UNC 0849R:

Hydrogen Blending: Commercial framework review and amendments

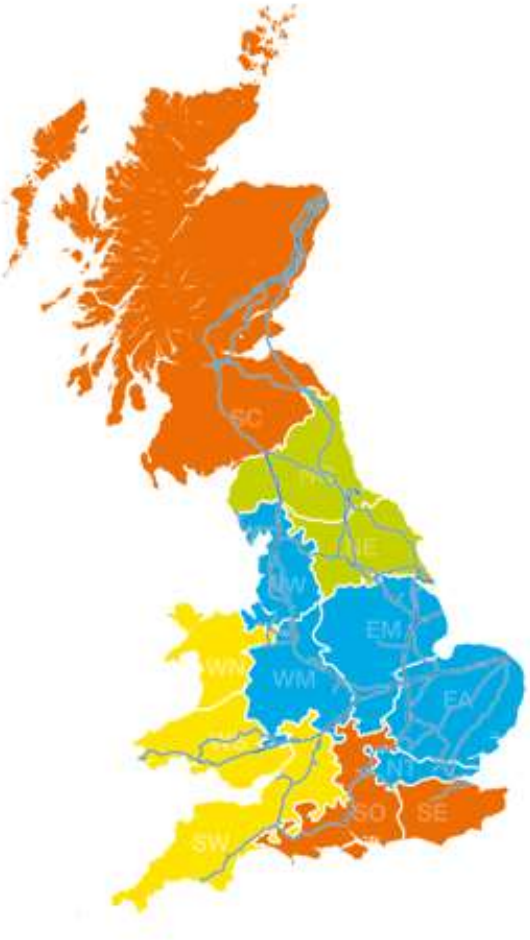
Review Group One

Monday 19th June

Agenda

10:00 – 10:05 Welcome and agenda
10:05 – 11:10 Introduction to Hydrogen Blending
11:10 – 11:20 UK Policy Timeline
11:20 – 11:30 EU Blending Strategy
11:30 – 11:35 Review Group Objectives
11:30 – 12:00 Assumptions and Parameters
12:00 – 12:15 Break
12:15 – 13:00 Gas Quality Review
13:00 – 13:45 System Operation Review
13:45 – 14:00 Next Steps, AOB, Close

Introduction to Hydrogen Blending



The Government are aiming towards a policy decision for blending up to 20% hydrogen into Distribution Networks in 2023, with a decision on transmission likely to follow.

The evidence case for **safety**, **feasibility** and **value for money** is currently being considered, along with the transport and storage consultation which sought views on blending as a strategic role as reserve off-taker

National blending capacity = up to 60 TWh pa.

Distribution Network capacity = up to 35 TWh pa.

Direct NTS Capacity (excluding distribution) = up to 25 TWh pa.

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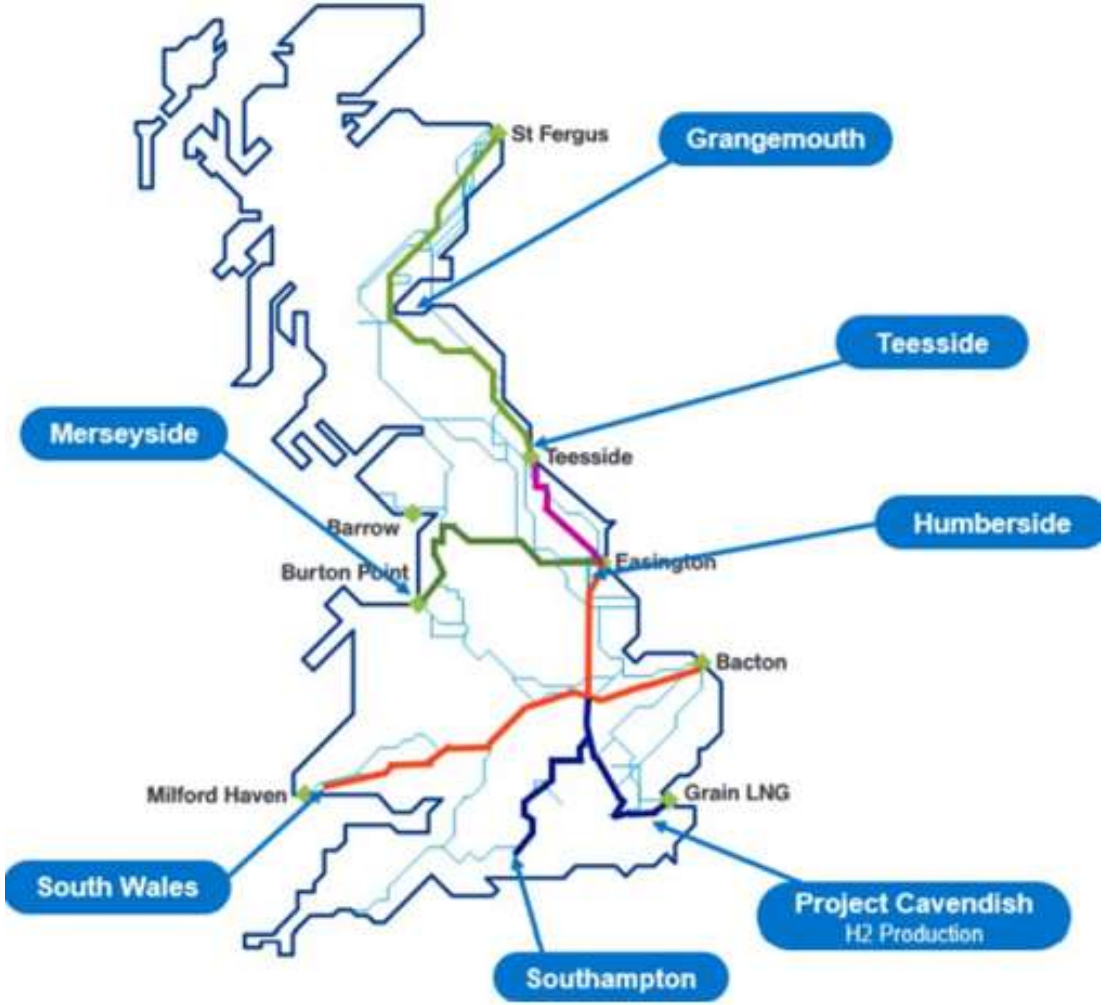
Introduction to Hydrogen Blending

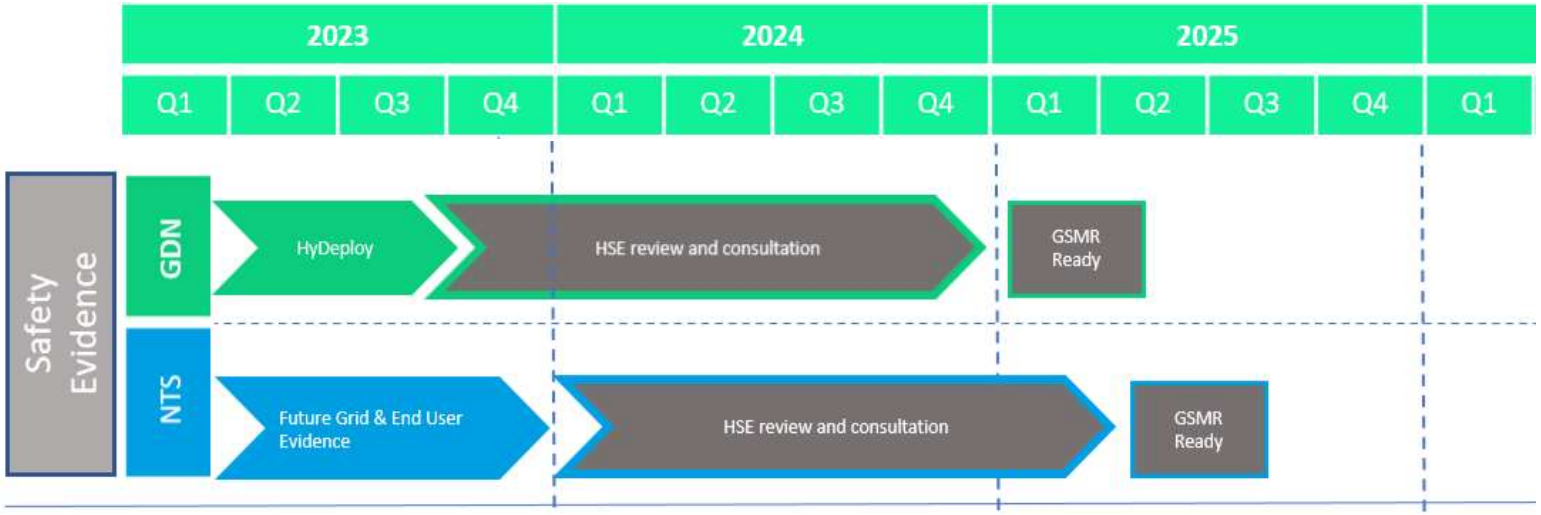
Benefits:

- Reduces carbon intensity of gas when blending green and blue (CCS) hydrogen
- Early route to market
- Encourage growth of the hydrogen market

As blending hydrogen into the networks is currently being considered as a transitional role, the application of blending needs to be **pragmatic** and **compatible with existing market arrangements**, with **minimal** amendments.



Expected Policy Timelines



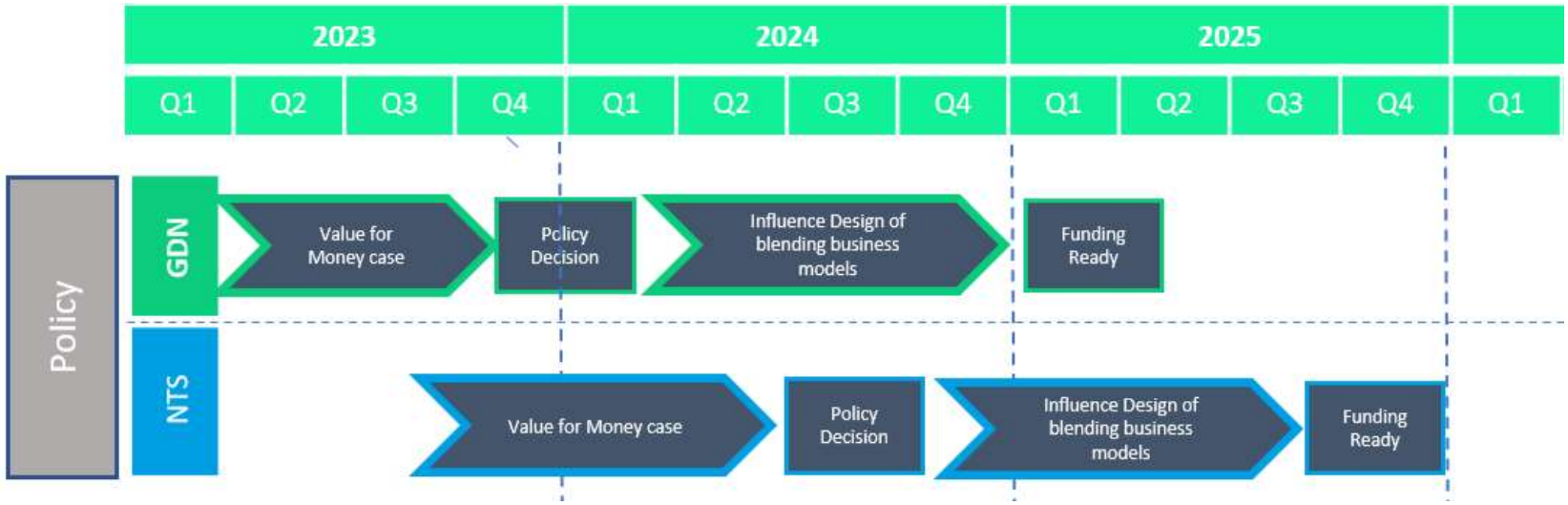
HyDeploy

Keele University (100 homes & 30 Uni buildings. 18 month trial)
Winlaton (668 homes, 1 school. 10 months)
Tested- network infrastructure/ pipes and home appliances.
Safety data evidence due to be submitted in 2023.

FutureGrid

Decommissioned asset test facility located in Cumbria.
Tests for 2%, 10% & 20% blends begin in 2023. Safety data due to be submitted by the end of the year.

Expected Policy Timelines



For the Distribution Networks, the Government have confirmed that a policy decision in principle will be made at the end of 2023. Development into the design of blending business models will then begin whilst the HSE conduct their safety evidence review. The Distribution Networks are therefore aiming to be GS(M)R ready by 2025, with first initial blend injections connecting throughout the year.

Timelines for the NTS is still unclear as this is dependant on the on-going work at Future Grid and the work reviewing impacts to Industrial end users, however current assumption is that this will follow shortly after Distribution.

EU Blending Strategy

Harmonised Rules

The Commission introduced a 5% blending mandate at interconnection points (article 20).
Parliament and the Council proposed to delete this article but agreed on common rules for gas quality for blended volumes comprises between 0 and 3 %, while leaving Member States the decision to apply H2 blending or not.
In the revised article 19, the Council proposes to apply harmonised rules at IPs for hydrogen blends up to **2%.**

Article 52 of the Regulation
The European Commission's initial proposal wanted the Network Codes and guidelines for gas and hydrogen in the EU to "*apply to all interconnection points within the Union and entry points from and exit points to third countries*".
The Parliament is supporting the Commission's proposal.
The Council has proposed to delete this reference to third countries.
The initial proposal of the Commission would means that we would need to comply with EU Network Code and guidelines, should we want to send gas/hydrogen to the EU.

Interconnectors

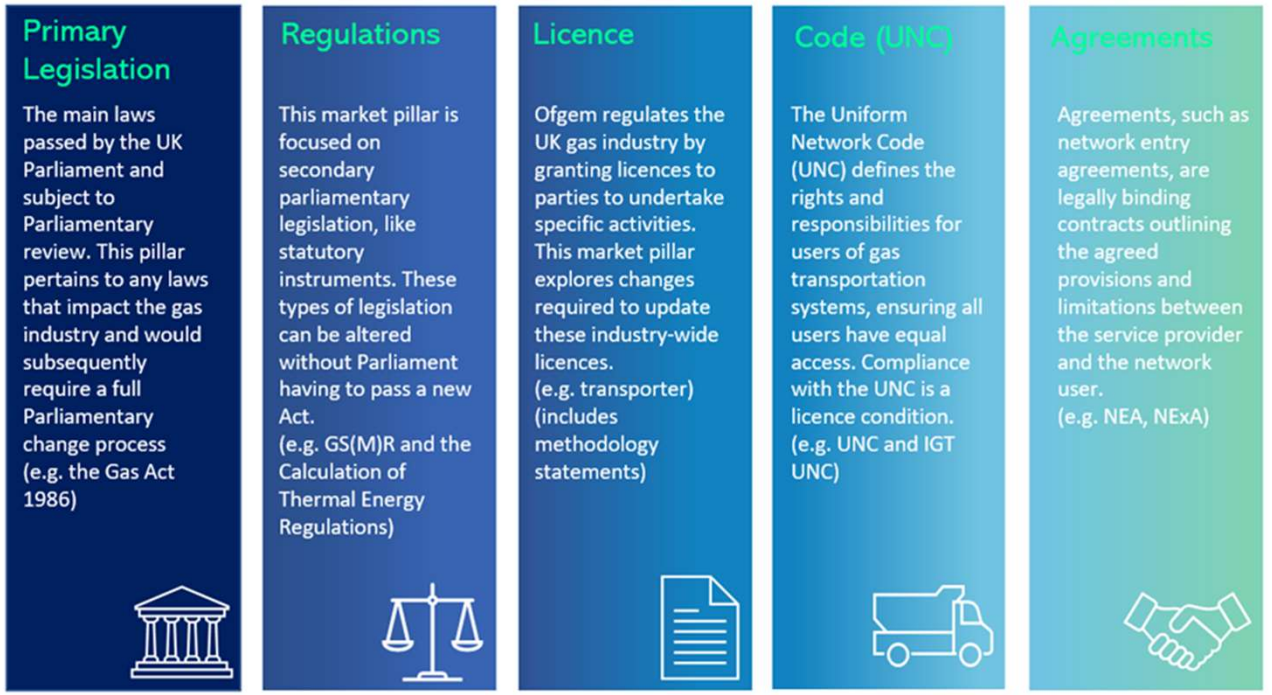
Belgian has amended its Gas Law to allow a 2% hydrogen blend as of July 2023. However, the first concrete injection project will start later, in 2024. Initial Blends will only impact the regional network and won't reach interconnection points. Fluxys has plans to reach a blending level up to 10%. Going beyond this threshold would require changes in the way the network is operated.

The Netherlands Government Strategy on Hydrogen also includes the option of a H2 blending obligation, outlining that "*Physical blending up to 2% is already achievable with minor adjustments, and with further adjustments, the percentage could gradually be increased to approximately 10-20%.*"

Gas Goes Green Proposal

The ENA Gas Goes Green working group have been involved in a number of workshops to develop an initial thought piece on existing commercial framework compatibility and the required amendments necessary.

This Review Group has been proposed for a period of 6 months to review these high-level amendments and further develop solution options with the objective to agree commercial framework changes required with wider industry and raise suitable enabling modifications.



0849R Work Group Objectives:

Work Group 1	Work Group 2	Work Group 3	Work Group 4	Work Group 5	Work Group 6
-Introduction and overview of H2 blending progress so far. -Agree Assumptions and Parameters -Gas Quality Review -System Operation Review	-System Operation Review continued.. -Balancing Review	-Trading Review -Charging Review (overview of functional specification project outputs)	-GGG Connections Methodology Solution Options -Capacity Review -Connections Review	-TBC (Progress to be reviewed throughout sessions)	-Final Considerations -Pre-mod Review

Assumptions and Parameters

There are still some unknown certainties for hydrogen blending which will be answered through separate pieces of work, therefore, to ensure deliverability of this project, a number of assumptions have been defined:

- Blending will be implemented with least change to existing market frameworks as possible.
- Both In-network (commingling facility owned by Gas Transporter) and pre-blend (commingling facility owned by Delivery Facility Operator) connections will be considered within this work
- Hydrogen will be available to blend
- Blending hydrogen onto gas networks may be used for the role of “reserve offtaker”; therefore variability in hydrogen volumes to be injected needs to be considered.
- Consideration of onshore networks regulatory frameworks (excluding Interconnectors)
- Other projects will be concluding on framework principles (e.g. the “Connections and Capacity Methodology project” and the “Functional Specification project”)
- Assume all existing market players will be included in blending development
- All GB I&C & Domestic users will be assumed to be customers of Hydrogen blend
- This project is just considering the commercial amendments required, not physical arrangements
- We assume within the project that low levels of blending (C.5%) won’t impact physical capability of the networks (due to higher volumes vs energy)

Assumptions and Parameters

The aim of this project is to enable the first roll out of hydrogen blend injections in a timely and efficient manner whereby no amendments to Primary legislation (Gas Act 1986) and Secondary legislation (GCOTER) is required. To achieve this, the below parameters for the first phase of blend connections have been agreed:

- Within this report we assume that GS(M)R will be updated following a HSE safety review in order to accept volumes of up to 20% hydrogen into the networks.

- Only low percentage volumes of C.5% of hydrogen will be blended into the networks. Injection sites will need to comply with CV target submitted by network operator. This is to minimise the risk of CV Capping, remaining in line with the requirements of the Thermal Energy Regulations.

- The Connections and Capacity Methodology project will be reviewing suitable connection roll out models that remain in-line with the Gas Act 1986. These models will then be considered within this work.

Do we agree with these assumptions and parameters?
Are there any additional considerations?

Gas Quality

Legislative Hierarchy Review

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Gas Quality Review - GS(M)R regulations set out gas quality specifications that gas transported in the networks must meet [currently 0.1% H2 molar].

Assumptions and Parameters

- This work assumes that an increase in hydrogen content of 20% volume will be granted following completion of the HSE safety evidence review.
- Only low percentage volumes of C.5% of hydrogen will be blended into the networks initially, which will be agreed within each Network Connection Agreement and NEA. This is to minimise the risk of CV Capping, remaining in line with the requirements of the Thermal Energy Regulations.

Existing market participant GQ conditions

Gas Transporter conditions

GS(M)R outlines duties for Gas Transporters to provide a safety case and ensure that content and characteristics of gas is compliant with specifications .

Connected party conditions

Gas quality conditions agreed through bilateral contracts, specifications outlined in GS(M)R:

- Network Entry Agreement
- Network Exit Agreements
- Interconnector Agreements
- Storage Connection Agreements

Shipper Conditions

UNC Section I – Entry Requirements
Shippers must deliver gas to the network that is compliant with network entry conditions (i.e., GS(M))R compliant), as detailed in Network Entry Agreements. For off-spec gas, entry can be restricted.

Hydrogen Blending: Gas Quality

	**Gas Act 1986: Section 48** Gas is defined as a substance in gaseous state; consisting of methane, ethane, propane, butane, hydrogen or carbon monoxide; or a mixture of two or more; or a combustible mixture of one or more with air.	**No Change** *(definition allows for a hydrogen blend)*
	**Gas Safety (Management) Regulations 1996** GS(M)R definition of gas- "gas" means any substance in a gaseous state which consists wholly or mainly of methane. **The Gas (Calculation of Thermal Energy) Regulations 1996**	**Amend:** GS(M)R to allow increased hydrogen content, or an exemption agreed (if changing GS(M)R for distribution first it will need to differentiate between NTS and DNs) **No Change** *(For blends above C~5%, a review may be necessary)*
	**Gas Transporter Standard Licence Conditions:** No inclusion of gas quality specifications Licencees must become party to and/or comply with industry codes	**No Change**
	**TPD Section I: Entry Requirements:** "Gas Entry Conditions" **TPD Section J: Exit Requirements:** "Standard Offtake Requirements" **TPD Section N: Shrinkage** **OAD Section F: Determination of calorific value: "**Minimisation of CV Shrinkage"	**TPD Section I: No Change** *(no direct reference to hydrogen limits included, refers to network entry provisions in NEA)* **TPD Section J: No Change** *(no reference to hydrogen limits)* **TPD Section N: No Change** **OAD Section F: No Change** *(Contains common interest for networks to minimise CV Shrinkage)*
	**Network Entry Agreement:** Includes provisions for gas entering the network set at 0.1% for Hydrogen **Network Exit Agreement:** No provisions included for hydrogen content	**Amend NEA:** Existing network entry agreements will need to be updated to include higher hydrogen content. For Distribution this can be actioned through engagement with the connected party, for Transmission a UNC Mod will need to be raised.

Amendments to Connection Contracts- Gas Transporters will need to ensure that GQ rules are transparent and encourage industry engagement.

Existing Network Entry Agreements:

Transmission – MOD enabler required and consultation with industry before increase of hydrogen content can be applied.

Distribution – Specifications within NEA can be changed through bi-lateral agreement between network and connected party. No enabling MOD required.

GS(M)R change for lower Wobbe Limit currently underway, each entry party will have to individually update their connection agreement to access a new gas quality range. ***Similar process could be followed for hydrogen blending? Consideration for impacted Network Exit Points required?***

New Network Entry Agreements – no obligation for MOD enabler for Transmission or Distribution, ***however greater need for transparency?*** (this will be further explored during the Connections workshop).

Interconnectors – EU Commission likely to apply harmonised rules at IP's for blends up to 2%. ***How will this impact the UK H2 blending strategy?***

System Operation

Legislative Hierarchy Review

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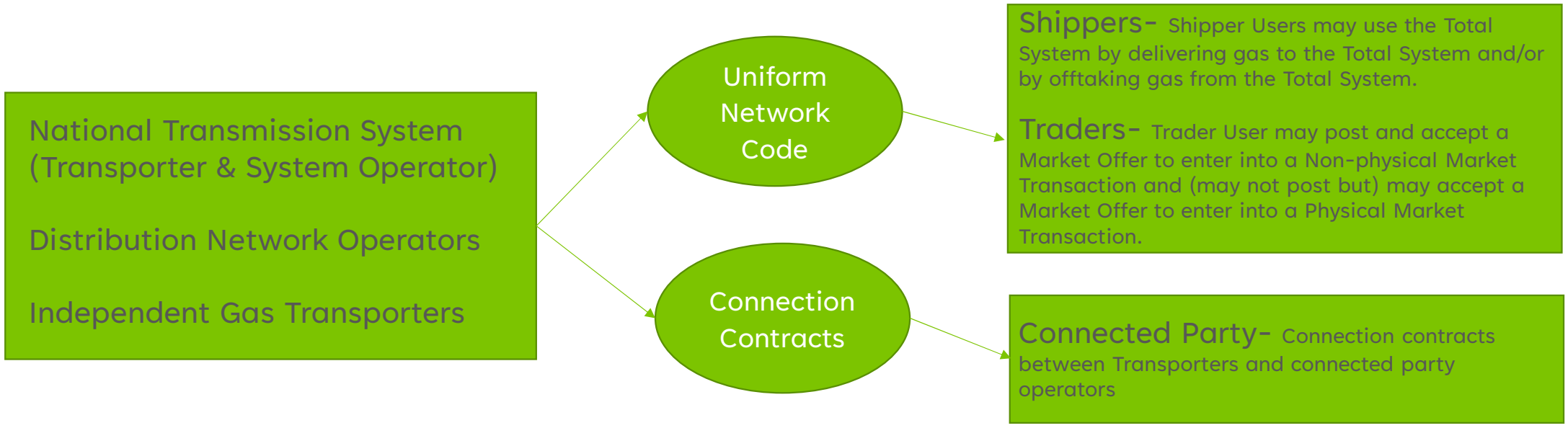
System Operation Review: Existing Market Participants

Assumptions and Parameters

- Blending hydrogen onto gas networks may be used for the role of “reserve offtaker”; therefore variability in hydrogen volumes to be injected needs to be considered.
- We assume within the project that low levels of blending (C.5%) won’t impact physical capability of the networks (due to higher volumes vs energy)
- Assume all existing market players will be included in blending development



Hydrogen Blending: System Operation

Primary Legislation	**Gas Act 1986:** Regulated activities (gas transportation, gas shipper, gas supplier)	**No change –**(*regulated parties will remain the same for blending)*
Regulations	**Gas Safety (Management) Regulations 1996** **The Gas (Calculation of Thermal Energy) Regulations 1996**	**No Impact**
Licence	**Gas Transporter Licence** Licensees must become party to and/or comply with industry codes **National Grid Gas plc Gas Transporter License Special Conditions** NTS System Operator means the licensee when carrying out an NTS System Operation Activity.	**No change**
Code (UNC)	**TPD:** **I- Entry Requirements** **K- Operating margins** **L- Maintenance and operational planning** **O- System planning** **Q- Emergencies** **OAD:** **I – NTS Operational Flows** **F – Determination of Calorific Value**	**Section I addition:** rules on system operator coordination and communication between NTS and DN's **Amend OAD Section F -** requirement for section outlining formalised communications between networks for managing CV. **No change to all other sections** **Future consideration-** mechanism to monitor/ mitigate imbalance of volume on networks with introduction of higher blend percentage (20%)
Agreements	**Network Entry Agreement** **Network Exit Agreement**	**NEA addition-** ability to reduce or interrupt blend injections if risk of breaching blend cap could be outlined here?

Constraint Management

All Gas Transporters and System operators are responsible for maintaining a safe and operable network.
Where constraints on the network develop, it is the Network Operators responsibility to manage that constraint by utilising a number of commercial or physical tools.

NTS:
- Short-term system flexibility (OPN request)
- scale back users' off-peak/interruptible capacity.
- Firm capacity surrender (buy-back)
- Offtake flow reductions
- Locational energy actions

DN's:
- Charge based on flows rather than pre-booked capacity, therefore DN's have the ability to scale back or increase flows without financial Implications as and when constraints develop.

Are existing constraint management tools and processes adequate for managing a blended gas?

Demand/supply forecasting as well as network planning and configuration is also managed by the network operator in order to reduce the risk of a constraint occurring. ***Do we foresee any amendments required for these processes with the implementation of H2 blending?***

Thank you

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