Department for Energy Security & Net Zero

Hydrogen economic regulatory framework

Developing an effective market framework for 100% hydrogen pipeline networks

Closing date: 9 September 2025

July 2025

Any enquiries regarding this publication should be sent to us at:
hydrogen.regulations@energysecurity.gov.uk

Contents

General information

Why we are consulting

Hydrogen is one of a handful of low carbon solutions which can help the UK achieve its emissions reductions targets for Carbon Budget Six and Net Zero by 2050 as well as provide greater domestic energy security.

Low carbon hydrogen can support the decarbonisation of dispatchable power, hard-to-electrify parts of the UK industrial sector and heavy transport, such as aviation and shipping. Within the hydrogen value chain, hydrogen transport and storage (T&S) infrastructure is vital in enabling hydrogen production to service demand across different end use sectors, supporting delivery of the UK's industrial decarbonisation commitments. Hydrogen T&S infrastructure will play a key role in achieving our Clean Energy Superpower Mission by delivering hydrogen-fuelled power generation in the 2030s, providing long term energy storage solutions to support electrification, and delivering whole system benefits by helping to manage the costs of electricity system constraints during peak demand periods.

A 2022 consultation sought views on proposals for hydrogen T&S infrastructure, including economic regulations for the hydrogen market established under the Gas Act 1986. We are now seeking stakeholder views on a proposed economic regulatory framework for 100% hydrogen pipeline networks to inform decisions and subsequent implementation through legislation, licences, and codes.

Consultation details

Issued: 15 July 2025

Respond by: 9 September 2025

Enquiries to:

Hydrogen Economy Team
Department for Energy Security and Net Zero
6th Floor
3-8 Whitehall Place
London
SW1A 2AW

Email: hydrogen.regulations@energysecurity.gov.uk

Consultation reference: Hydrogen economic regulatory framework consultation: Developing an effective market framework for 100% hydrogen pipeline networks.

Audiences:

We are seeking views from stakeholders with an interest in hydrogen economic regulatory frameworks. This includes (but is not limited to) hydrogen producers, hydrogen users, gas transporters, gas shippers, storage operators, project developers, trade associations, consumer champions, academia, policy think tanks, prospective investors or investment bodies.

Territorial extent:

The scope of this consultation is Great Britain only although responses are invited from all parts of the United Kingdom. The Department for Energy Security and Net Zero will continue to engage with the devolved administrations in Scotland and Wales as proposals are developed. Because of the separate market and regulatory arrangements for gas in Northern Ireland we are not intending these proposals for economic regulation of hydrogen to extend to Northern Ireland.

How to respond

Your response will be most useful if it is framed in direct response to the questions posed, and with evidence in support wherever possible. Further comments and wider evidence are also welcome. When responding, please state whether you are responding as an individual or representing the views of an organisation.

We encourage respondents to make use of the online e-consultation wherever possible when submitting responses at https://energygovuk.citizenspace.com/industrial-energy/hydrogen-economic-regulatory-framework as this is the government's preferred method of receiving responses. However, responses in writing or via email will also be accepted. Should you wish to submit your main response via the e-consultation platform and provide supporting information via hard copy or email, please be clear that this is part of the same consultation response.

Responses can be submitted via the email or postal address below.

Email to: hydrogen.regulations@energysecurity.gov.uk

Write to:

Hydrogen Economy Team
Department for Energy Security and Net Zero
6th Floor
3-8 Whitehall Place
London
SW1A 2AW

Consultation reference: Hydrogen economic regulatory framework consultation: Developing an effective market framework for 100% hydrogen pipeline networks

Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our privacy policy.

We will summarise all responses and publish this summary on GOV.UK. The summary will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

Quality assurance

This consultation has been carried out in accordance with the government's consultation principles.

If you have any complaints about the way this consultation has been conducted, please email: bru@energysecurity.gov.uk.

Executive Summary

This consultation seeks views on the economic regulatory framework for 100% hydrogen pipeline networks, established under the Gas Act 1986. It sets out proposed changes to this regulatory framework to best suit the needs of hydrogen networks. We are seeking stakeholder views on this assessment of network needs and the proposed approach to the hydrogen economic regulatory framework and any further evidence available to support decisions.

Assessments and proposals in this consultation draw on responses to the 2022 consultation on Hydrogen Transport and Storage and subsequent review of regulatory frameworks, including views and evidence shared by the Hydrogen Delivery Council (HDC) Transport and Storage Working Group.

In this consultation, '100% hydrogen pipeline networks' means systems of pipeline infrastructure used for transporting only hydrogen gas, with one or more entry points (where hydrogen is put into the pipeline) and multiple exit points (where hydrogen is taken out of the pipeline), requiring appropriate regulation of relevant network users to provide for its safe and efficient operation. This term is used interchangeably with 'hydrogen networks' throughout the consultation.

Chapter 1 outlines the government's strategic vision for 100% hydrogen pipeline networks, the current economic regulatory framework for these networks under the Gas Act 1986, and key similarities and differences between natural gas and hydrogen markets that have informed assessment of regulatory needs.

Chapter 2 outlines our minded to position for the regulation of balancing within the economic regulatory framework for 100% hydrogen pipeline networks, proposing to retain the current primary and residual balancing licence structures established under the Gas Act. It then considers which industry participants are likely to be best placed to hold responsibility for primary balancing under a licence. It seeks views on proposals that hydrogen producers are likely best placed to undertake primary balancing for early hydrogen networks, though other participants, such as offtakers, would not be excluded from seeking and holding a shipper licence should they meet necessary eligibility and legislative criteria.

Chapter 3 outlines the role of system operation within natural gas networks, and likely activities that will need to be undertaken in 100% hydrogen pipeline networks. It considers which party should assume a system operation role within 100% hydrogen pipeline networks and seeks views on the proposal that hydrogen transporters assume these responsibilities as part of their transporter licence, as is the case in natural gas today.

Chapter 4 considers the relevance of licensed supply to 100% hydrogen pipelines and proposes exempting hydrogen pipelines from supplier licence requirements to remove unnecessary regulatory barriers for the first hydrogen pipelines, keeping this approach under review as pipelines develop.

Chapter 5 seeks views on any further licensed responsibilities that could be required within 100% hydrogen pipeline networks.

Chapter 6 considers the role of a network code in supporting the effective operation of hydrogen networks and seeks views on the proposal that a new hydrogen network code should be developed for early hydrogen pipeline networks, including those funded through the Hydrogen Transport Business Model (HTBM). It seeks views on the proposal that government would be best placed to take on a coordinating function for code development, using a minimum viable product approach, and government's role in modifying the code in the future.

Chapter 1: Hydrogen economic framework – Strategic Vision

Strategic overview

The government's vision is to establish a sustainable UK low carbon hydrogen industry to support decarbonisation of power and hard-to-electrify sectors as part of our mission to become a Clean Energy Superpower; optimise long-term security and affordability of the energy market; and seize the opportunities the hydrogen sector will bring for jobs and economic growth.

Low carbon hydrogen can support the decarbonisation of dispatchable power, hard-to-electrify parts of the UK industrial sector and heavy transport, such as aviation and shipping. Within the hydrogen value chain, hydrogen transport and storage infrastructure (T&S) is vital in enabling hydrogen production to service demand across different end use sectors, supporting delivery of the UK's decarbonisation commitments. Hydrogen T&S infrastructure could play a role in meeting our Clean Energy Superpower Mission, being a key facilitator in delivering hydrogen-fuelled power generation, providing long term energy storage solutions to support electrification, and delivering whole system benefits by helping to manage the costs of electricity system constraints.

Hydrogen T&S can support the growth of a competitive hydrogen market to deliver value for money and reduce costs to consumers. To realise these aims, infrastructure could eventually include an integrated and resilient network with multiple entry and exit points, connected to several hydrogen storage facilities at various scales.

Pipeline transport through hydrogen networks offers the most cost-effective mode of transporting the volumes of hydrogen expected to be required to support hydrogen demand in the early 2030s. There will also likely be a role for small-scale pipelines and non-pipeline transport, including tube trailers, to connect production with offtakers prior to hydrogen networks coming online or in areas where volumes and distance do not justify the levels of investment required for substantial network infrastructure.

In the early years of the hydrogen economy, we anticipate that most industrial and power demand for hydrogen will be located within or in the immediate vicinity of large industrial clusters where sites can share network infrastructure and access available supply. We therefore expect initial hydrogen T&S networks to first develop on a regional basis to support demand expected from hard to decarbonise industrial and power users in or near these industrial clusters. It is also important for early T&S infrastructure to be located where it will offer the greatest strategic value for future expansion throughout the 2030s, with further connections to new production, offtake and storage sites, as the hydrogen market grows.

In line with this, the early support for regional pipeline networks could then extend to the development of a core network, providing transmission-scale connections between regions and

to sources of hydrogen production and storage further afield and more dispersed demand, and in due course to also support international hydrogen trade. These inter-regional connections could support network resilience and energy security, as well as foster competition and subsequent market growth with more users able to access the network. However, initial regional networks will need to operate as integrated and self-sustaining hydrogen eco-systems from the outset, until the strategic needs case for inter-regional connections has been established.

The 2023 T&S Networks Pathway and our Clean Energy Superpower Mission underlines our position that there is a need for a degree of centrally driven strategic planning of T&S infrastructure, combined with elements of a market-led development, to enable efficient, cost-effective and timely roll-out. Strategic planning refers to the assessment of T&S network needs in the short- and long-term to inform the subsequent allocation of funding to enable infrastructure which best meets our ambitions for decarbonisation, energy security, economic growth and value for money. It can offer clarity and confidence to consumers, producers and infrastructure projects, supporting the growth of the hydrogen economy.

Developing a hydrogen regulatory framework

An effective economic regulatory framework is required to support delivery of the UK's first 100% hydrogen pipeline networks, and onwards growth to meet longer-term ambitions set out in the T&S pathway. Economic regulatory frameworks seek to:

- Ensure networks operate safety, efficiently, and fairly through the provision of clear responsibilities and relationships for critical activities; and
- Offer clarity to prospective network participants as to how networks will operate together.

Economic regulation will need to support the UK's first hydrogen networks. Flexibility will also be critical to foster growth, supporting networks as they change and connect to grow the UK's low-carbon hydrogen economy.

Hydrogen is already defined as 'gas' under the Gas Act 1986, which creates the licensable activities of conveying gas through pipes (transportation), arranging with a transporter for the conveyance of gas (shipping) and the supply of gas to premises (supply). Through conditions of licence, transporters and shippers are required to engage on the basis of detailed arrangements set out in a network code, which provides each with additional responsibilities. This regulatory framework applies to pipeline networks. Non-pipeline transport is not regulated by the Gas Act 1986.

This consultation considers the suitability of the regulatory framework set out under the Gas Act for the needs of the hydrogen economy to meet objectives for market regulation, using the following core design principles:

- Allocates clear roles and responsibilities for market participants to ensure hydrogen flows from producers to end users are safe and reliable;

- Provides commercial confidence to market participants; and
- Flexible to adjust to a future competitive market as networks grow.

This consultation is focused on the regulation of early 100% hydrogen pipeline networks, with a focus on power and industrial customers. The proposals are not intended to cover any supply of hydrogen to homes or small non-domestic premises; the potential role of hydrogen in heating these buildings will be covered in a separate forthcoming consultation. Any regulatory implications of that consultation would be picked up separately, as needed. Separate regulatory arrangements will remain in place for the upcoming H100 Fife Neighbourhood Trial, including supply.

Natural gas: Key similarities and differences

The Gas Act was designed for the needs of a competitive natural gas market. 100% hydrogen pipeline networks will be very different, requiring us to make changes to this framework to best suit market needs, as has been done successfully for Carbon Capture Usage and Storage (CCUS).

Hydrogen pipelines are likely to have similarities with established natural gas pipelines, though with some key differences; the natural gas network and its economic regulatory framework is mature, having become well-established over decades. It has large-scale, interconnected infrastructure and is a liquid market, benefitting from diverse sources of gas supply and routes to market, with less reliance on gas storage for providing system resilience and reliability than is expected for hydrogen. As a nascent market, early 100% hydrogen pipeline networks will instead initially operate as smaller, self-contained systems, with shorter pipelines and fewer connected assets than those that exist in natural gas today.

Network infrastructure will initially be supported by business models, including hydrogen transport, production, storage and power. The early hydrogen market will likely be characterised by contractual agreements between key participants (e.g. between hydrogen producers and hydrogen offtakers) and it is unlikely that there will be wholesale trading markets for which to trade hydrogen gas, as exists in natural gas today.

Chapter 2: Balancing hydrogen networks

Chapter summary

This chapter seeks views on how balancing should be regulated within the economic regulatory framework for 100% hydrogen pipeline networks and considers which industry participants are likely to be best placed to hold responsibility for regulated activities under a licence.

Overview

A critical function of the hydrogen economic regulatory framework will be to maintain safe pipeline pressures. This is referred to as ‘balancing’, as system pressures need to be ‘balanced’. Maintaining consistent pipeline pressure is fundamental to the safe and reliable flow of gas to those who produce, transport, and use it.

As in natural gas and electricity, balancing hydrogen pipeline systems will be important to maintain safe and reliable networks, ensuring users get the hydrogen they need, when they need it.

What is Balancing?

‘Balancing’ is the process of ensuring the amount of gas entering network pipelines is the same as the amount of gas taken out of network pipelines. It is important to balance networks, so the system is operated within safe pressures and provides a reliable service for users.

If pressures fall outside of acceptable limits, this is an ‘imbalance’. If more gas enters the pipeline than is taken out, pressures could increase to unsafe levels, which in extreme cases could lead to pipe rupture. If too little gas comes into the pipeline than is taken out, this could also present a safety risk and prevent users from taking out the gas they need.

In natural gas pipelines, molecules move slowly through the network. This means that balancing pipelines is considered over a 24-hour period, starting at 5am and ending at 5am the next day. In contrast, electricity flows instantaneously and needs more regular balancing. At its fastest, the electricity system needs to take balancing actions second-by-second.

Balancing is critical to ensure the system is operated within safe pressures and provides a reliable service for users. Different system events could lead to hydrogen network imbalance, such as unexpected drops in production, demand or storage downtime, network unavailability, or a mismatch of gas flowing in and out of the pipelines.

Those responsible for hydrogen balancing will need to make decisions and take appropriate actions to support the overall balance of the network including their own volumes of gas being transported through the system. Actions are likely to vary, depending on the type and cause of the imbalance. This may include turning up or down production and offtake or moving hydrogen in and out of storage. Decisions and actions will be informed by the specific situation and network capabilities.

The range of actions that a responsible entity could take in the event of imbalance will depend on physical network design. This will set the range of balancing tools that are available, for example what transport and storage assets could be used. For example, if storage is available within a network, this could be used to manage pipeline pressure up or down by injecting or withdrawing hydrogen from storage.

The most appropriate action to balance a network will also need to consider the specific situation, such as how quickly gas needs to move to respond to an imbalance, as response times are likely to vary between different types of connected infrastructure (see Table 1). For example, if a storage asset is online, it could be used very quickly to respond to an imbalance. If a storage asset is offline, this would take longer. Table 1 below does not include estimated response times for above-ground storage technologies, but these may also be available to some 100% hydrogen pipeline networks. Overall, hydrogen production and storage technology response times are likely to be varied compared to natural gas.

Table 1: Estimated response times of different hydrogen production and storage technologies[1]

Technology		
Electrolytic hydrogen production	Cold start up time (PEM/Alkaline)	5 to 10 minutes/30 to 60 minutes
	Hot ramp rate (PEM/Alkaline)	10% per second/1% per minute
CCUS-enabled hydrogen production	Cold start up time	6 to 8 hours
	Hot ramp rate	1 to 2% per minute
Hydrogen salt cavern storage (dry cavern technology assumed)	Cold start up time (switch from injection to withdrawal)	1 to 3 hours
	Hot ramp rate (when currently withdrawing)	1 to 2% per minute

The physical design of 100% hydrogen pipeline networks will also establish the volume of gas stored in pipelines that could be moved to address an imbalance. The energy density of natural gas means it can be stored in large volumes within pipelines. This is referred to as ‘linepack’.

[1] Source: Internal DESNZ analysis

Linepack is one of the key tools used in balancing to adjust physical pressures in pipelines. Natural gas has a longer balancing timeframe than electricity, with 24 hours real-time to resolve imbalances on the system. Hydrogen is physically less dense in volume mass than natural gas, which means it is less compressible within pipelines, lowering its overall energy and linepack density. This means that linepack in early hydrogen networks may only provide a limited balancing response time compared to natural gas. While the exact balancing timeframes for hydrogen is uncertain, internal DESNZ analysis suggests this could be between 2-6 hours for some networks. Because of the limited availability of linepack, we expect storage will be important to help balance networks in times of system stress.

Core hydrogen balancing activities

Regardless of the types of tools available within a given network, such as linepack or storage, the same core balancing activities will need to be undertaken in all hydrogen networks; from the UK's first pipeline systems to a mature, established market. These activities, summarised below, relate to delivering hydrogen gas in and out of the pipeline system and monitoring flows to ensure it is kept within acceptable pressure limits.

100% hydrogen pipeline networks and connected infrastructure will need to consider system resilience needs and ensure their physical design supports the network to effectively manage potential imbalances. Alongside this, regulation will play a vital role in establishing clear responsibilities and accountability to carry out core activities to ensure that networks operate in a fair and transparent way.

Core balancing hydrogen activities will include:

Sharing data: regular data on gas flows and pressure will need to be shared between responsible entities delivering gas into the network. This would inform decisions to how much hydrogen gas should be put in ('entry flows') or taken out of the pipeline ('exit flows') within a set balancing timeframe. Responsible entities will also need access to system demand forecasts to monitor system pressures.

Changing gas flows: responsible entities will on occasion need to change the flows of gas if system data indicates a potential system imbalance. This could include making physical changes on the system, like adjusting system pressures, withdrawing hydrogen from storage, or ramping demand up or down.

Maintaining system resilience: as the volume of hydrogen linepack will be more limited than natural gas, storage will be a critical tool in offering system resilience and confidence to users. In some situations, hydrogen in stores could be used to help resolve system imbalances. For example, hydrogen could be taken out of storage to allow a producer to flow hydrogen to their offtakers during maintenance or an unexpected outage, to keep the system within safe pressures. Responsible entities would also have access to other tools, for example turning up or down production and/or offtake and would decide the most appropriate action based on the individual circumstances.

Manage emergencies: responsible entities may need to give and/or take instruction to avoid and manage any emergencies on the system, as in natural gas today.

Questions

1. **Do you agree with the identified core activities that hydrogen networks will need to undertake to balance their systems? Please explain your answer and provide any supporting evidence, including any additional core activities that hydrogen networks may need to undertake to balance their systems.**

Balancing licence structures

Gas balancing responsibilities are primarily set out in licences, regulated by the Office of Gas and Electricity Markets ('Ofgem') under the Gas Act, and a network code. The Gas Act sets out who should be licensed and establishes the powers for them to carry out relevant activities under licence. Entities can apply for a licence and, subject to meeting eligibility and legislative requirements, a licence is granted by Ofgem.

In natural gas, balancing responsibilities are shared across two types of licences: primary and residual, with additional detail set out in the Uniform Network Code ('UNC'). The UNC is the legal document that forms the basis of arrangements between licensed gas transporters and the shippers whose gas they transport. More details on the UNC are in Chapter 6.

- **Primary balancers** are responsible for most day-to-day balancing activities under a 'shipper' licence. A shipper is defined in the Gas Act as an entity that arranges for gas to be introduced to, and conveyed by means of, or taken out of, a pipeline system operated by a licensed gas transporter.[2] They arrange for gas to be transported in and out of the network, share data with network operators, and take instruction in emergencies. In natural gas, primary balancers are usually commercial shipping entities, with numerous licensed shippers operating in the market.
- **Residual balancers** act as a 'backstop' for primary balancers when additional physical actions are needed to resolve an imbalance. They continually monitor gas supply and demand on the system. The physical design and scale of the natural gas network allows the residual balancer to take physical actions to the network when required, if primary balancers fail to resolve an imbalance, like utilising linepack to adjust the pressures and gas flows in the pipelines. They are also responsible for giving instructions to the market to prevent an emergency such as a National Gas Supply Emergency (NGSE), but these emergencies are very rare and have never been declared for natural gas. Residual balancing is carried out by the National Transmission System (NTS) System Operator (currently National Gas Transmission (NGT)) under their Gas Transporter licence. Residual balancing is one of many different functions of the NTS System Operator. There can be several actions taken by the residual balancer in a normal natural gas day.

[2] The Gas Act, Section 7A

The start of this chapter outlined expected core balancing activities for hydrogen networks. These are likely to be similar to natural gas; with a focus on sharing and receiving data, managing gas flows and responding to emergencies. As in natural gas, hydrogen licences will need to effectively regulate these balancing activities to ensure that participants have clear responsibilities and powers to undertake those activities. This will support safe system operation, provide confidence to its users, and a reliable, fair and transparent system. Balancing licence structures will also need to be flexible to support networks to develop from early stages towards a future competitive market.

Primary and residual balancing license structures could be retained for hydrogen networks. This could offer advantages in early network stages, as sharing responsibility across multiple entities would avoid a single point of failure. If primary balancers failed to resolve an imbalance, the residual balancer acting as the 'backstop' could step in to bring the system back to safe pressures. As networks grow to become more similar to today's natural gas market, retaining existing natural gas licence structures could also facilitate market development and provide a familiar regulatory structure to industry. But, as early hydrogen networks will be simpler and smaller than natural gas, a dual licence structure could add unnecessary complexity for some of the UK's earliest hydrogen networks.

Alternatively, balancing responsibilities could be combined and assigned to one, single entity. This would require the creation of a new licence that merges primary and residual balancing duties. This could streamline regulatory requirements for earlier networks, which may be more proportionate to their smaller scale. However, concentrating regulatory responsibilities could introduce a single point of failure, be less familiar to industry and, by design, create a monopolistic entity that could inhibit transition to a future competitive market as networks grow.

Summary: Balancing licence structures for hydrogen networks

In light of the above considerations, UK government is minded to retain primary and residual balancing structures for hydrogen networks as this is likely to best meet the needs of early networks, whilst supporting future growth. It would provide a familiar regulatory structure for industry, share responsibility between relevant network participants, and avoid creating a single point of failure.

Questions

2. **Do you agree with our assessment that primary and residual balancing licence structures should be maintained for 100% hydrogen pipeline networks? Please explain your answer and provide any supporting evidence.**

3. **Do you think there will be any costs, savings or other economic and business impacts associated with retaining these licence structures? Please explain your answer and provide any supporting evidence.**

Hydrogen primary balancing

This section considers who may be best placed to hold primary balancing responsibilities under licence.

Primary balancing in natural gas is commonly undertaken by commercial gas shippers, operating under a shipper licence. Shippers are defined in the Gas Act as those who arrange with gas transporters to move gas in and out of the pipeline. Only those holding a shipper license are entitled to arrange for gas to be moved through pipelines by gas transporters and access the network in this way. Any market participant wishing to move their gas must either have a shipper licence or contract with a licensed shipper to do so on their behalf.

Under section 7A of the Gas Act, required balancing activities are defined in the shipper licence itself. As commercial wholesalers, gas shippers in natural gas also buy and sell gas as part of the wholesale market, with licence conditions that enable and constrain how shippers operate within the network, that indirectly governs how gas is traded.

The Gas Act does not require shipper licences to be held by a specific entity, although certain types of licence holders are excluded from holding a shipper licence. Those seeking a licence will instead need to demonstrate they can deliver relevant functions identified earlier in this chapter and meet eligibility and legislative criteria.

A range of entities are expected to operate in hydrogen networks, who could seek a shipper licence to undertake primary balancing activities. This includes hydrogen producers, hydrogen transporters, hydrogen storage operators, and hydrogen offtakers. Table 2 considers the likely suitability of identified participants to carry out balancing activities for hydrogen pipeline networks.

Third parties, such as commercial gas shippers, may also seek a role in hydrogen pipeline networks. In practice, the Hydrogen Production Business Model (‘HPBM’) may limit the role of third parties in early networks due to restrictions on selling subsidised hydrogen volumes to risk-taking intermediaries (‘RTIs’). However, as the market matures, licence structures could be flexible to enable third parties to enter the market. Third parties could also be able to undertake services on behalf of primary balancers to help them fulfil their responsibilities, provided this complies with the Low Carbon Hydrogen Agreement (‘LCHA’). Government recognises the potential contribution of RTIs in a well-functioning market and will review the RTI position in the LCHA in future, taking into account the wider regulatory environment.

Table 2: Suitability of market participants to undertake primary balancing responsibilities

Network participant	Key considerations
Hydrogen producer: An entity generating low-carbon hydrogen, likely supported through the HPBM in early market phases. Producers will retain direct ownership of HPBM-supported hydrogen before this passes to a qualifying offtaker.	**High degree of control over gas flows that could support producers to seek primary balancing activities**. Producers are responsible for delivering gas to offtakers under commercial contracts (which may include provisions for temporary storage) and providing required data to do so. Some producers will also carry out balancing activities for smaller, private pipelines, though may have varying technical ability to carry out network balancing, depending on their ability to access relevant transport and storage infrastructure.
Hydrogen offtaker: An end user of hydrogen e.g., for industrial processes or power generation. Offtakers would assume direct ownership of HPBM-supported hydrogen under existing LCHA terms at an agreed point of sale.	**Some control over gas flows that could support offtakers to seek primary balancing activities.** Some offtakers, such as hydrogen to power plants, may wish to take direct responsibility for hydrogen in, and moving from, storage. They may also be able to ramp up and down generation in some situations to help manage short-term imbalances. Offtakers could control gas flows by reducing or increasing demand. However, offtakers may have varying technical ability to carry out core balancing activities and not wish to assume primary balancing responsibility for hydrogen as it moves through the pipeline, as they are users of the network, rather than direct participants in the transport of gas.
Hydrogen gas transporter: A licensed entity responsible for transporting hydrogen through pipelines connecting producers, offtakers and storage, likely supported through the HTBM in early market phases.	**Likely unsuited to assuming primary balancing responsibilities.** Gas transporters likely to have limited technical ability to carry out primary balancing functions, as they would require other parties to take balancing actions on gas inputs and exit flows. Current unbundling rules in the Gas Act prohibit gas transporters from any undertakings related to production or supply of gas or holding a shipper licence.[3]
Hydrogen storage operator: An entity managing a store of hydrogen either underground or above ground, likely supported through the Hydrogen Storage Business Model (HSBM) in early market phases.	**Likely unsuited, in most cases, to assuming primary balancing responsibilities.** Storage operators may have limited technical ability to carry out core balancing functions, as they would only have direct control of gas moving in and out of a storage facility.

[3] The Gas Act, section 8H

Third party, e.g. commercial gas shipper: A licensed entity responsible for arranging transportation of gas through the gas network.	**May seek primary balancing responsibilities in future networks.** Likely to have technical ability able to carry out core balancing activities from relevant experience and skill based on balancing role in natural gas, but other features, like wholesaling and arbitrage activities, are unlikely to be a characteristic of early hydrogen networks. Under current HPBM terms, qualifying volumes of subsidised hydrogen cannot be sold to RTIs, but this position is open to review. RTIs could still play a role in the market, providing services to licensed primary balancers, as long as the legal and beneficial title in the hydrogen transfers directly from the producer to a Qualifying Offtaker.

Summary of position: primary balancing responsibilities

Primary balancing in natural gas is regulated through a gas shipper licence. The Gas Act 1986 does not require shipper licences to be held by a specific entity. Prospective participants must however be able to fulfil the necessary balancing responsibilities set out in the licence and any other eligibility or legislative criteria.

In early networks, hydrogen producers are likely best placed to hold primary balancing responsibilities through a shipper licence. They have high technical ability to undertake relevant activities, with access to relevant data, as well as a critical role in managing their gas inputs and outputs. Undertaking primary balancing activities would therefore complement their wider system roles and responsibilities, notably to supply hydrogen to their offtakers.

Other participants would not be excluded from applying for a licence to undertake primary balancing activities, should they meet legislative and eligibility criteria. This includes Gas Act unbundling rules, which prohibit certain participants like gas transporters and interconnector licence holders from seeking a shipper licence. For example, some hydrogen offtakers, such as hydrogen to power plants, may choose to apply for a licence to assume direct control of hydrogen moving in and out of the pipeline, moving hydrogen from storage to their plant.

Questions

4. **Do you agree that producers are likely best placed to hold primary balancing responsibilities for hydrogen networks? Please explain your answer and provide any supporting evidence.**

5. **Do you agree that other parties, for example hydrogen offtakers, should not be excluded from applying for a licence? Please explain your answer and provide any supporting evidence.**

6. **Do you think there will be any costs, savings or other economic and business impacts from producers or offtakers holding primary balancing responsibilities? Please explain your answer and provide any supporting evidence.**

Chapter 3: Allocating a System Operator for hydrogen pipeline systems

Chapter summary

This chapter seeks views on the allocation of responsibility for the system operation of hydrogen pipeline networks. It sets out the activities that a hydrogen System Operator may need to undertake and proposes that the role of System Operator should be allocated to the owners of pipeline systems in their capacity as licensed transporters of hydrogen under the Gas Act 1986. This is consistent with arrangements within the natural gas system, where National Gas Transmission (NGT) is given System Operator responsibility for the National Transmission System (NTS) through conditions of its transporter licence. It is proposed that this arrangement is kept under review as 100% hydrogen pipeline networks grow and connect.

Overview

Hydrogen pipeline networks will serve the needs of multiple users to flow hydrogen from pipeline network entry points to network exit points. As summarised in Chapter 2, whilst primary balancers will each have responsibility for ensuring that their entry and exit flows are balanced, a System Operator will also be needed to take residual balancing actions should primary balancers fall short in their responsibilities. More broadly, a System Operator will act as a central decision-maker, taking actions that meet the needs of pipeline network users (e.g. ensuring that their gas flow nominations can be accommodated) whilst ensuring that overall pipeline integrity and safety is maintained. A System Operator would coordinate its decision-making activities from a control centre, and act under a licence, pursuant to the Gas Act 1986. Its decisions would be taken in accordance with arrangements set out in a network code (see Chapter 6 for further details).

What is System operation?

‘System operation’ refers to activities that enable a pipeline system to function safely and meet the needs of its users. In the natural gas system, National Gas Transmission (NGT) is both the pipeline system owner and System Operator for the National Transmission System (NTS). It is given its designation of “NTS System Operator” through conditions of its transporter licence.

In discharging its duties as NTS System Operator, NGT undertakes a range of activities. These activities include:

- operating the pipeline network: conveying gas safely and efficiently from entry to exit points and managing any issues/constraints that might arise, e.g. due to infrastructure failure or maintenance;

- managing balancing arrangements: enabling users to make “nominations” (i.e. informing the System Operator of the amount of gas they intend to flow onto or off the NTS at entry and exit points) and acting as residual balancer when entry and exit flows are out of balance, thereby ensuring that linepack remains within an acceptable range;
- managing a process to fairly allocate pipeline network capacity to users; and
- managing charging arrangements, new network connections, gas quality, and emergencies.

System operation in the early hydrogen economy

As set out in Chapter 1, initial 100% hydrogen pipeline networks will have more modest infrastructure and use than the NTS. As such, the activities a hydrogen System Operator will need to undertake in order for a pipeline network to function safely and meet the needs of its users are likely to be a subset of the activities set out above for the NTS.

However, system operation will remain critical to the safe operation of hydrogen pipeline networks: providing a central decision-maker responsible for receiving information from participants and taking actions to ensure effective pipeline operation. Residual balancing will notably remain one of the System Operator’s key responsibilities, as set out in Chapter 2. In the early hydrogen economy, residual balancing activities are likely to centre on considering and undertaking physical actions to maintain pipeline pressures, for example flexing linepack, instructing primary balancers to change their gas flows, including to make use of hydrogen of storage, or, in the most severe cases of imbalance, reducing flows to users.

Questions

7. **Do you agree that responsibility for the system operation of hydrogen pipeline networks will need to be allocated to an entity through licence? Please explain your answer and provide any supporting evidence.**

8. **In your view, what are the key activities that a hydrogen pipeline System Operator will need to undertake? Please explain your answer and provide any supporting evidence.**

Who is best placed to assume responsibility for pipeline system operation?

The Gas Act envisages that transporters will play a role, under licence, in both the ownership and operation of their pipeline networks. In natural gas, system operation responsibility therefore lies with the transporter, so that they have responsibility for both owning and operating the pipeline. Within hydrogen pipeline networks, system operation responsibilities could either:

- **Mirror existing NTS arrangements**: allocating responsibility to pipeline network owners, such that each pipeline network owner would also be its System Operator; or alternatively
- Be allocated to a **single, overarching entity** under a new licence. Pipeline networks would be independently owned, but system operation would be carried out by a single, distinct entity.

Table 3 assesses these options against the desired outcomes for hydrogen pipeline networks identified in Chapter 1. This assessment indicates that hydrogen pipeline network owners are likely to be best placed to assume system operation responsibility, notably in the early stages of when hydrogen pipeline networks are modest in scale and regionally isolated.

Transporters will be most familiar with their pipeline networks and user needs and are therefore likely to be best able to take operational decisions in early network stages. Retaining similarity with current legislative structures could support deliverability, offering clarity to investors more quickly on system responsibilities. A 2021 consultation on a Future System Operator also identified that the natural gas system operation approach offered day-to-day operational efficiencies for the network.[4]

Assigning responsibility to an overarching System Operator might offer some longer-term, strategic benefits, notably as pipeline networks grow and with their potential to connect to a national, or international, network. These benefits are however likely to be outweighed by the near-term benefits of transporters assuming a System Operator role, offering a more proportionate approach for smaller, early networks, and directly connecting decision-making responsibilities to those with operational control. We could however seek to retain flexibility in licence design to enable later change, should market evolution merit reassessment.

[4] Proposals for a Future System Operator role: https://www.gov.uk/government/consultations/proposals-for-a-future-system-operator-role

Table 3: Assessment of system operation responsibility for hydrogen pipeline systems

Assessment Criteria	Pipeline system owners	A single entity
Flexibility: provides arrangements that can adapt or be changed to align with changes in infrastructure and the way it is used.	Early hydrogen pipeline networks will be modest in scope and regionally isolated. Producers and offtakers will contract with one another on a bilateral basis. System operation approach will likely be sufficient to support network decisions. When pipeline systems grow and likely interconnect, this approach may remain viable but could become sub-optimal if combined decision-making is needed across networks operated by different System Operators. Licence drafting could offer flexibility to change, should there be a case to reallocate responsibility in later network stages.	A single, overarching System Operator for early networks is unlikely to offer benefit to early networks. However, as pipeline systems grow and likely interconnect, the case for a single overarching System Operator may grow. For example, it might offer operational efficiencies and enable decisions to be made in the context of the whole energy system. However, the scale and needs of future hydrogen pipeline networks remain uncertain.
Commercial confidence: provides an effective solution for initial pipeline systems	Offers consistency with current NTS arrangements and expectations of existing legislation, offering clarity to network participants of legislative responsibilities. Preserves day-to-day operational efficiencies offered by a combined owner and operator arrangement.	Arrangements likely to be less familiar to industry, due to divergence with NTS arrangements. Would require new legislation to define a new System Operator operating as a single, overarching entity. Could result in a loss of day-to-day operational efficiencies, which could result in higher infrastructure maintenance costs.
Capability and expertise: allocates clear roles and responsibilities for market participants	Prospective pipeline owners should have, or be able to build, capability and capacity to deliver activities needed to operate their pipeline networks. System Operator responsibilities may extend these operational responsibilities beyond the scope anticipated by some prospective pipeline owners (e.g. to undertake residual balancing). Specific responsibilities would be set out in licence and code but are expected to be limited in scope for early networks.	May not have relevant capability or experience (e.g. gas control centre experience) but could acquire this ahead of pipeline system operation to deliver core operational activities.

Questions

9. Do you agree with the assessment that hydrogen pipeline network owners are best placed to hold responsibility for system operation, under their hydrogen transporter licence? Please explain your answer and provide any supporting evidence.

Chapter 4: Supplier licences

Chapter summary

This chapter considers the role of the licensed supplier for hydrogen. This framework for supply was developed for a mature natural gas market. As set out in Chapter 1, the needs of early hydrogen networks are likely to be different. This chapter proposes to exempt the supply of hydrogen to premises from licensing requirements to remove unnecessary regulatory barriers in relation to the first hydrogen pipelines and keeping this approach under review as pipelines develop.

This consultation is focused on the regulation of early hydrogen pipeline networks, with a focus on power and industrial customers. The proposals are not intended to cover any supply of hydrogen to homes or small non-domestic premises; the potential role of hydrogen in heating these buildings will be addressed in a separate forthcoming consultation. Any regulatory implications of that consultation would be picked up separately, as needed. Separate regulatory arrangements will remain in place for the upcoming H100 Fife Neighbourhood Trial, including supply.

Supplier licensing objectives

Suppliers play an important role in the natural gas market, purchasing gas from shippers before retailing it to consumers. The licensable activity of supply is mandated and provided by the Gas Act 1986 which prohibits a person from supplying "to any premises gas which has been conveyed to those premises through pipes" unless authorised to do so by a licence.[5] Where previous chapters in this consultation are concerned with pipeline networks, the supplier licensing requirement applies to all pipelines, which may include the earliest point-to-point pipelines. The Gas Act defines the role of the supplier. Ofgem, as the regulator, uses 'supplier licence conditions' to establish more specific rules and obligations that the licensee must comply with. The Gas Act also includes a series of conditions for supplier licence exemptions.

While suppliers have a number of responsibilities in natural gas networks, the supplier licence is associated with two main functions:

- **Protection of consumer interests**

While the Act mandates and provides the licensable activity of supply, it is relatively high-level in terms of the regulatory requirements that licensees must fulfil. The more detailed obligations and rules set out under the supplier licence conditions are principally to ensure consumers, particularly domestic and vulnerable domestic consumers, are protected.

[5] Gas Act 1986, Section 5(1)(b)

For example, licensed suppliers are required to ensure both new and existing customers are offered the same tariffs; abide by Standards of Conduct to behave in a fair, honest and professional manner; and ensure there are continuity of supply arrangements in place for all consumers should the supplier cease operations.

- **Enabling the effective functioning of a wholesale market and creation of a competitive and regulated retail market**

Suppliers provide consumers with the ability to choose their retailer (i.e. supplier) from the competitive retail market. Suppliers compete with one another to offer consumers the best price, both in terms of the cost of the commodity and back-office efficiencies; offer innovative tariffs, with a secondary objective of incentivising certain consumer behaviours; and offer high levels of customer service.

In turn, suppliers are able to appoint a gas wholesaler (i.e. shipper) from the competitive wholesale market. Suppliers generally appoint a shipper based on price and reliability, or to enable vertical integration of a supplier and shipper.

Supplier licensing drives prices down by enabling consumer choice and seeks to incentivise standards of customer service by supporting competition between suppliers, though competition can also take place in an unlicensed market. This is, however, dependent on there being scope for multiple suppliers to compete with one another, and similarly, multiple shippers being in competition with one another in the wholesale market.

In early market stages, these objectives of hydrogen supply licensing are unlikely to be applicable to the hydrogen market, notably ahead of a wholesale hydrogen market:

- **Protection of consumer interests:** The large industrial and power offtakers we expect to connect to early hydrogen networks are unlikely to need the consumer protection obligations and measures offered by supplier licences.
- **Enabling the effective functioning of a wholesale market and creation of a competitive and regulated retail market:** Hydrogen producers will contract directly with offtakers for the supply of hydrogen. As such, there will be limited-to-no scope for a competitive retail or wholesale market.

Early hydrogen offtakers are instead likely to possess sufficient negotiating powers and capacity to engage directly in the market without additional regulatory oversight. Requiring an additional supply licence could therefore place an unnecessary additional step between producers and offtakers and may duplicate bilateral contracts between producers and offtakers.

Exemptions to the supplier licensing requirement

While the Gas Act prohibits the supply of gas, including hydrogen, conveyed to premises by pipelines without a licence, it recognises that there may be circumstances in which obtaining a

supply licence is unreasonable or unnecessary. This is provided for in licensing exceptions and exemptions[6] within the Act.

The Gas Act grants the Secretary of State powers to issue licensing exemptions through secondary legislation[7]. These exemptions may either be case-specific, applicable only to a specified pipeline or premises, or class-wide, applicable to pipelines meeting certain criteria.

Within the Act, Schedule 2A notably provides five licensing exceptions[8] that can be applied for, where eligible market actors do not need to hold a licence to carry out an otherwise licensable activity. The most relevant of these exceptions that can be sought for hydrogen supply applies to those supplying to 'very large consumers'. The exception is defined through a threshold for such large consumers: those undertaking "a supply of gas to any premises at a rate in excess of 2,000,000 therms a year". This threshold for annual consumption seeks to separate large, generally industrial consumers, from small domestic and business consumers.

This exemption recognises that large consumers do not need the same consumer protections as smaller consumers, deeming 'sufficiently large consumers' capable of engaging directly with a shipper in the wholesale market for gas, rather than a licensed supplier making arrangements on their behalf.

Exempting the supply of hydrogen to premises

The consumption threshold to exempt 'large consumers' from licensed supply is based on the mature natural gas market. As such, it doesn't translate effectively to the nascent hydrogen economy, which will substantially differ from the natural gas market in terms of scale and user profile.

Early hydrogen networks are expected to connect to industrial and power offtakers that would similarly not require the additional consumer protections offered through licensing of supply and be equipped to make arrangements directly with hydrogen producers. Some of these may however fall below the exemption threshold and be subject to supplier licences. In such cases, obtaining and complying with a supplier licence is likely to pose an unnecessary regulatory duty for early industrial projects. Creating an exemption from licensed supplier requirements could therefore remove unnecessary regulatory barriers for the first hydrogen pipelines.

Alternatively, setting a hydrogen-specific exemption threshold could retain regulatory protections for supply to smaller offtakers, whilst removing barriers for larger industrial and power users. There is, however, limited data available to establish a suitable threshold, which could risk a specific exemption being unsuitable for user needs. For example, if this threshold were set too high, this could place unnecessary regulatory burdens on some pipelines. If the

[6] There is no substantive difference between a licensing exemption and exception, which both achieve the same purpose of suspending the licensing requirement. The difference in nomenclature is a consequence of where they are established; exemptions are implemented through regulations, while exceptions are set out within Schedule 2A of the Act.
[7] Gas Act 1986, Section 6A(1)
[8] Gas Act 1986, Schedule 2A

threshold was set too low, it may not offer appropriate services to those who need them. Information from early pipeline networks could offer relevant data on offtaker consumption levels as the market emerges to inform any future supplier licensing regime.

Summary of position: Supplier licences

We are minded to exempt persons involved in the supply of hydrogen through pipes to premises from the requirement to hold a supplier licence. This will remove unnecessary regulatory barriers for the first hydrogen pipelines. As networks scale up**,** with an increased number of market participants, a case could emerge for regulatory intervention, either to support competition in supply and/or to offer consumer protections as smaller offtakers join hydrogen networks. A range of factors are likely to drive future regulatory needs, for example user profile, network scale, and the role of other market participants in driving a competitive wholesale market. We therefore recommend keeping regulatory arrangements in respect of the supply of hydrogen under review as pipelines develop.

Questions

10. Do you agree with the assessment that persons supplying hydrogen through pipes to premises should be exempted from supplier licence requirements, but that this arrangement should be kept under review as hydrogen networks develop? Please explain your answer and provide any supporting evidence, including in support of any alternative options, such as a new exemption threshold.

11. Do you expect there to be any costs, savings or other economic and business impacts from the proposed exemption? Please explain your answer and provide any supporting evidence.

Chapter 5: Other hydrogen licences

Chapter summary

This chapter seeks views on any further licensed responsibilities that could be required within 100% hydrogen pipeline networks.

Overview

This consultation proposes that the following activities in the hydrogen economy are regulated under licence:

- Transportation: Conveying hydrogen through pipes to premises, or to a pipe-line system operated by a gas transporter;
- Shipping: Arranging with a transporter for the conveyance of gas.

As set out in Chapter 4, we propose keeping future regulation of the activity of supply under review.

The Gas Act also regulates – though does not license – the storage of hydrogen in storage facilities.[9] Storage will play an important role in hydrogen networks, helping participants to manage imbalances in supply and demand.

Storage regulation in the Gas Act covers:

- **Independence**: storage operators should be legally independent or 'unbundled' from any company that produces or sells gas to prevent conflicts of interest.
- **Third party access**: prevents storage operators with significant market power from potentially manipulating the market by discriminating between potential storage users. Third party access ensures storage services must either be auctioned or offered on a non-discriminatory basis by the storage operator to users, with contracts on equivalent terms and transparent storage capacity allocation. Some storage facilities can be exempt from providing third party access if they are not technically or economically critical to the overall gas market operations; if granting third party access could negatively impact the operational safety of a storage site; and/or, if by granting third party access the storage site could become economically unviable. Ofgem can enforce compliance and resolve disputes on access to storage facilities.[10]

The Gas Act does not license the activity of gas production. Hydrogen producers will however also play a key role in hydrogen networks: responsible for producing hydrogen and arranging with offtakers (or storage facilities) for supply. As such, we assess that they are likely to be best placed to assume primary balancing functions under a shipper licence (see Chapter 2).

[9] The Gas Act section 8R-8S
[10] The Gas Act section 19B

Providing independent economic regulation through licensing these key market activities could however offer additional benefits, for example providing regulatory stability that encourages investment, offering a transparent monitoring and enforcement framework, and enabling regulators to respond to new risks that may emerge as networks develop.

Questions

12. Do you consider that any other activities in 100% hydrogen pipeline networks should be regulated under licence, for example the activities of production and/or storage? Please explain your answer and provide any supporting evidence.

Chapter 6: Network Code

Chapter summary

In this chapter, we are consulting on our approach to a network code for 100% hydrogen pipeline networks.

What is a Network Code?

A 'network code' is a legal document that forms the basis of the arrangements between network owners and network users. It sets out the detailed responsibilities of network participants, including responsibilities related to balancing and system operation. A network code can be considered as the rulebook which defines how network participants should act, to ensure the effective and efficient operation of the network.

Codes are given legal force through the requirement of licensed entities to be parties to the code, through conditions in their licences. As the regulator, Ofgem is responsible for ensuring that licensed entities meet their licence conditions.

Natural gas networks are covered by the Uniform Network Code (UNC). This is an agreement between licensed gas transporters (pipeline owners) and the licensed shippers whose gas they transport. In addition to the UNC, a new code has recently been developed for Carbon Capture and Storage (CCS) networks. The role of the CCS Network Code is similar to the UNC. It sets out the arrangements that apply to licensed CO2 Transport and Storage Companies (T&SCo) and network users.

The CCS Network Code was developed using a 'minimum viable product' approach, focusing on early network needs. This has resulted in a much smaller and more streamlined code compared to the UNC, whist ensuring the code can continue to develop as CCS networks evolve. The CCS Network Code was developed in partnership between industry and government.

Following the Hydrogen Transport and Storage consultation in 2022, the government response[11] set out that nearly half of respondents said that hydrogen should have its own arrangements (i.e. something equivalent to the UNC but specifically for hydrogen) distinct from those for natural gas. In contrast, 6 respondents (about 18%) thought that the UNC could be adapted to accommodate the conveyance of hydrogen. We committed to keep the market framework and industry commercial arrangements under review with a view to introducing timely amendments where they are warranted. This consultation sets out the next stage in our thinking with respect to the network code.

[11] Proposals for hydrogen transport and storage business models

Recommendation for a hydrogen network code

In considering arrangements for 100% hydrogen pipeline networks, we identified that an alternative approach to a network code would be an arrangement of bilateral agreements between transporters and network users. However, in our view this arrangement does not ensure the fair, transparent and standardised rules for all network users which a network code can deliver. A network code should help to create a level playing field and facilitate network development by encouraging investment and participation in the network. Our view is that a single network code will be needed to support early hydrogen pipeline networks, including those funded through the HTBM.

We have been considering how we can ensure there is a network code in place for early 100% hydrogen pipeline networks. There is an option to modify the UNC to make it also applicable to hydrogen networks. However, in response to our 2022 Transport and Storage Consultation, nearly half of respondents expressed interest in a hydrogen specific code. In our view, modifying the UNC for hydrogen would likely impose an unnecessarily excessive compliance burden upon participants in early networks, as we expect there to be significant differences between the development and operation of early hydrogen networks compared to the mature natural gas network. It is also likely that the existing UNC governance and modification processes are not optimised for the level of ongoing code development that is expected to be required, as hydrogen networks develop. In addition, there is a risk that using the UNC to cover both natural gas and hydrogen networks could have unintended consequences and could cause disruption to the natural gas market during the UNC modification process.

Building on the experience of CCS our minded-to position is that a new hydrogen network code should be developed that is specific to 100% hydrogen pipeline networks.

Questions

13. **Do you agree that a network code will be required for early 100% hydrogen pipeline networks, including those that are funded through the HTBM? Please explain your answer and provide any supporting evidence.**

14. **Do you agree that a new hydrogen network code should be developed? Please explain your answer and provide any supporting evidence.**

Code Development: Roles and responsibilities

We have considered the roles and responsibilities of different stakeholders with respect to initial hydrogen code development (to the point when the first issue of the code is published). In our view, based on the experience of developing the CCS Network Code, successful delivery of an initial hydrogen network code will be achieved through industry and government working in partnership, with collaboration from Ofgem and other relevant stakeholders, e.g. the National Energy System Operator (NESO).

There will need to be a coordination function to plan code development, drive progress, and convene stakeholders. Building on the experience of CCS Network Code development, our minded-to position is that UK Government is best placed to take on the coordination function for development of the first issue of the code. Our view takes into account the relative nascency of the hydrogen sector compared to natural gas and understandably likely insufficient capacity within industry to fulfil the coordination function. This approach will also help ensure that development of the code is aligned with developing government policy for hydrogen, including business models across the value chain.

We anticipate that as the hydrogen economy develops in the longer term, government will play a reduced role in the development and modification of the code, relative to industry and other relevant stakeholders. Government may still need a role in modifying the code in line with government policy objectives and in the interests of future network participants.

We welcome views on the role of UK Government in the development of a hydrogen network code, as well as views on the types of stakeholders who should be involved in the initial development of the code.

We also welcome views on which types of entities should be party to the hydrogen network code. As noted above, the UNC is principally an agreement between natural gas transporters and shippers, whereas the CCS Network Code is an agreement between Transport and Storage Companies and network users.

Questions

15. **Do you agree with the description of the role of UK Government during code development and subsequent modification? Please explain your answer and provide any supporting evidence.**

16. **Which types of stakeholders do you think should be involved in the development of the code? Please explain your answer and provide any supporting evidence**

17. **Who should be a party to the code? Please explain your answer and provide any supporting evidence.**

Code Development: Content

Project developers have indicated that they will need to understand the responsibilities of market participants, as specified in the code, before making investment decisions.

To keep pace with the development of 100% hydrogen pipeline networks, our minded-to position is that the first issue of the hydrogen network code should be developed based on a ‘Minimum Viable Product’ (MVP) approach. This means prioritising issues that are most relevant to early hydrogen networks and their users for the first issue of the code, whilst ensuring the code is flexible enough to adapt as hydrogen networks develop over time. This approach has been used successfully for the development of the CCS Network Code, which produced a code approximately 300 pages in length, compared to over 1500 pages of the

UNC[12], which was developed over many years for the more mature and complex natural gas networks

We welcome views on which issues should be prioritised during initial code development, as well as which issues are important to consider for later iterations of the code. Respondents may wish to consider the content of both the existing UNC and CCS Network Code when answering this question.

We also welcome views on the level of progress that is required from the code at the different stages of project development, to enable hydrogen projects to progress and make investment decisions.[13]

Questions

18. Do you agree that the hydrogen network code should be developed using a minimum viable product approach? Please explain your answer and provide any supporting evidence.

19. What is the minimum level of progress in code development that is required at the different stages of project development to enable investment decisions? Please explain your answer and provide any supporting evidence.

20. Which issues should be prioritised during initial code development? Please explain your answer and provide any supporting evidence.

[12] Accurate at the time of writing, noting that the UNC is a living document which is regularly modified
[13] Project development stages could include submitting bids for business model support, signing business model contracts, taking Final Investment Decisions ('FID') and commencement of operations.

Next steps

This consultation seeks views on proposals for 100% hydrogen pipeline networks to inform implementation through legislative changes and licence and code design.

It proposes that:

- Current primary and residual balancing licence structures established under the Gas Act 1986 should be retained.
- Hydrogen producers are likely best placed to assume primary balancing responsibilities under licence, though other network participants, for example offtakers, should not be prevented from seeking and holding the relevant licence should they meet necessary eligibility and legislative criteria.
- Hydrogen transporters should assume the role of System Operator under licence.
- 100% hydrogen pipeline networks should be eligible to seek exemption to the licensed activity of supply, and that this position should be kept under review as networks develop.
- A code should be developed, coordinated by Government, using a using a minimum viable product approach.

We will consider responses to this consultation and publish a response, including next steps to implement any changes to regulatory frameworks.

Consultation questions

Chapter 2: Balancing hydrogen networks

1. Do you agree with the identified core activities that hydrogen networks will need to undertake to balance their systems? Please explain your answer and provide any supporting evidence, including any additional core activities hydrogen networks may need to undertake to balance their systems.
2. Do you agree with our assessment that primary and residual balancing licence structures should be maintained for 100% hydrogen pipeline networks? Please explain your answer and provide any supporting evidence.
3. Do you think there will be any costs, savings or other economic and business impacts associated with retaining these licence structures? Please explain your answer and provide any supporting evidence.
4. Do you agree that producers are likely best placed to hold primary balancing responsibilities for hydrogen networks? Please explain your answer and provide any supporting evidence.
5. Do you agree that other parties, for example hydrogen offtakers, should not be excluded from applying for a licence? Please explain your answer and provide any supporting evidence.
6. Do you think there will be any costs, savings or other economic and business impacts from producers or offtakers holding primary balancing responsibilities? Please explain your answer and provide any supporting evidence.

Chapter 3: Allocating a System Operator for hydrogen pipeline systems

7. Do you agree that responsibility for the system operation of hydrogen pipeline networks will need to be allocated to an entity through licence? Please explain your answer and provide any supporting evidence.
8. In your view, what are the key activities that a hydrogen pipeline System Operator will need to undertake? Please explain your answer and provide any supporting evidence.
9. Do you agree with the assessment that hydrogen pipeline network owners are best placed to hold responsibility for system operation, under their hydrogen transporter licence? Please explain your answer and provide any supporting evidence.

Chapter 4: Supplier licences

10. Do you agree with the assessment that persons supplying hydrogen through pipes to premises should be exempted from supplier licence requirements, but that this arrangement should be kept under review as hydrogen networks develop? Please explain your answer and provide any supporting evidence, including in support of any alternative options, such as a new exemption threshold.

11. Do you expect there to be any costs, savings or other economic and business impacts from the proposed exemption? Please explain your answer and provide any supporting evidence.

Chapter 5: Other hydrogen licences

12. Do you consider that any other activities in 100% hydrogen pipeline networks should be regulated under licence, for example the activities of production and/or storage? Please explain your answer and provide any supporting evidence.

Chapter 6: Network code

13. Do you agree that a network code will be required for early 100% hydrogen pipeline networks, including those that are funded through the HTBM? Please explain your answer and provide any supporting evidence.

14. Do you agree that a new hydrogen network code should be developed? Please explain your answer and provide any supporting evidence.

15. Do you agree with the description of the role of UK Government during code development and subsequent modification? Please explain your answer and provide any supporting evidence.

16. Which types of stakeholders do you think should be involved in the development of the code? Please explain your answer and provide any supporting evidence

17. Who should be a party to the code? Please explain your answer and provide any supporting evidence.

18. Do you agree that the hydrogen network code should be developed using a minimum viable product approach? Please explain your answer and provide any supporting evidence.

19. What is the minimum level of progress in code development that is required at the different stages of project development to enable investment decisions? Please explain your answer and provide any supporting evidence.

20. Which issues should be prioritised during initial code development? Please explain your answer and provide any supporting evidence.

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