of relevant EU-definitions, which are relevant bearing in mind Energinet's market model:

»*Nomination* « is defined in the Regulation's Article 2 No 8 as: » the reporting by the Network User to the transmission system operator of the actual flow that the Network User wishes to inject into or withdraw from the system, prior to such an injection or withdrawal«.

»*Re-nomination*« is defined in the Regulation's Article 2 No 9 as: » the reporting of a corrected nomination, subsequent to a nomination«.

14.3 National legislation

In relation to Energinet's obligations above, Energinet must under the Danish Gas Supply Act make sure there's economic incentives for the users to balance their portfolio in Energinet's infrastructure without a need for Energinet to intervene. This follows from Article 12(1) No 7 cf. No 6 in the Danish Gas Supply Act. To achieve that, Energinet sets a market model for usage of Energinet's infrastructure. This follows from Article 36 a, in the Danish Gas Supply Act. This includes also imbalance charges in Energinet's market model. The methodology for balancing and imbalance charge must be approved by DUR before entering into force. This follows from Article 40(1), No 1 and 2, in the Danish Gas Supply Act.

Affiliated terms and conditions on management of congestion and capacity allocation must be set by Energinet and submitted to DUR. This follows from the Danish Gas Supply Act's Article 23 and Article 5 of the Danish Regulation on System Responsibility and use of the Gas System.

15. Legal basis – Tariffs

15.1 Directive

The EU hydrogen and decarbonised gas market package retains rules on tariffs in general. In Denmark under the political agreement on financial conditions for hydrogen infrastructure, regulated third-party access is present from the beginning. This means that the allowable costs of Energinet must be allocated onto the tariff.

The tariff (allocation of costs) must follow a methodology approved beforehand by the Danish Utility Regulator (DUR). This follows from Article 35, cf. Article 78(1) point (a), cf. Article 78(7) point (a) in the Directive.

The methodology for the tariff must be published prior to entry into forces. This follows from Article 78(8), cf. Article 78(7) point (a), cf. Article 35(2) in the Directive.

The methodology for Energinet's tariffs must be approved by DUR. This follows from Article 78(1) point (a).

15.2 Regulation

Where the Directive is focused on the overall functioning, it can be stipulated that the Regulation is more detailed. Its general aim in relation to tariffs is to promote harmonised methodologies for the calculation of tariffs. This follows from Article 1 second section point (a) in the Regulation.

Further, the Regulation entails several relevant directly applicable definitions in Article 2. A non-exhaustive list of relevant EU-definitions, are:

»*Allowed revenue* « is defined in the Regulation's Article 2, No 37 as: » the sum of transmission service revenue and non-transmission service revenue for the provision of services by the transmission system operator for a specific time period within a given regulatory period which such transmission system operator is entitled to obtain under a non-price cap regime and which is set in accordance with Article 78(7) point (a), of Directive (EU) 2024/1788«.

»*Target revenue*« is defined in the Regulation's Article 2, No 38 as: » the sum of expected transmission service revenue calculated in accordance with the principles set out in Article 17(1) and expected non-transmission service revenue for the provision of services by the transmission system operator for a specific time period within a given regulatory period under a price cap regime«.

The methodologies for the tariffs must be approved by DUR. But they must also be transparent, applied in a non-discriminatory manner, take into account the need for system integrity and its improvement and finally reflect the actual costs incurred. This follows from Article 17(1) first section in the Regulation.

The methodologies must also as a starting point, be set separately for every entry point into or exit point of Energinet's infrastructure. However, the principle of uniform tariffs can also be applied subject to approval by DUR. This follows from Article 17(1) fourth section in the Regulation.

What Energinet is allowed to charge the users of Energinet's infrastructure is the tariff payment. The allowed charge is normally within a regulatory period. I.e. a time span of a number of years, where Energinet is allowed to recover a corresponding depreciation value of the assets and investments, appropriate returns etc. (non-exhaustive).

Due to the difficulties for an emerging hydrogen market, there is also a specific hydrogen rule on the recovery of costs. I.e. costs periodically incurred in the upstart phase of the Internal Hydrogen Market, can be postponed until there is an utilisation of the infrastructure related to the costs. This is often referred to as the Inter Temporal Cost Allocation Mechanism. The rule can be applied to projects such as Energinet's. Under the approval of the Danish Regulatory Authority, Energinet can potentially spread the recovery of allowed charges across multiple regulatory periods, meaning, that later users in time will pay for the capacity when they "activate" it, despite it being built initially. This follows from Article 5(3) in the Regulation. Currently DUR has taken it upon them to develop and fixate the use and limitation of Energinet's possible inter temporal cost allocation under the scheme in the Regulation's Article 5(3).

15.3 National legislation

In relation to Energinet's obligations above, Energinet must under the Danish Gas Supply Act set the tariff model for usage of Energinet's infrastructure. This follows from Article 36 a, in the Danish Gas Supply Act. The methodology must be approved by DUR before entering into force.

Affiliated terms and conditions must be set by Energinet and submitted to DUR. This follows from the Danish Gas Supply Act's Article 23 and Article 5 of the Danish Regulation on System Responsibility and use of the Gas System.

There is not yet any provisions on allowed charges for Energinet on hydrogen, but Energinet expects it will follow the somewhat similar regimes of those for methane and/or electricity.

16. Legal basis – Connections

16.1 Directive

The EU hydrogen and decarbonised gas market package retains rules on third party access in general. Third party access covers both the usage of the infrastructure by market participants and connectivity for producers and costumers.

A fundamental rule in a liberalised energy sector is the right of third parties to access the infrastructure. Thus, the EU hydrogen and decarbonised gas market package has a rule on third party access to Energinet's hydrogen infrastructure. This follows from Article 35 in the Directive.

In Denmark under the political agreement on financial conditions for hydrogen infrastructure, regulated third-party access is present from the beginning. This means that there is no negotiated access regime for Energinet's infrastructure.

The Directive does not retain explicit Articles on connection in relation to the hydrogen infrastructure. However, following the experience from the methane sector (natural gas), there's inspiration in Article 58 on connection fees and costs for biomethane production facilities. Energinet considers that there must be a similar regime for connection to the hydrogen infrastructure as well. This is in line with the requirement in Article 78(8).

Fees and procedures for non-discriminatory connection of e.g. industrial customers and hydrogen storage facilities to hydrogen transmission infrastructure must be established and published by the operator and approved by the regulatory authority, cf. the Directive Article 42(1).

Article 38 of the Directive states the general legal framework for refusal of access to hydrogen infrastructure on the basis of lack of capacity or lack of connection and the principle of operator's obligation to assess the need for necessary enhancements as far as it is economic to do so or when a potential customer is willing to pay for them.

16.2 Regulation

Where the Directive is focused on the overall functioning, it can be stipulated that the Regulation is more detailed. Its general aim in relation to connection (access) is to establish non-discriminatory rules. This follows from Article 1 first section point (a) in the Regulation.

The methodologies for the tariffs must be approved by the Danish Utility Regulator (DUR). This also covers connection fees, which sometimes goes by the name connection tariffs. Irrespective they must be transparent, applied in a non-discriminatory manner, take into account the need for system integrity and its improvement and finally reflect the actual costs incurred. This follows from Article 17(1) first section in the Regulation.

16.3 National legislation

The Danish Energy Agency intends to amend the Danish Gas Supply Act Article 18 through adjusting it, while repealing Article 35 a to facilitate connection of other types of facilities than upgraded biomethane facilities. The amendment involves the legal basis for the Danish Energy Agency to issue a Regulation on connections to the Danish hydrogen infrastructure.

In addition to the Regulation, Energinet expect to establish technical requirements to the facilities that are to be connected to Energinet's hydrogen transmission infrastructure. Energinet is currently developing these technical requirements and intends to make market consultations on these requirements later.

17. Legal basis – Hydrogen quality

Energinets work on hydrogen quality was addressed in the first information package. However, the legal basis was not elaborated on, why it has been included in this information package. The first information package and the chapter on hydrogen quality can be found on Energinets webpage: Hydrogen market dialogue (energinet.dk)

17.1 Directive

The Directive sets out the tasks for hydrogen network operators in Article 50, including rules for hydrogen quality. As a hydrogen transmission network operator, it is Energinets task to provide other operators sufficient information on hydrogen quality to ensure secure, efficient and coordinated development and interoperability. Additionally, an hydrogen transmission network operator such as Energinet can also be responsible for ensuring efficient hydrogen quality management and stable hydrogen quality in the infrastructure in line with applicable hydrogen quality standards.

The regulatory authority (regulatory authority in this area is to be decided) has the duty to monitor the development of hydrogen quality and hydrogen quality management by hydrogen network operators, cf. the Directive Article 78(1) point (h).

17.2 Regulation

The Regulation sets out rules for cross-border coordination regarding hydrogen quality in Article 55. Under these rules, Energinet shall as a hydrogen transmission network operator cooperate with other hydrogen transmission network operators on cross-border hydrogen quality differences to avoid restrictions to cross border flows of hydrogen.

To Energinet's knowledge, it is not yet decided who will determine the hydrogen quality in Denmark (see below), but Energinet will, based on future established Danish hydrogen quality requirements, have to coordinate with the German Hydrogen Transmission Network Operator (HTNO) on cross border hydrogen quality.

17.3 National legislation

In the present methane network, gas quality requirements are set by the Danish Safety Technology Authority under the rules in the Danish Regulation No 230 of 21 March 2018 with a legal basis the Danish Gas Security Act.

To Energinet's knowledge, it is not yet decided if hydrogen quality will be regulated equivalently to gas quality (methane) in a new or amended Regulation on hydrogen quality or if the requirements should be set by HTNO's as technical requirements. In all circumstances, hydrogen quality would have to be coordinated cross-border by Energinet with the German hydrogen transmission network operator.

SECTION 4 – NEXT STEPS

Going forward, Energinet will continue to involve market participants in the development of the Danish Hydrogen Backbone (DHB) and the framework for the future utilization of a Danish hydrogen transmission network.
In this Section follows an update on the next steps concerning step two of the user commitment process, the expected timeline for methodologies to the Danish Utility Regulator (DUR), coming information packages and at the end information on how to can stay informed on news from Energinet related to hydrogen.

18. Step two of the user commitment process

As part of this information package, Energinet has also released a concept paper regarding the step two of the user commitment process, which can be found on Energinets webpage: Hydrogen market dialogue (energinet.dk)

The concept paper generally describes the user commitment process and goes into depth with four specific topics related to the future terms and conditions for the binding commitments and long-term capacity contracts. Market participants are asked to give written feedback to the concept paper by 31 October 2024 and are encouraged to book bilateral meetings with Energinet prior to his date. If necessary Energinet will facilitate a trilateral meeting with Gasunie

19. Expected timeline for methodologies to the Danish Utility Regulator

As mentioned in Section 2 Energinet will develop terms and conditions (methodologies) for connection and access to the Danish hydrogen infrastructure and in this context request regulatory approval of the methods by the Danish Utility Regulator (DUR).

The first request entails a number of methods deemed necessary to execute step two of the user commitment process. Request will according to plan be sent to DUR in Q1 2025 in due time for DUR to review the methods and determine whether to approve or reject the proposed methods before step two of the user commitment process which is planned to be held in the second half of 2025.

After step two of the user commitment process a number of methods follows in line with developing the regulatory framework for the Danish hydrogen infrastructure before an ordinary sale of capacity will take place approximately half a year before the commencement of operation.

20. Further information packages

The next information package is planned to be published in the summer of 2025 in due time before step two of the user commitment process. If deemed necessary Energinet will publish additional papers throughout 2024 and until summer 2025.

The process for involving market participants in 2024 and 2025 is illustrated in Figure 4 below.

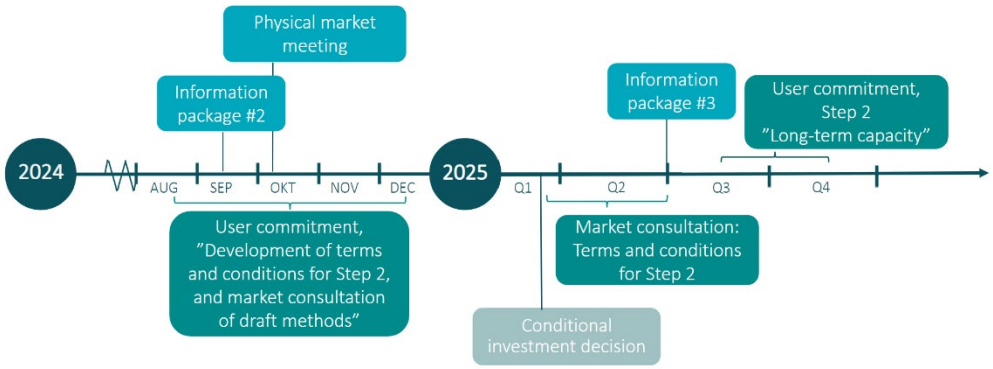
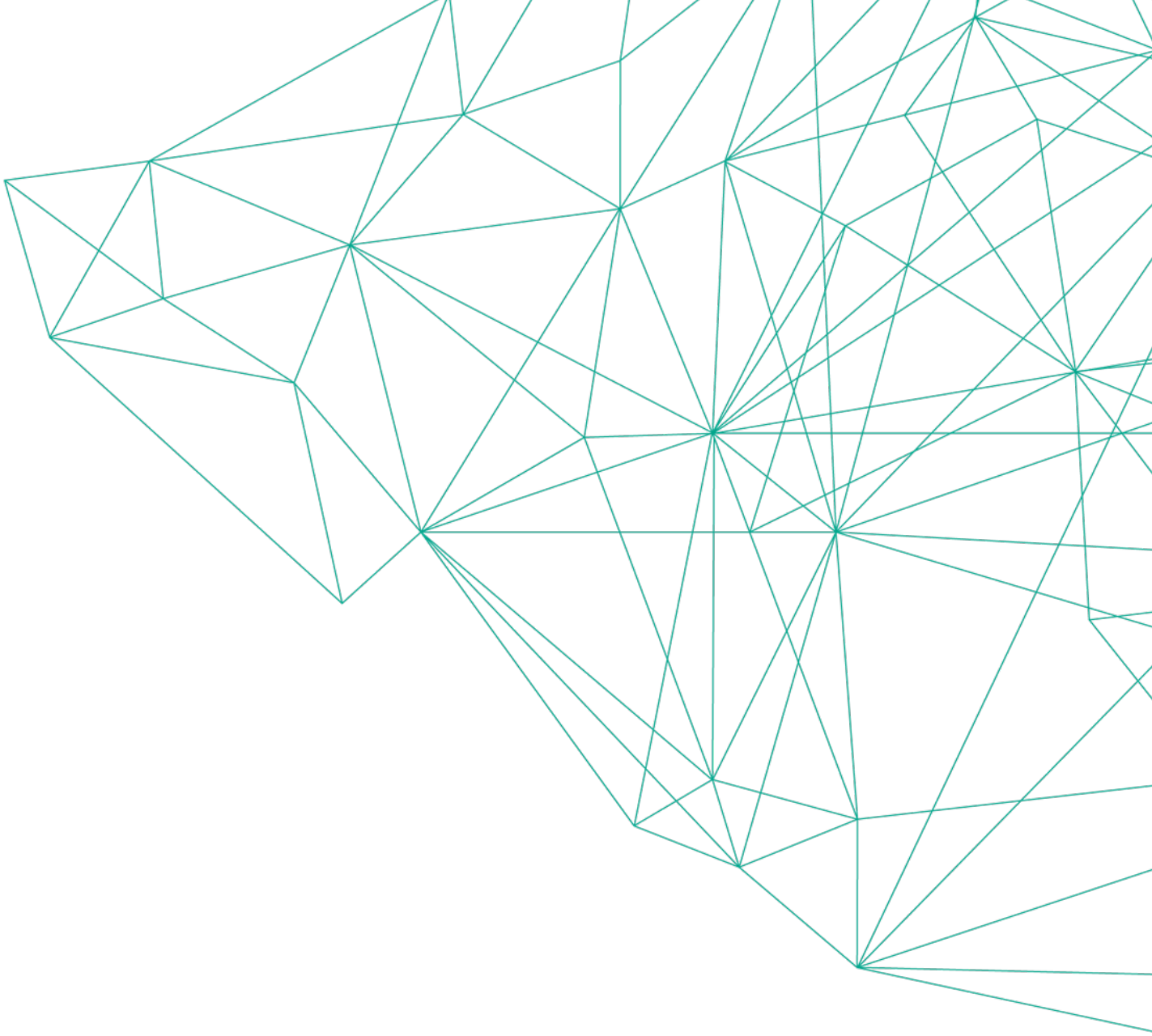


Figure 4: Process for market dialogue in 2024 and 2025.

20.1 Interested in news from Energinet on hydrogen?

If you wish to be notified on news from Energinet regarding hydrogen including future information packages, please sign up at our webpage on hydrogen https://en.energinet.dk/hydrogen/.



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