UNC Modification	At what stage is this document in the process?
# UNC 0799: ## UNC arrangements for the H100 Fife project (100% hydrogen)	01 Modification 02 Workgroup Report 03 Draft Modification Report 04 Final Modification Report

Purpose of Modification:

Introduction of amended arrangements into the UNC to facilitate the use of 100% hydrogen gases specifically required for the industry H100Fife Ofgem Network Innovation Competition project.

Next Steps:

The Proposer recommends that this Modification should be: -

- considered a material change and not subject to Self-Governance
- assessed by a Workgroup

This Modification will be presented by the Proposer to the Panel on 20 January 2022. The Panel will consider the Proposer's recommendation and determine the appropriate route.

Impacted Parties:

High: Consumers (within the project area), CDSP, Shippers, Suppliers & Distribution Network Operators

Low:

None: Independent Gas Transporters

Impacted Codes: UNC

Contents

Timetable

Modification timetable:

Date Modification Raised	07 January 2022
New Modification to be considered by Panel	20 January 2022
First Workgroup Meeting	27 January 2022
Workgroup Report to be presented to Panel	17 March 2022
Draft Modification Report issued for consultation	17 March 2022
Consultation Close-out for representations	08 April 2022
Final Modification Report available for Panel	13 April 2022
Modification Panel decision *(at short notice)*	21 April 2022

Any questions?

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1 Summary

What

This UNC Modification seeks to introduce arrangements into the UNC to facilitate the SGN Network Innovation Competition project entitled H100FIFE. The H100FIFE project is a 100% hydrogen network trial project managed and operated by SGN and forecast to operate from quarter one 2023 until 31st March 2027. The project plans to convert at least 270 existing natural gas consumers in Fife from a methane-based energy source to a 100% hydrogen energy source. The H100FIFE project is seen as critical to provide evidence to support the wider role out of 100% hydrogen use for heat on the GB gas network aligning with government targets to meet carbon net zero targets in 2045 (Scotland) and 2050 (England & Wales). The project derived evidence will include safe operation of the network, security of supply as well as the ability to utilise commercial arrangements laid out in the UNC for a hydrogen-based energy source. Several changes to the UNC are anticipated to be required spanning a number of UNC Sections. SGN had anticipated utilising the derogation framework set out in UNC Modification 760 to implement required changes into the UNC, however at this point in time it is not clear whether Modification Proposal 760 will (a) be implemented by Ofgem and (b) if implementation is approved whether the timescales for implementation will align to the H100FIFE project timelines.

Why

A cornerstone of the H100FIFE project is to facilitate hydrogen gas supply to end consumers using the existing industry commercial frameworks laid out in the UNC with minor modifications implemented where necessary to enact change and to aid clarity of specific H100FIFE project requirements. The existing industry arrangements detailed in the UNC are specific to methane gas with the term gas being defined in General Terms Section C Interpretation 3.1.1 as a gas consisting of *hydrocarbons or mixture of hydrocarbons and other gases consisting* ***primarily of methane.*** Modification of the UNC to widen industry arrangements to include hydrogen within the definition of 'gas' is an obvious requirement, albeit restricted at this stage to arrangements associated with the H100FIFE project only and not including the wider natural gas networks. The definition of gas in primary legislation is wider than the UNC definition and the Gas Act 1986 includes hydrogen within its definition of gas.

How

As the H100FIFE project is itself time bound, arrangements to facilitate hydrogen will be included as transitional text in the UNC covering the period the project will operate from and to. The changes will also be restricted to the relevant Supply Meter Points associated with the project, which will be identified using the existing Network Identifier field in CDSP central systems as H100FIFSGN. This will introduce a distinct set of arrangements specifically for these Supply Meter Points (where they are required). Implementation of UNC changes detailed in this Modification Proposal will be switched on upon confirmation of H100FIFE project specific regulatory and legal requirements being satisfied. These requirements will include Ofgem sign off on specific project conditions and also confirmation from the Health and Safety Executive (HSE) of acceptance of the SGN H100FIFE Project Case For Safety.

2 Governance

Justification for Authority Direction.

The proposer believes that the changes which would be introduced by the implementation of this Modification, albeit restricted to a small number of Supply Meter Points, requires Authority direction due to the significant linkages with the HSE and case for safety sign off, GS(M)R interactions, Gas (Calculation of Thermal Energy) Regulations interactions requirements to maintain Shipper/Supplier competition and as this Modification focuses on the introduction of hydrogen into UNC arrangements for the first time it is considered appropriate that Ofgem should have oversight and ultimate sign off on the Modification's implementation.

Requested Next Steps

This Modification should:

- be considered a material change and not subject to Self-Governance.
- be assessed by a Workgroup.

3 Why Change?

The H100FIFE project focuses on three main elements all of which will be managed under the umbrella of SGN group companies.

- The first of the three elements is hydrogen gas production which will be operated by SGN Futures (H100) Limited with two purpose-built hydrogen gas electrolysers and hydrogen storage vessels. This first element is outside of UNC arrangements and the scope of this Modification Proposal, although the existing UNC definition of a Connected Delivery Facility will apply to the hydrogen gas production facility.
- The second element which will be owned and operated by Scotland Gas Networks Plc, is the gas transportation network which will require a new purpose-built low-pressure network to be constructed in parallel with the existing natural gas network to supply hydrogen to consumer's homes. Scotland Gas Networks PLC will enter into a Network Entry Agreement with SGN Futures (H100) Limited which will specify the Network Entry Provisions between the two parties.
- The third element is the consumer interaction which will require hydrogen appliances to be installed in consumers' homes along with hydrogen ready gas meters. This element will be implemented by SGN Futures (H100) Limited.

It is the second element covering the introduction of 100% hydrogen into the regulated gas network which requires modifications to the UNC to permit the commercial arrangements between gas transporters and gas shippers to function.

A main H100FIFE project objective is to ensure the end consumer experience of using 100% hydrogen is identical to natural gas, including the ability to switch gas supplier. A further objective requires the H100FIFE project to ensure end consumers are not charged more than their equivalent natural gas charges (both transportation charges and energy supply costs). As a result of the lower calorific value of hydrogen, approximately 12 MJ/M3 compared to the natural gas calorific value ranging from 38 to 41MJ/M3, the volume of gas used by consumers will be approximately three times greater to deliver an identical equivalent energy requirement.

To ensure consumers are not charged more for the energy they consume due to higher recorded hydrogen metered volumes, SGN in conjunction with the CDSP are implementing a solution to adjust consumers' metered

volumes. This will ensure energy allocation and transportation charges remain reflective of the actual energy consumed at the consumers' premises.

The existing UNC arrangements largely synchronise for hydrogen gas utilisation compared to natural gas as the core of the UNC arrangements are focused on energy (kWh) as opposed to the individual elements of the specific type of gas utilised. There are a small number of changes required to facilitate the specifics of hydrogen as a gas compared to methane, including changes required to clarify how existing arrangements will work for hydrogen, as well as specific changes to carve out obligations which are not suitable at this stage for the H100FIFE project. As the H100FIFE project is time limited in its operation UNC transitional arrangements are considered appropriate at this stage for the changes associated with this UNC Modification. The H100FIFE project will also be defined in the UNC which will permit the changes detailed in this UNC Modification to apply only to the H100FIFE project specific Supply Meter Points. It may be possible to extend the modifications this UNC Modification would introduce to future projects as and when they are required by modifying the UNC rules to other UNC defined projects, such as the planned hydrogen village project.

The H100FIFE project plans to introduce hydrogen gas into the Total System via a new LDZ embedded entry point which will require volume and energy measurement to be recorded in line with existing arrangements. A gas shipper will be registered against this H100 new entry point and the energy introduced into the Total System will be registered against this Shipper's energy User Daily Quantity Input (UDQI). It is anticipated that no UNC changes will be required to facilitate this part of the project and existing arrangements for gas entry directly into the LDZ will be utilised for hydrogen energy.

4 Code Specific Matters

Reference Documents

1. UNC General Terms Section C – Interpretation 3.1.1 – definition of gas.
2. UNC TPD Section H – Demand Estimation and Forecasting
3. UNC TPD Section I – Entry Requirements
4. UNC TPD Section J – Offtake Requirements
5. UNC TPD Section M – Supply Metering
6. UNC TPD Section N – Shrinkage
7. UNC TPD Section R - Storage
8. SGN H100FIFE – website for project details reference - https://www.sgn.co.uk/H100Fife
9. Gas Safety (Management) Regulations - https://www.legislation.gov.uk/uksi/1996/551/contents/made
10. Gas (Calculation of Thermal Energy) Regulations 1996 (amended 1997) - https://www.legislation.gov.uk/uksi/1997/937/contents/made

Knowledge/Skills

No additional skills or knowledge are required.

5 Solution

Business rules:

The following business rules (The H100FIFE Project Rules) will apply only to the H100FIFE project LDZ System Entry Point and H100 Supply Meter Points on a transitional basis: -

1. Establish a transitional set of rules (the H100FIFE Project Rules) which will be ringfenced to H100 Supply Meter Points and the H100 LDZ System Entry Point. The rules should apply from a date notified by the Transporters until 31/03/27.

2. All obligations and provisions detailed in the UNC will apply equally to H100FIFE project LDZ System Entry Point and H100 Supply Meter Points, Users and Transporters unless specified in the rules set out in the H100FIFE Project Rules.

3. Amend the definition of gas for the purposes of the H100FIFE project LDZ System Entry Point and H100 Supply Meter Points to mean a gas consisting of predominantly hydrogen.

4. Supply Meter Points which are connected to the H100FIFE project network and are being supplied with hydrogen gas will be defined as H100FIFSGN using the pre-existing Network Indicator field in CDSP central systems. Any Supply Meter Point (at the point in time when the Supply Meter Point is converted from natural gas to hydrogen gas) whose Supply Meter Point Reference Number is already established shall retain this Supply Meter Point Reference Number for the duration of the H100FIFE Project trial period.

5. The relevant Transporter will publish on a secure platform hosted by the CDSP and keep up to date information accessible by relevant industry parties detailing all H100Supply Meter Points which are connected to the H100FIFE project network and the date on which hydrogen gas was first supplied to the H100 Supply Meter Point, this date being the start of the gas day on which hydrogen was first supplied to the relevantH100 Supply Meter Point and a date (where applicable) on which hydrogen gas was last supplied to the H100 Supply Meter Point. The provision of the information will also constitute notice pursuant to Section J 2.4.1 and 2.4.3 to a Registered User of a change in the relevant characteristics of gas offtaken at a H100 Supply Meter Point where the Registered User has requested that it be given notice of a change in such gas characteristics.

6. The Metered Volume as defined in TPD M 1.5.3 (d) will be amended to include a further adjustment (in addition to the correction for temperature and pressure) to reflect the conversion of the hydrogen recorded volume to that of an equivalent natural gas volume by means of a Multiplication Factor applied to the calculated Metered Volume. The Multiplication Factor will be used to calculate a natural gas equivalent Metered Volume for the purposes of calculating a Metered Quantity using a natural gas calorific value. The Multiplication Factor will be set to reflect the Declared CV for the duration of the H100FIFE project trial period.

7. Exclude H100 Supply Meter Points from UNC TPD Section H 1.6 NDM Sample requirements. Meter readings from H100FIFE project H100 Supply Meter Points will reflect larger hydrogen gas consumption volumes and as such will not be reflective of natural gas consumption. It would therefore not be appropriate to use H100 Supply Meter Point's daily offtake of gas for the purposes of the development of End User Categories and Demand Models.

8. The Standard Offtake Requirements as defined in TPD J 2.1.2 refer to requirements of gas composition and pressure referenced in Section 16(1) of the Act (The Gas Act 1986 as amended in The Gas Act 1995). The Act points to The Gas Safety (Management) Regulations 1996 Part 8 (Schedule 3) which details the content and other characteristics of gas. It is anticipated that the H100FIFE project case for safety (reviewed by the HSE) will provide an alternative to the requirements detailed in Part 8 of the Gas Safety (Management) Regulations 1996 relating specifically to Schedule 3 applicable to the hydrogen content of gas (currently <=0.1% (molar)). Therefore, Standard Offtake Requirements applicable to the H100FIFE project will be required to reference this case for safety and for the purposes of transparency

the Transporter will make the hydrogen gas characteristics available to the industry (included in the industry document referenced in business rule #5).

9. The Transporter will take account of any available data or relevant Shrinkage information pertaining to the H100FIFE project network which may impact upon the Assessed LDZ Shrinkage in relation to the requirements detailed in UNC TPD Section N 3.3 for the relevant LDZ (for the H100FIFE project this will be the Scotland LDZ).

10. The storage associated with the H100FIFE project is part of the Connected Delivery Facility and is upstream of the LDZ System Entry Point and as such UNC TPD Section R is not relevant to the H100FIFE project.

11. For the purposes of the Regulations (The Gas (Calculation of Thermal Energy) Regulations 1996) (as amended 1997) the calculation of thermal energy for H100 Supply Meter Points will be declared pursuant to Regulation 7, 8, 9 and 10 (Part III). The H100 LDZ System Entry Point and H100 LSupply Meter Points will be registered as being part of the Scotland LDZ (LDZ SC) in CDSP central systems as the creation of a new LDZ is currently deemed not cost efficient, however a distinction will be drawn to recognise that the calculation of thermal energy is carried out pursuant to Regulation 7 and therefore is a separate charging area for the purposes of the Regulations. To ensure accurate consumer billing and Shipper energy allocations Business Rule # 6 will apply to H100 Supply Point Metered Volumes and Metered Quantities. Therefore, for the purposes of the H100FIFE project, UNC OAD Section F 1.2 (a), (b) and (c) will reflect that there will be established a H100FIFE project Charging Area pursuant to Regulations 7, 8, 9 and 10 and that the Scotland LDZ will also represent the H100 Charging Area.

12. H100 Supply Meter Points will attract the same gas Transportation charges as detailed in UNC TPD Section Y and reflected in the published Scotland Gas Networks transportation charging statement.

13. The H100FIFE project Transporter will ensure there is an agreement in place with a gas producer to meet security of supply requirements as detailed in the H100FIFE Project Case For Safety as agreed with the HSE. As such the Transition Rules for the H100FIFE project should include H100 Supply Meter Points in the scope of TPD Section Q 1.9.1 (dis-application of TPD Section Q).

14. The H100 hydrogen production facility will be defined as a Connected Delivery Facility as referenced in UNC TPD Section I 1.2.2.

15. The H100 Connected Delivery Facility is a LDZ System Entry Point and as such is a (Individual and not an Aggregate) System Entry Point which will facilitate delivery of gas to the Total System by a Delivering User.

16. The H100 hydrogen production facility operator will be SGN Futures H100 Limited and who will be defined as a Delivery Facility Operator (DFO) – in line with UNC TPD I 1.2.3.

17. A LDZ System Network Entry Agreement will be in place between the Transporter (Scotland Gas Networks) and the DFO (SGN Futures H100 Limited) in line with I 1.3 which will include Gas Entry Conditions (in line with I 2.4), Measurement Provisions (I 2.5) and Local Operating Procedures (I 2.6).

6 Impacts & Other Considerations

Does this Modification impact a Significant Code Review (SCR) or other significant industry change projects, if so, how?

None.

Consumer Impacts

The H100FIFE project is seen as the first step on proving hydrogen as a viable, safe and effective means of delivering a decarbonised energy source for heat to domestic consumers. The outputs and innovative learnings of the H100FIFE project will provide evidence to take forward an expansion of 100% hydrogen networks across the UK including the utilisation of industry commercial frameworks to provide a basis for the interaction between industry parties. The successful implementation of this Modification will impact on the consumers connected to the H100FIFE project network (at least 270 consumers) by facilitating a carbon neutral energy source and also providing hydrogen appliances and access to an affordable energy source. The H100FIFE project uses a voluntary approach to opting consumers into the project and therefore does not obligate consumers to participate. In relation to Ofgem priorities and objectives the implementation of this Modification would align to Ofgem's enduring priority to focus on advancing decarbonisation of energy sources, enabling investment in low carbon infrastructure at a fair price, to deliver a future retail market that works for all consumers and the planet and also to ensure energy system governance, including Ofgem, are fit for the future.

What is the current consumer experience and what would the new consumer experience be?

The H100FIFE project has as one of its primary objectives to deliver a safe, secure, and affordable decarbonised energy source to consumers with as little impact on the consumer experience as possible. The Modification focuses on aligning UNC obligations and outputs for hydrogen in relation to Transporter and Shipper interactions. This is to ensure that the consumer experience in relation to energy costs and ability to switch supplier are maintained throughout the H100FIFE project lifespan as they would be for a natural gas supply. The new consumer experience would facilitate a carbon neutral energy source with little difference to that of a natural gas energy source. Consumers will have the option to opt into the H100FIFE project trial or remain with a natural gas supply. Consumers will also have the option to switch back to a natural gas supply from hydrogen as and when they may choose to do so.

Impact of the change on Consumer Benefit Areas:

Area	Identified impact
Improved safety and reliability The H100FIFE project will operate to ensure security of supply obligations are maintained and safe and secure operation of the pipeline system will be in accordance with the procedures set out in the H100FIFE Project Case For Safety.	None
Lower bills than would otherwise be the case It is intended that the H100FIFE project is a trial project to prove the supply of a hydrogen energy source. The economics of the project have been designed to ensure that consumers taking part will not incur any additional costs other than what they would normally incur from a natural gas energy supply.	None

Reduced environmental damage The H100FIFE project is primarily designed to deliver all of the intended environmental objectives detailed below: - • a reduction in Greenhouse Gas emissions • new providers and technologies • a move to hydrogen or lower greenhouse gases • the journey toward statutory net-zero targets • decarbonisation An assessment will be made using the Ofgem guidance document (Carbon Costs Guidance) during the Workgroup discussions. The proposer estimates that 662tonnes of CO2 per annum will be saved following the connection of 300 domestic properties to the H100 network based on an average annual quantity of 12,000KWh at a natural gas CO2 emission of 0.184kg/KWh.	Positive
Improved quality of service Implementation of this Modification Proposal would ensure continuity of industry commercial arrangements detailed in the UNC for hydrogen and as a result would support the current value chains across the industry.	None
Benefits for society as a whole The implementation of this Modification proposal will facilitate H100FIFE project objectives to deliver a carbon neutral energy source in the form of hydrogen gas. The learnings and demonstrable outputs from the H100FIFE project will potentially lead to the successful role out of hydrogen usage across GB, which in itself will lead to environmental benefits to society as a whole.	Positive

Cross-Code Impacts

None. (no IGT involvement in the H100FIFE Project).

EU Code Impacts

None.

Central Systems Impacts

The CDSP have instigated a change proposal to support the implementation of this Modification Proposal under XRN5298 (https://www.xoserve.com/media/42754/xrn5298-h100-fife_phase1-cp.pdf) in relation to Option 2 – the business rules included in this Modification Proposal have been established to support this change request option.

7 Relevant Objectives

Impact of the Modification on the Transporters' Relevant Objectives:

Relevant Objective	Identified impact
a) Efficient and economic operation of the pipe-line system.	Positive
b) Coordinated, efficient and economic operation of (i) the combined pipe-line system, and/ or (ii) the pipe-line system of one or more other relevant gas transporters.	None
c) Efficient discharge of the licensee's obligations.	Positive
d) Securing of effective competition: (i) between relevant shippers; (ii) between relevant suppliers; and/or (iii) between DN operators (who have entered into transportation arrangements with other relevant gas transporters) and relevant shippers.	Positive
e) Provision of reasonable economic incentives for relevant suppliers to secure that the domestic customer supply security standards… are satisfied as respects the availability of gas to their domestic customers.	None
f) Promotion of efficiency in the implementation and administration of the Code.	None
g) Compliance with the Regulation and any relevant legally binding decisions of the European Commission and/or the Agency for the Co-operation of Energy Regulators.	None

(a) Efficient and economic operation of the pipe-line system: - The Ofgem document "Guidance on the treatment of carbon costs under the current industry code objectives" has been reviewed and it is considered that the carbon costs associated with the reduction in greenhouse gas emissions resulting from the H100FIFE project will be positive in terms of the efficient and economic operation of the pipe-line system.

(c) Efficient discharge of the licensee's obligations- the implementation of this Modification Proposal would support the delivery of the H100 project which is funded under SGN's Special Condition 3.9 Net Zero Pre-construction Work and Small Net Zero Projects Re-opener & Special Condition 5.2 RIIO-2 network innovation allowance.

(d) Securing effective competition between (i) Shippers & (ii) Suppliers – the implementation of the Modification Proposal would ensure the continuation of consumers' ability to switch gas Supplier (and Shipper) for hydrogen consumption.

8 Implementation

The proposer suggests a potential implementation date to support the H100FIFE project target commissioning date in relation to the physical works to install the new gas network and the provision of the infrastructure to produce hydrogen gas. This is forecast to be 01/01/23 and as a part of the preparation works to realise the H100FIFE project goals, the implementation of this Modification proposal is key to underpinning the supporting industry arrangements. As specified in this Modification Proposal an Implementation Date should be triggered as soon as possible after the following points are confirmed: -

1. The relevant Ofgem H100Fife specific project conditions are satisfied.
2. The H100Fife regulatory model is agreed with Ofgem.
3. The HSE provide a letter of assistance to the H100 project in relation to the H100FIFE Project Case For Safety.
4. The relevant Xoserve system requirements detailed in XRN5298 are implemented.

9 Legal Text

Text Commentary

Legal commentary to follow.

Text

Legal text to follow.

10 Recommendations

Proposer's Recommendation to Panel

Panel is asked to:

- Agree that Authority Direction should apply.
- Refer this proposal to a Workgroup for assessment.