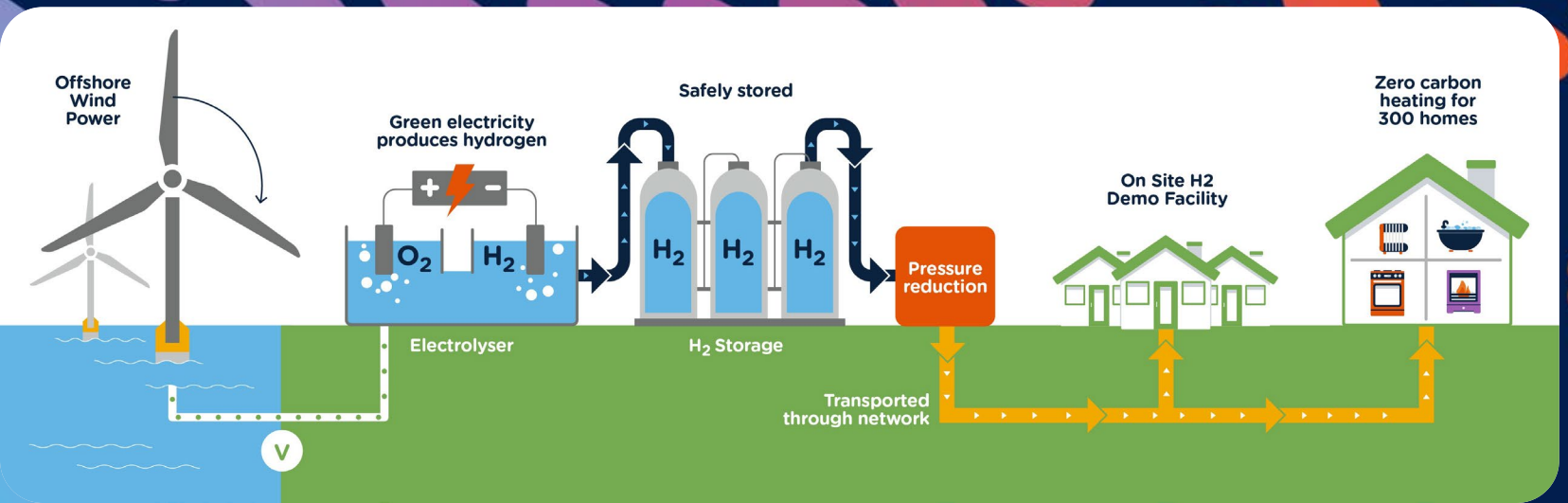
H100 Fife
Industry Engagement

Regulatory Discussion Topics – Metering, Billing & Data Flows

Q3 2023



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Discussion Topics

1. Hydrogen Transition Schedule
2. Customer Communications Examples & Uptake
3. Gas Entry & Distribution – System Balancing
4. Smart Metering
    a) Types
    b) Ownership & Management
    c) Metering Accuracy
5. Billing Accuracy – Multiplication Factor
6. Technical Preconditions for Hydrogen Metering
7. Identifying H100 Fife Customers in Central Systems
8. Customer Choice - Opt In/Out Process
9. Supplier Collaboration Requirements Pre-Install
10. Recap
11. Industry Ask and Contact Information

SGN H100 Fife

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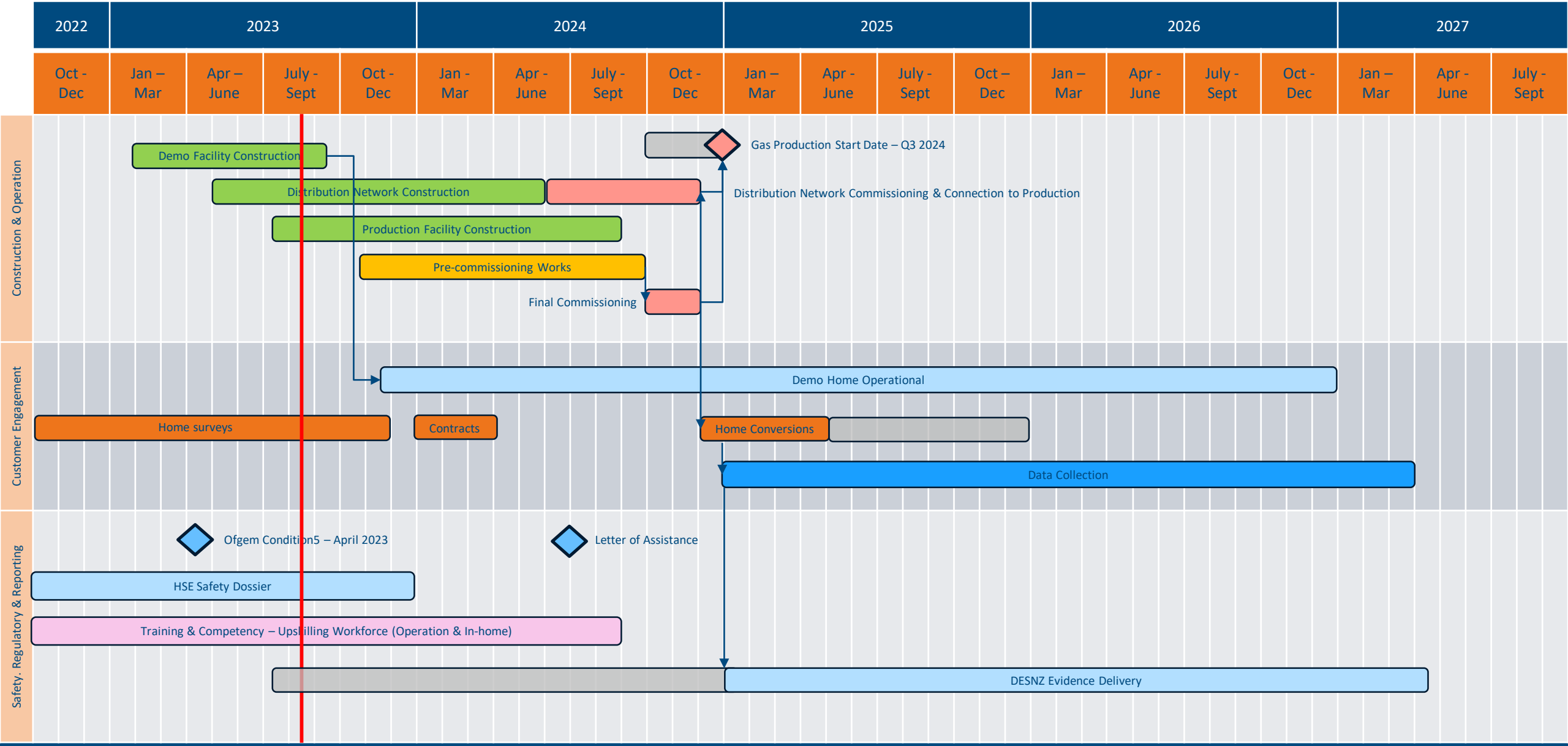
Hydrogen Transition Schedule



H100 Fife Customer Communications Examples

H100 Fife is the beginning of a historic change

SGN H100 Fife

Following a nationwide search, Buckhaven and Denbeath were chosen for the world's first green hydrogen zero-carbon heating network – H100 Fife.

We're using the offshore wind turbine in Fife Energy Park to make the hydrogen we need. We'll transport the green hydrogen gas through a newly built gas network to 300 opted-in homes in Buckhaven and Denbeath.

Homes which decide not to opt in will remain on the existing natural gas network.

If you opt in, you'll receive a free new hydrogen boiler and free hydrogen appliances to replace your natural gas appliances. These will be installed, maintained and serviced free of charge until 2027. You'll also get £1,000 for playing an important role in our journey to net zero.

Want to take part in H100 Fife?

Turn the page to start your journey and become among the first in the world to use green hydrogen gas for heating and cooking.

Review and register

If you live in the network area, you could be eligible for a green hydrogen gas supply. To qualify, you should currently:

- **Have a domestic natural gas supply**
- **Live in a terraced, semi-detached or detached home, or in a ground or first floor flat.**

Participation in H100 Fife is subject to a full assessment of your property which will be carried out by our highly trained surveyors.

Survey and sign up

Once you register, we'll contact you to arrange a visit where we will check your home meets our criteria for hydrogen conversion. If it does, we'll find out what new appliances you'll need.

Following your survey, you'll get a summary of the findings including any changes required before we can transition you. We'll explain this to you and support you throughout.

Signing up

Once you're happy with everything, you can sign your H100 Fife contract.

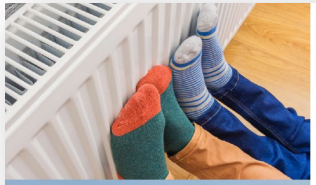
Everyone taking part in H100 Fife gets £1,000. We'll pay you £50 when you sign your H100 Fife contract, £200 when we install the new appliances, and £250 every winter from 2024 to 2026. You'll get these payments as long as you're still participating.

Preparing your home

We'll let you know if you need to do anything to get ready for installation. This could include lifting floor coverings (such as rugs – not carpets), clearing cupboards and loft spaces or making a clear access for appliances.

We may also need to do some work outside your home to prepare for your new hydrogen gas supply.

This is all free of charge, planned in advance with you and carried out by skilled engineers.



Green gas is coming to homes in Buckhaven and Methil

YOU can opt-in for a **brand-new free** gas boiler and appliances, while playing a key role in the battle against climate change.

SGN ...our gas. Our network.

Why should I join H100 Fife?

We're offering a hydrogen gas supply, new hydrogen appliances and a new hydrogen boiler, all at no cost, to up to 300 homes in Buckhaven and Denbeath.

As well as receiving these with **free** installation, maintenance and servicing, we'll pay you **£1,000**.

If you join H100 Fife, you'll be playing an important part in our journey to **net zero** and this is our way of recognising that and **thanking you**.

- ✓ **£1,000** for taking part
- ✓ **Free** new hydrogen boiler and appliances to replace your natural gas appliances
- ✓ **Free** installation, maintenance and servicing
- ✓ **Cut** your carbon footprint
- ✓ **Hydrogen gas** billed at the cost of natural gas

Join us at Buckhaven Community Education Centre on **15 and 16 September** to chat with our expert team about joining our H100 Fife project and our plans for the community. If you can't make it to either event don't worry, you can still...

Register now and take part: h100fife.co.uk/get-involved

Where is the work taking place?

The new network will be built alongside our existing gas network. Up to 300 homes in Buckhaven and Denbeath which are in the coverage area, can choose to opt-in to H100 Fife to use clean hydrogen gas or remain with their existing natural gas supply.

If you live in the coverage area, you can register to take part in H100 Fife here: www.h100fife.co.uk

The construction phases of our work have been split into five phases. During each phase of our work, it may be necessary to implement road closures and use temporary traffic lights at times. We'll give as much advance notice of this as possible.

Phase	Work areas		Schedule
Phase one	H100 Fife site – Fife Energy Park		May 2023
Phase two	Clyde Street Cowley Street Don Street Forth Street Swan Street	Tay Street Tweed Street Ward Street Wellesley Road	May 2023 – September 2023
Phase three	Barncraig Street Bow Street Den Street Institution Street	Sandwell Street Wall Street Wellesley Road	September 2023 – February 2024
Phase four	Ruskin Crescent Sandwell Street Stark Street		January 2024 – February 2024
Phase five	Buchan Gardens Burns Avenue Carlyle Crescent Den Walk	Omar Crescent Shakespeare Avenue Wellesley Road	March 2024 – July 2024

These dates are subject to change, so for all the latest information including details of road closures and temporary traffic lights, visit our H100 Fife roadworks page.

Scan for: h100fife.co.uk

Smell gas? 0800 111 999

If you need this leaflet in a different format or language, call 0800 975 1818

What is H100 Fife?

H100 Fife is leading the way in decarbonising home heating. It will be the first 100% green hydrogen-to-homes zero carbon network anywhere in the world, demonstrating the potential for the whole British gas network to deliver hydrogen gas.

Up to 300 homes in Buckhaven and Denbeath, Fife, have the choice of signing up to H100 Fife to use clean hydrogen gas or remaining with their existing natural gas supply. If you decide to take part, you'll receive £1,000, a new hydrogen gas boiler, hydrogen gas meter and new hydrogen gas appliances to replace your existing natural gas appliances. We'll supply, install, service and maintain everything for you.

Why here?

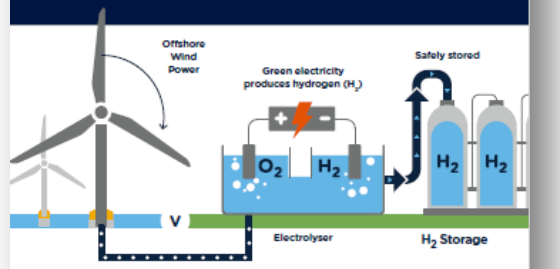
Buckhaven and Denbeath were chosen following a nationwide search for the most suitable site for this 100% hydrogen network. The area has access to offshore wind, an existing gas network, a dedicated energy park and a rich history in energy, once being home to one of Scotland's largest collieries and a major player in coal export. Decades later, we're retaining the energy heritage of this area, and developing the Fife Energy Park for our H100 Fife project.

Here are the great reasons to join H100 Fife – the world's first hydrogen gas network

- Help the environment and protect future generations by moving to a clean energy source.
- Receive £1,000 for taking part and playing an important role in our journey to net zero.
- Have your natural gas boiler and meter, and natural gas appliances, replaced with brand new hydrogen gas alternatives.
- Free installation and free servicing and maintenance until 2027.
- It doesn't cost to participate in H100 Fife. Hydrogen gas will be billed at the energy unit price of natural gas with the option of changing your gas supplier at any time.
- Help us gain valuable insight, which will in turn help Scotland get to net zero.
- Continue to enjoy a gas supply that gives you instant warmth and full control of your heating.

How will it work?

We've chosen Energy Park Fife as the ideal location to produce the hydrogen we need. Our site is in Buckhaven, right next to the large wind turbine which we'll be using to supply the electricity for the project. You can see our site from the viewing platform on Wellesley Road, near its junction with Swan Street.



Clean power

We're working closely with ORE Catapult to use its huge offshore wind turbine. Fife's rich wind resources provide the turbine an abundant source of clean electricity. We'll also have a back-up connection from the electricity grid.

Green hydrogen

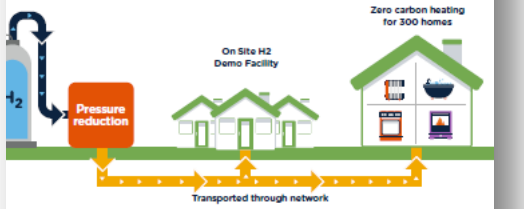
Electricity generated by the turbine is used to produce hydrogen at a dedicated electrolysis plant. This facility separates water into its elements: hydrogen and oxygen gas. If the electricity used is from renewable sources, like the wind we're using, the hydrogen produced is called green hydrogen.

Storage facility

Hydrogen is stored on-site in six purpose-built tanks. We'll store more than enough to heat 300 homes, ensuring supply won't be disrupted during even the coldest weather conditions.

The project is investing £32 million to help the community to transition to zero-carbon heating and develop the energy park into a hub for renewable energy innovation, bringing jobs and opportunities to local residents and businesses.

A range of green technologies will go into H100 Fife's end-to-end green hydrogen network. Here's how the project will use tried-and-tested tech to show the world it's possible to turn wind energy into safe, warm homes.



New network

We'll transport the green hydrogen through a newly built gas network to 300 opted-in homes in Buckhaven and Denbeath. Homes which decide not to opt in can remain on our existing natural gas network.

Visit our demonstration homes

Before hydrogen is installed in your home, we want you to see what a hydrogen home looks like and how similar it can be to your existing central heating set up. So, we're building a hydrogen demonstration facility. You'll get the chance to visit the homes to test and use hydrogen appliances before they are installed in your home. You'll also be able to see the minimal changes that will be made to your heating system and ask us any questions.

Clean, warm homes

State-of-the-art hydrogen appliances and boilers, fitted and maintained free for participants, provide zero-carbon heating and cooking for the project until 2027.

Project benefits

This is an exciting opportunity for you to transition early to zero-carbon energy and have a key role in this world-first project. All homes that opt-in will be connected to our new hydrogen gas network from 2023/24 to 2027.

New hydrogen boilers and appliances completely free

We'll replace your natural gas boiler, gas meter and any gas appliances with brand new hydrogen gas alternatives. You won't pay a penny for any of these. They will all also be installed by gas safe registered engineers free of charge.

Hydrogen boilers and appliances take up the same amount of space as standard boilers and appliances and work in the same way. They have already been tested to the same high safety standards as their traditional counterparts. Our project partners Baxi and Worcester Bosch are trusted and market leading boiler manufacturers.

Understandably you might be worried about disruption to your home during the installation. We believe hydrogen gas is among the least disruptive renewable energy sources out there and you'll be able to see this for yourselves in our hydrogen demonstration facility.

£1,000 for taking part

As well as receiving free new hydrogen appliances, we'll pay you £1,000. You're playing an important part in our journey to net zero and this is our way of recognising that and thanking you. We'll pay you £50 when you sign your H100 Fife contract, £250 when we install the new appliances, and £250 every year for the remaining three years of the project.

Can I opt in to H100 Fife?

If you live in this network area you could be eligible to take part if you:

- have a domestic 'natural' gas supply
- live in a terraced, semi-detached or detached home
- live in a ground floor or first floor flat

Your H100 Fife journey

Customers are so important to us, so we've worked closely with key stakeholders, experts and customers to map out your journey from beginning to end, and will be with you every step of the way.

You'll have the choice of opting in for a hydrogen gas supply or remaining with your existing natural gas supply. This is subject to a full assessment of your property.

Landlords and tenants must all agree to join the project. Properties in multiple occupancy buildings, such as flats which aren't on the first or ground floors, and non-domestic properties, are not eligible.

You can opt out of H100 Fife at any time during the entire length of the project. Your natural gas supply will be reinstated with the relevant appliances, boiler and meter installed at no charge.

- Review and register
- Survey and sign up
- Preparing your home
- Installation
- Aftercare

Customer Uptake

Customer Registration Update (*Accurate 25.08.23*):

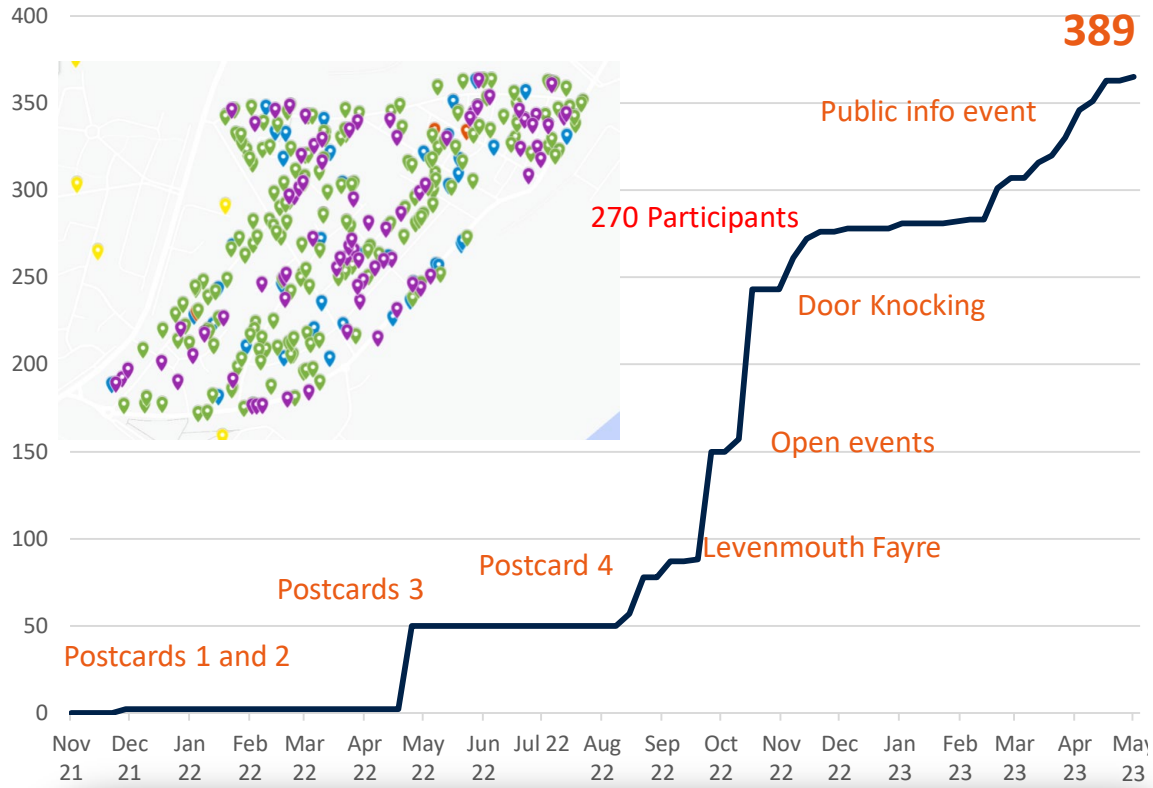
389 Customers registered in total in the network area
348 live customers
45 additional registrations outside network area

Customer Activity:

- Postcards, open events, fayre days
- Customer Welcome Pack
- Property surveys underway

Community Activity:

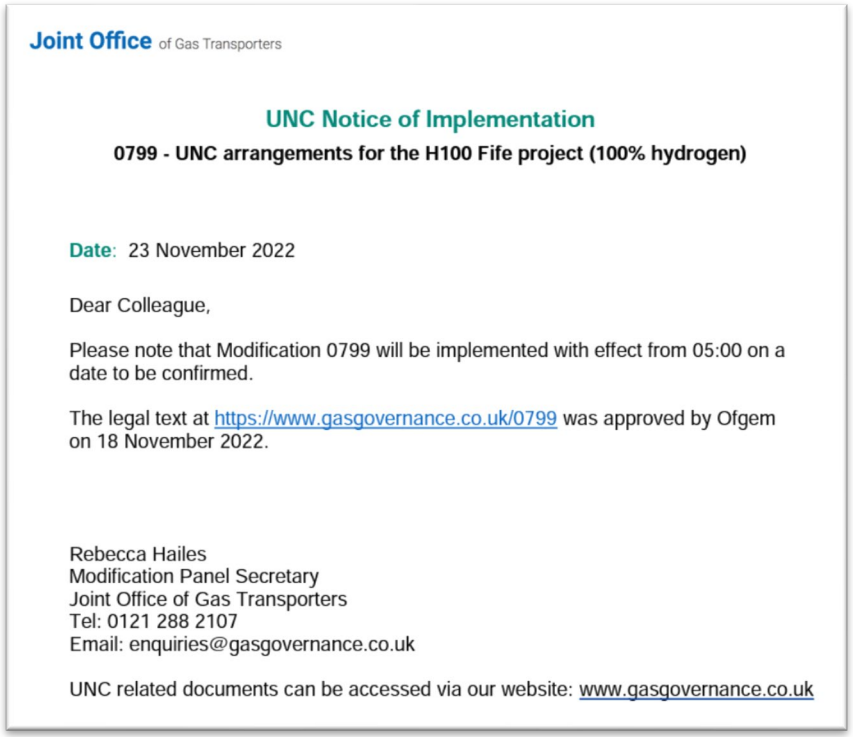
- Sponsorship of local Football Club, 70+ children attending weekly summer camps
- Regular newsletters
- Local schools engagement to continue for 2023-24
- Including new programme with Levenmouth Academy and their Career fair day
- H100 Fife Big Summer BBQ: 800+ residents attended, 40 Stalls for local charities, community groups and local small businesses



Gas Entry & Distribution – System Balancing:

Uniform Network Code & Calorific Value

- UNC MOD799 – introduction of 100% hydrogen into Total System under UNC and change to definition of 'gas'
- H_2 will be produced by SGN Futures (H100) Ltd and distributed in the network by Scotland Gas Networks plc (SGN regulated). No separate purchasing/sourcing of H_2 required by shippers.
- Following process for Calculation & Declaration of CV under The Gas (Calculation of Thermal Energy) Regulations 1996 - G(COTE)R
- Energy into Total System based on recorded CV at point of entry.



Joint Office of Gas Transporters

UNC Notice of Implementation

0799 - UNC arrangements for the H100 Fife project (100% hydrogen)

Date: 23 November 2022

Dear Colleague,

Please note that Modification 0799 will be implemented with effect from 05:00 on a date to be confirmed.

The legal text at https://www.gasgovernance.co.uk/0799 was approved by Ofgem on 18 November 2022.

Rebecca Hailes
Modification Panel Secretary
Joint Office of Gas Transporters
Tel: 0121 288 2107
Email: enquiries@gasgovernance.co.uk

UNC related documents can be accessed via our website: www.gasgovernance.co.uk

Smart Metering: *Types*

- Customer will receive new SMETS2 H_2 gas meters.
- Inclusive of prepayment and credit meter functionality.
- There are over 7.38m prepayment customers in the UK and the number of customers switching to prepayment is increasing – driven in the main by the cost of energy crisis.
- There will be valuable transferable learnings from H100 Fife for Village Trial and key stakeholders such as DESNZ, Ofgem, Scottish Government, GDNs & industry.

Enabling continued access to prepayment services will be a core requirement for the customer offer in H100 Fife.

There are high volumes of prepayment customers in the trial area who will expect to be able to continue with prepayment as part of the Hydrogen transition.

Smart Metering: *Proposed Approach Hydrogen Meter Ownership & Management*

SGN Futures (H100) Ltd will finance the SMETS 2 Hydrogen Meters and **SGN Metering Ltd** will oversee physical installation and maintenance services. SGN will be responsible for legacy stranding costs where applicable.

SGN Metering Ltd will provide the MPRN's of customers enrolled in the H100 Fife Project to relevant suppliers in advance of the transition from natural gas to Hydrogen. During the project **Xoserve** will notify **shippers** where customers are enrolled in H100 Fife and there has also been **a change of supplier**.

SMETS 2 Hydrogen Meters to be linked to DCC through comms hub. **Suppliers** will remain responsible for undertaking **commissioning activities with the Smart DCC** including meter barcode scanning to activate tariffs.

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Smart Meter Accuracy

Ensuring accuracy of customer billing is key to avoid overpayment and financial disadvantage.

- **Customers will pay the energy unit cost of natural gas for hydrogen gas supply, suppliers will continue to offer customers tariffs as though they were consuming natural gas.**
- In order to achieve volume equivalence within day for customer billing, our approach is:
  - The Meter Manufacturer will set a default Calorific Value in the SMETS2 Hydrogen Meter at point of production
    - Allows for prepayment meter accuracy since Multiplication Factor does not form part of the Smart Metering Equipment Technical Specifications 2 (SMETS2)
  - This will ensure that the SMETS 2 Hydrogen Meter will calculate the volume of gas as though it were natural gas
  - When customers top up their Meter this will ensure that they are paying the correct amount for their Hydrogen usage
  - The meter and In Home Display will show the corrected volume and meter reads will be communicated remotely to suppliers

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Hard coding CV into all meters at point of production enables any meter to have prepayment functionality.

Billing Accuracy: *Credit Meters - Multiplication Factor (MF)*

- The H100 trial in Fife will use a derived MF to ensure that customers who receive 100% hydrogen gas as part of the trial are not overbilled.
- MF applied by suppliers for credit customers in central billing systems to ensure accuracy of billing.
- Change Proposal XRN5298 sets out this approach – approved at Change Management Committee on 10th November 2021.
- The MF is usually 1 for domestic-type meters and is an attribute of the meter – held in the MDD (Market Domain Data) table in central systems.
- The value of the derived Multiplication Factor will be in the region of 0.3 and to 3 decimal places – REC Mod on enumeration underway for non-derivatives of 10.

Multiplication Factor being set by SGN and SGN will consult with Ofgem.

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Example of a derived Multiplication Factor for H100 Fife trial sites

	Customer using standard natural gas	Customer using Hydrogen with a standard Multiplication Factor	Customer using Hydrogen with a special Multiplication Factor
Customer Annual Quantity (AQ)	13,000 kWh	13,000 kWh	13,000 kWh
Metered usage for a period (hydrogen customer uses greater quantity due to lower gas quality)	100 m3	329 m3	329 m3
SC LDZ Gas Calorific Value (CV)	39.5	39.5	39.5
Standard Conversion Factor (CF)	1.02264	1.02264	1.02264
Multiplication Factor (MF)	1	1	0.294 (estimated value)
Calculated Energy: m3 x CV x CF x MF /3.6	1,122 kWh	3,691 kWh	1,085 kWh

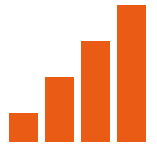
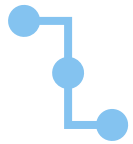
Standard customer unaffected by Hydrogen use in the LDZ

Hydrogen customer would be overbilled if a standard multiplication factor were used

Special multiplication factor ensures that the Hydrogen customer is not overbilled

Technical Preconditions for Hydrogen Metering

- DCC Wide Area Network coverage available
- SMETS 2 Electricity Meter and Communication Hub installed and working
- Default CV applied to SMETS 2 Hydrogen Meter
- Supplier's metering agent able to scan the barcode on the SMETS 2 Hydrogen Meter to register with supplier systems
- To remove the risk of the standard Scotland LDZ CV being applied remotely by suppliers, suppliers will be asked to suppress CV update messages to the SMETS 2 Meter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Identifying H100 Fife Sites in Central Systems

Shippers can identify MPRNs, within their ownership, taking part in the H100 Fife Project through GES (Gas Enquiry Service) Online Portal via manual search

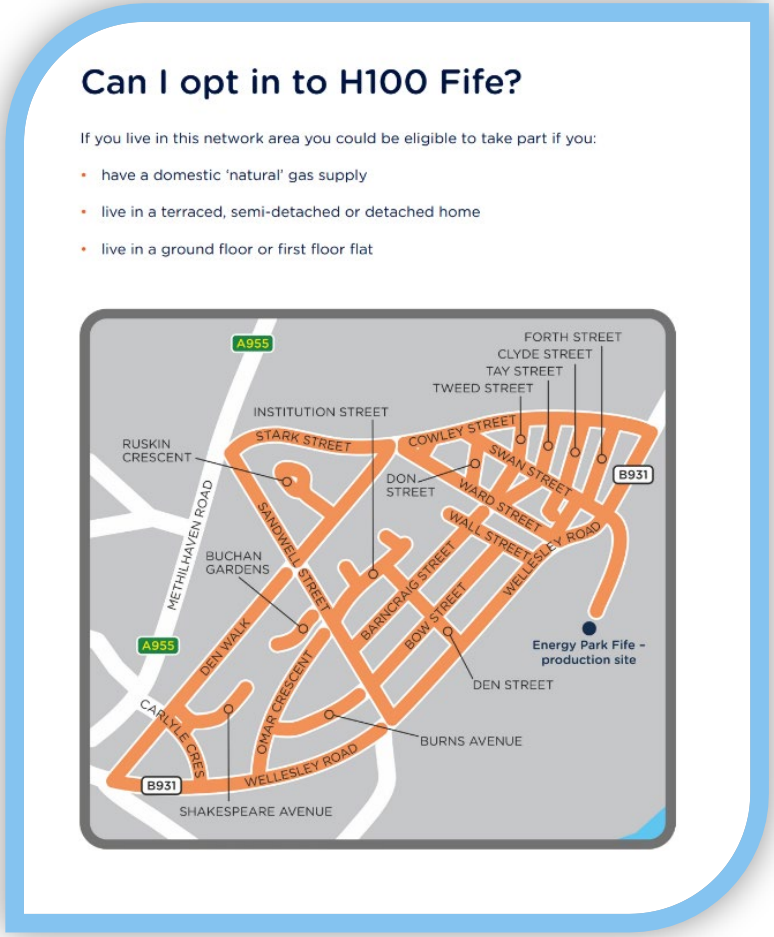
- The Network Project Name will be the description of the project.
- The Network Indicator will be H100FIFSGN.
- The Network Project Start Date is the date the consumer will first receive hydrogen.
- The Network Project End Date is the date the consumer stopped receiving hydrogen.

GES Online Portal example

Shipper Name	
Shipper Short Code	
Current Supplier	
Current Supplier Short Code	
Incoming Supplier	
Previous Supplier	
Previous Supplier ID	
Confirmation Reference	
Confirmation Effective Date	
Withdrawal Status	
Market Sector Code	
Meter Link Code	
Supply Meter Point Class	
Interruption Contract Exists	
Network Project Name	SGN 100% H2 LEVENMOUTH FIFE
Network Indicator	H100FIFSGN
Network Project Start Date	10 Jun 2023
Network Project End Date	10 Mar 2027

Customer Choice - Opt In/Out Process

- Customers participating in the H100 Fife Project are entitled to opt out at any time after opting-in and have the hydrogen appliances and meter replaced with natural gas assets.
- The relevant suppliers will be contacted to confirm the transition from hydrogen to natural gas.
- Where a customer **opts out** and is on a Smart Pay As You Go tariff the expectation is that SGN will be required to remove the hydrogen meter and the **supplier** will need install a SMETS 2 natural gas meter.



- ***Where a customer is on a credit tariff the standard approach for SGN would be to replace with a legacy meter however this approach to meter replacement needs validation.***

The above points are also relevant to customer reversal to natural gas at the end of the trial if an enduring hydrogen strategy isn't implemented

Supplier Collaboration Requirements Pre-Install

Contractual

- **Suppliers** to advise MAP's/MEM's of the **MPRN's to be excluded** from national arrangements
- **Suppliers** to comply with **deemed contract terms**, including a commitment not to send operatives to carry out physical works on SMETS 2 Hydrogen Meters in the H100 Fife network area

Logistics

- **Schedule of installations**, close working with SGN programme
- **Postcode & MPRN** provision
- Meter technical details

Customer Engagement

- Confirmation of **Smart Metering Appointment**
- Confirmation of **tariff details**
- Provision of **smart card** (for retail top ups)

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Summary – H100 Fife 'Hydrogen Neighbourhood'

1. Customers can to opt-in to the project, or remain with their existing natural gas supply.
2. Participating customers will receive new hydrogen boilers and meters, and other hydrogen appliance replacements on a like for like basis where available at no cost.
3. The first customers will be connected at the end of 2024 with the aim of all 300 being connected in the first half of 2025. Customers can opt-out at any time.
4. SGN have been working with Xoserve and industry to devise a billing and metering solution to ensure the customer is not financially disadvantaged.
    a) Customers will be able to remain with their existing suppliers or switch suppliers if they wish during the trial.
    b) Customers will be billed by the supplier based on their natural gas tariff.
5. The project will finance new hydrogen SMET2 meters that will be installed and maintained by SGN Metering, who will be acting as the default MEM for the duration of the project.
6. The project will be covering the stranding costs of legacy meters where applicable.

Summary – H100 Fife 'Hydrogen Neighbourhood'

7. A new CV for hydrogen will be set by the meter manufacturers at point of production to allows meters to calculate the volume of hydrogen gas as though it were natural gas.
8. CV hardcoding will allow accuracy of hydrogen metering for prepayment meters where multiplication factor cannot be applied.
9. There are technical preconditions required to enable hydrogen metering:
    - DCC Wide Area Network coverage available
    - SMETS 2 Electricity Meter and Communication Hub installed and working
    - Suppliers will need to suppress CV update messages to hydrogen meters
10. A bespoke multiplication factor registered with the meter in MDD will be applied by suppliers in central systems to credit meters for accurate billing.
11. Ofgem expectation that any changes to normal business processes that are required by suppliers could be done as manual workarounds for the duration of the trial to avoid any unnecessary costs to consumer

Get in touch!

For any overarching project queries, please contact:
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H100 Fife Downstream Project Manager
07583079128
Lorna.archer@sgn.co.uk

For any queries relating to Xoserve and central systems, please contact:
Victoria Mustard
Decarbonisation Strategy Lead
07519 605 322
Victoria.mustard@xoserve.com

For any queries relating to domestic metering, please contact:
Rhiannon Osuji
Commercial Manager
07583 131 046 / 02394 283 096
Rhiannon.osuji@sgn.co.uk

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Key Ask from Industry:

1. **Nominate a primary and secondary contact** from your organisation as point of contact for H100 Fife project.

2. Attendance at **Regulatory Industry Working Group** for H100 Fife, which will be established by SGN in early 2024 to progress key collaborative activities in relation to install planning and operational coordination.

3. Raise any **concerns or resourcing challenges** the project needs to be aware of.

4. Ultimately reaching a point of **endorsement** of project's regulatory model as presented today.

Thank you

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