

XOSERVE

System Readiness for Net Zero: From Natural Gas to Hydrogen and Biomethane

I-SEE Sustainable Energy & the Environment Webinar

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What we will cover today

Agenda

- **Gas Market Context & Structure**
- **Drivers for change**
- **Central Systems**
- **Managing Different Gases Programme**
- **Case Studies**





01

Market context



Evolution of the GB gas market



- 1949 over 1,000 individual gas boards are nationalised
- 1960 gas is found in the North Sea
- 1967 – 1977 conversion from town gas to natural gas
- 1986 Privatisation
- 1996 UK Link and Network code go live
- 1996 – 1998 Competition introduced
- 1998 Transco formed
- 1998 Meter reading unbundled
- 1998 Bacton to Zeebrugge interconnector
- 2002 Metering services unbundled
- 2005 Distribution network sale and Xoserve creation
- 2016 Smart metering and data communications company
- 2017 Funding, governance and ownership review of Xoserve
- 2017 Distribution network Cadent created
- 2017 UK Link replacement and settlement reform
- 2020 Central switching service goes live
- 2023 National Gas Transmission created

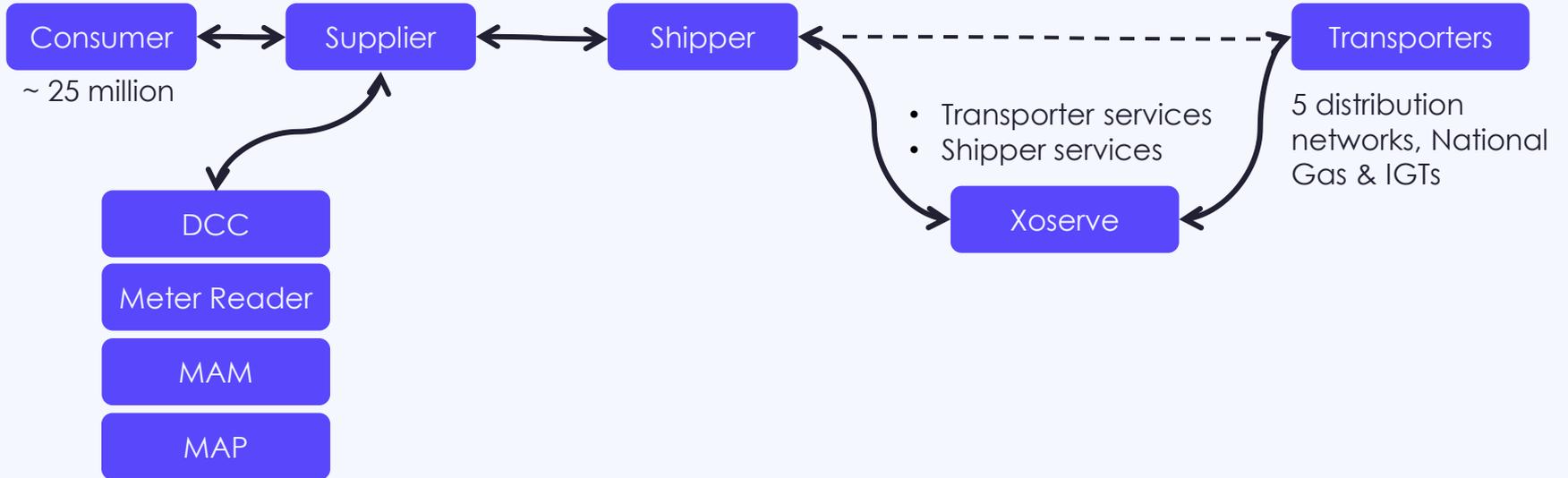
X Simplified gas market

- Heating
- Cooking
- Industrial use
- Power generation

- Consumer billing
- Meter reading
- Metering services

- Gas procurement
- Arranging gas transportation

- Transports gas
- Mains and service laying
- Charge shipper for gas transportation





Consideration for change

- 13 LDZs with their own charging rates, daily calorific value (CV) and daily demand profiles
- Gas flows are relatively constant
- Calorific values are relatively stable and within a narrow range
- Consumption is in terms of energy
- The lowest settlement level is daily
- The gas market has many stakeholders, including shippers, suppliers, transporters, metering companies

2024 Demand

| | |
|---------------------------|---------|
| Annual gas demand | 743 TWh |
| Annual electricity demand | 290 TWh |





02

Drivers for change



Drivers for change

Two major decarbonisation deadlines



All net-zero scenarios show that some form of gas will continue to be needed through to 2050

Clean Power 2030 and Net Zero 2050

Gas is still vital in this transition for:

- Power generation
- Industrial/Domestic heating
- Storage and security of supply

But to get there, a whole system approach is essential - one that recognizes the role of hydrogen, biomethane, and existing gas infrastructure to support a resilient and cost-effective transition.

X How gas will feature in a net zero Future

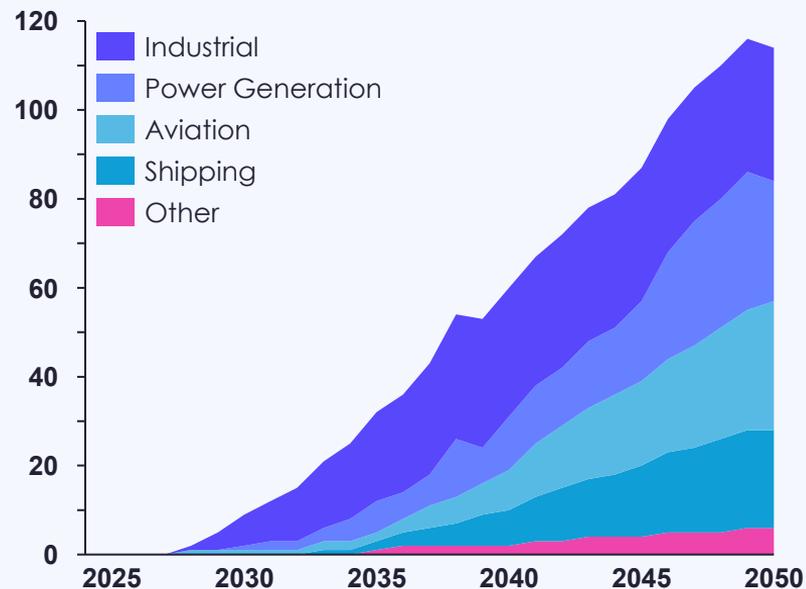
NESO's Future Energy Scenarios 2025

- Electricity demand is forecast to grow significantly, with gas required as a flexible option to balance rising power needs.
- Hydrogen could supply between **98 and 325 TWh** by mid-century, providing a major share of low carbon energy.
- Sustainable biomethane has the potential to meet up to **38% of UK gas demand by 2050**.

UK Government Policy Direction

- The Clean Energy Industries Action Plan positions hydrogen as a critical pillar of the UK's clean energy and net zero transition.
- A revised Hydrogen Strategy is expected imminently.
- In the biomethane space, the GGSS has been extended until 2028
- Carbon Capture, Utilisation and Storage (CCUS) is backed with £9.4bn of capital funding allocated over the current Spending Review period.

Projected H₂ demand by sector in 2050 under the FES Holistic Transition Scenario - NESO (TWh)



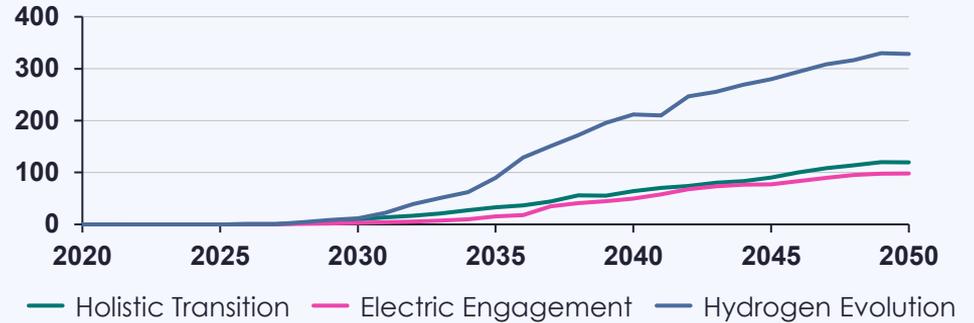
X The evolving role of green gas

Hydrogen and biomethane as becoming pillars of the transition

Major investments are underway:

- £2bn allocated to the first Hydrogen Allocation Round (11 production projects).
- £960m for the Green Industries Growth Accelerator.
- £500m for hydrogen transport and storage infrastructure.
- Biomethane has seen rapid growth since the early 2000s, with over 140 biomethane plants now connected to the gas grid.

H₂ capacity forecast range to 2050 - NESO FES (TWh)



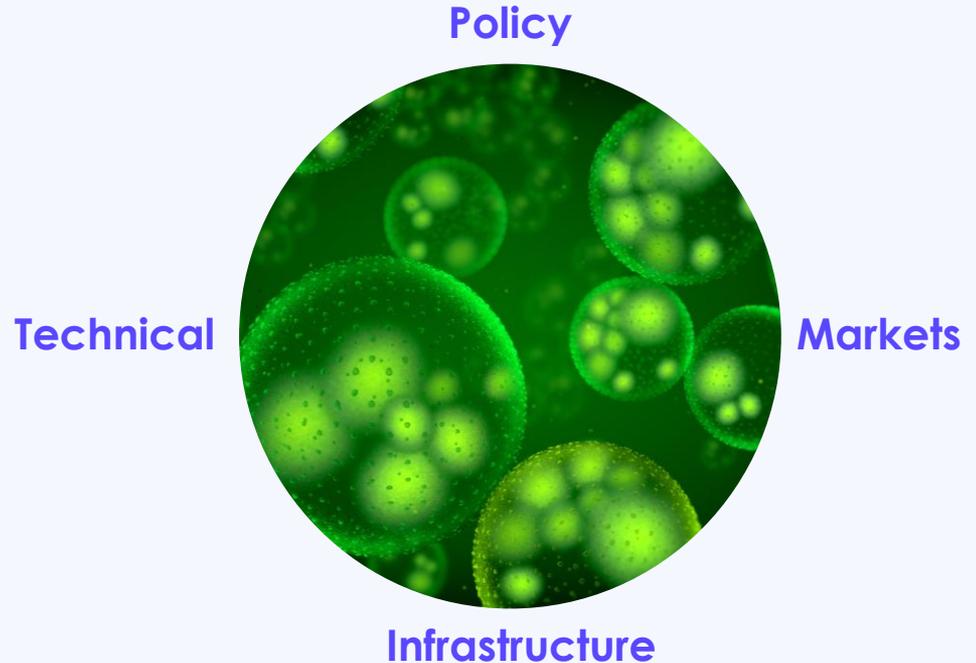
Quarterly biomethane energy injections - Xoserve (TWh)



X Challenges with market evolution

- Uncertainty around **policy direction** when it comes to green gases.
- **Hard-to-abate sectors** where electrification alone is insufficient.
- High costs and slow deployment of **new infrastructure**, with disruption risks for networks.
- Complexities of **operating a multi-gas system** - balancing natural gas, biomethane, and hydrogen with different calorific values (CVs).
- This includes **high-quality, granular, and frequent data** is needed to track gas composition and blending

Addressing these challenges will require technical innovation, and industry-wide collaboration.





03

Central Systems

Xoserve's role

Xoserve undertakes the role of the gas industry's **Central Data Services Provider** (CDSP) and provides a suite of vital services for gas suppliers, shippers and transporters.

We **maintain the central register** (UK Link) which holds industry-critical data for the circa 25 million gas meter points in Great Britain.

We undertake gas meter registration, record gas consumption, **energy settlement activities** and other data services. In addition, we provide essential central services to gas shippers, retailers and other industry participants.

We also act as the **billing agent** for the gas networks, we produce and issue the gas transportation charge invoices, covering gas network capacity and gas commodity charges.



1,590,694,544
(1.6 billion)
meter reads
processed

188,879,765
AQs processed
successfully



Gross value of all
Transportation invoices:
£7,638,513,998
(7.6 billion)

X Ensuring a fair and efficient market

Data



UK Link provides the backbone for gas data:

- Gas inputs and calorific values
- Offtake locations
- Meter details
- Reads and consumption
- **Energy** calculations
- Offtake quantities (AQ / SOQ)
- Charge rates

Accurate and granular data is key.

Settlement



Gas market balanced and settled daily.

For large consumers, actual **energy** is used.

For the rest, daily values are estimated and reconciled on actual **energy** consumption.

Inputs and output **energy** of the total gas system must align.

Billing



Gas transported through the networks to the supply meter points is subject to charges related to the various aspects of the supply and delivery of gas.

Based on the amount of **energy** moving through the system.

Energy calculation is critical to ensure accurate billing.

Regulation



Importance of offtake quantities

Energy informs the offtake quantity values of gas

- The Annual Quantity (AQ), along with its daily offtake quantity equivalent (SOQ) provides a view of expected energy consumption of gas based on historic usage.
- They support the calculation of daily gas allocation/demand forecasts and consumption estimates.
- It provides a vital feed into the energy calculations for balancing of the total gas system.
- It is used to define the correct charge rates for billing calculations.



Gas Allocations



Site Capacity



Billing



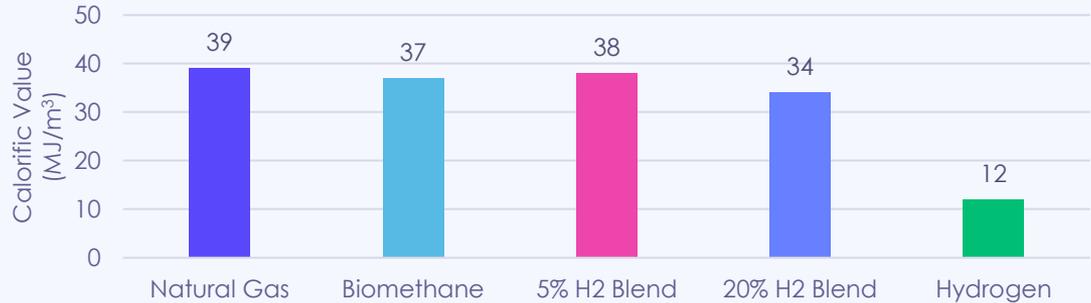
Energy calculation - the calorific value dilemma

Billing is based on gas volume and calorific content

meaning the energy content of gas matters. With increasing biomethane and hydrogen blending, each with lower CVs, customers may receive less energy per unit of volume consumed.

Variability of gas throughout the day reduces the certainty of gas quality consumed.

This may lead to potential impacts to the calculation of the flow weighted average daily CV used within the defined geographical charging areas (LDZ) used to calculate energy.

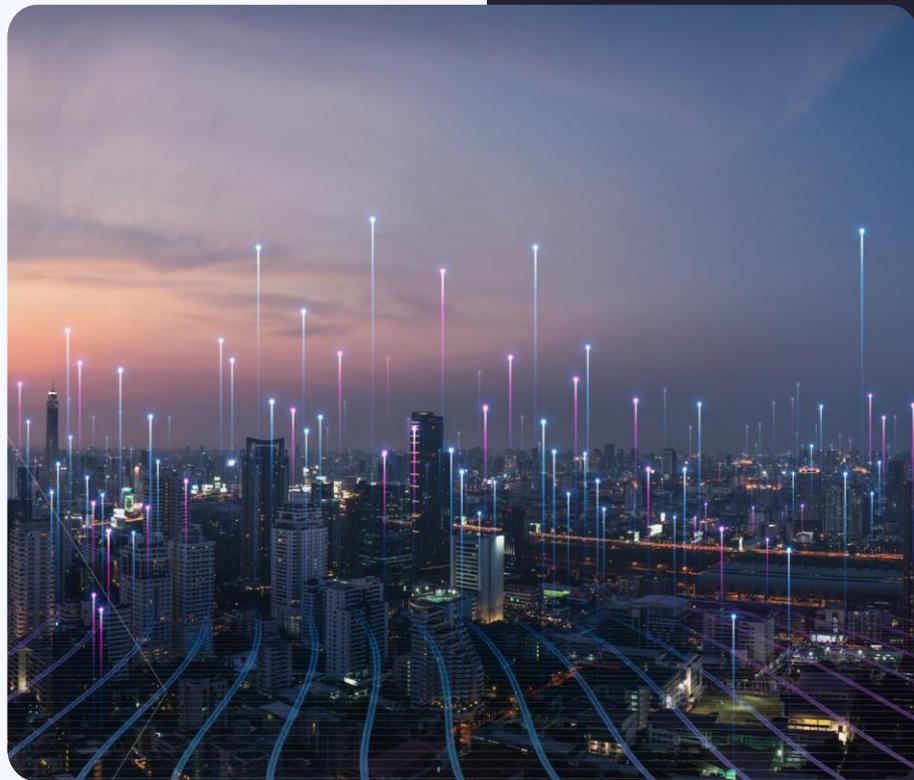


X Data and decarbonising gas

Data will make or break the transition to net zero.

High-quality, granular, and frequent data is needed to:

- Track gas composition and blending.
- Optimise network operations, production, and storage needs.
- Guarantee system reliability and security of energy supply.
- Facilitate fuel transition.
- Cross-industry data sharing to support energy integration.



The role of Xoserve is evolving

Traceability & Transparency

Clear visibility of gas flows including green gases and associated carbon impacts

Flexibility & Modularity

Proactive system design to adapt as the gas and electricity market evolves

Integration & Interoperability

Promotion of seamless data exchange across electricity, natural gas, hydrogen, biomethane

Xoserve's role is evolving from a data custodian to an active enabler of a digital, multi-gas system





04

Managing Different Gases

X Managing Different Gases Programme



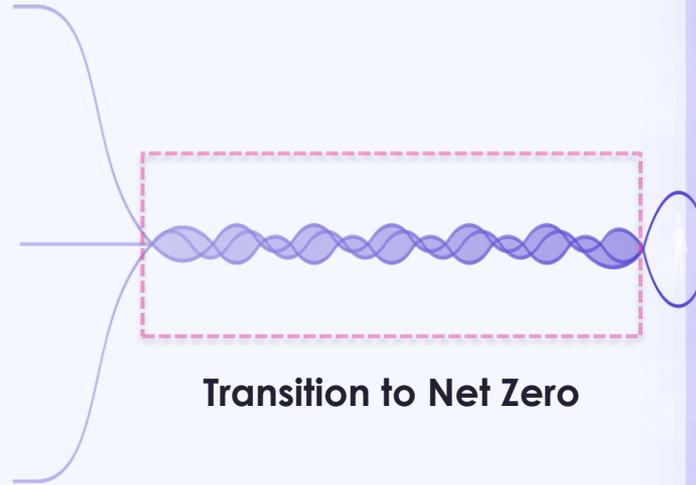
Market Evolution



Data Readiness



Central Systems



Transition to Net Zero

Scenarios Investigated

- 1 Non propanated biomethane
- 2 Up to 5% Hydrogen Blending
- 3 Up to 20% Hydrogen Blending
- 4 100% Hydrogen

The last year we worked closely with the distribution networks and National Gas to deliver this work

Programme findings

Scenarios Investigated

Scenario 1: Non propanated biomethane injection

Scenario 2: Up to 5% hydrogen blending

Scenario 3: Up to 20% hydrogen blending with dynamic daily injections

Scenario 4: 100% Hydrogen Network



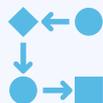
Key Findings



Significant reduction of propane injection costs and associated carbon dioxide



Low to medium impact to the central systems



A lower biomethane CV could affect the Flow Weighted Average CV process



Local distribution zones might need to be divided into charging zones for billing accuracy

X Programme findings

Scenarios Investigated

Scenario 1: Non propanated biomethane injection

Scenario 2: Up to 5% hydrogen blending

Scenario 3: Up to 20% hydrogen blending with dynamic daily injections

Scenario 4: 100% Hydrogen Network



Key Findings



Small scale low risk step towards decarbonisation



Low impact to the central systems



Minimal system changes



Working within the current network constraints

X Programme findings

Scenarios Investigated

Scenario 1: Non propanated biomethane injection

Scenario 2: Up to 5% hydrogen blending

Scenario 3: Up to 20% hydrogen blending with dynamic daily injections

Scenario 4: 100% Hydrogen Network



Key Findings



An intermediate stage towards decarbonisation



High impact to the central systems



Local distribution zones would need to be divided into charging zones



For accurate billing multiple billing CVs would be required per charging zone per gas day

X Programme findings

Scenarios Investigated

Scenario 1: Non propanated biomethane injection

Scenario 2: Up to 5% hydrogen blending

Scenario 3: Up to 20% hydrogen blending with dynamic daily injections

Scenario 4: 100% Hydrogen Network



Key Findings



A complete green gas solution that can be implemented in CDSP systems as an independent stand-alone network



Medium impact on CDSP systems if to run in parallel with natural gas



System redesign would be required to manage the 2 regimes concurrently



System changes relate to system functionality for parallel operation rather than settlement or process changes



Supporting the decision making

This work informs the industry and policymakers

Key audiences: Gas networks, regulators and industry workgroups

Our role: We enable these stakeholders by providing insights into the impact to the Central Systems while we make sure that we set the foundations for a digital multigas system

Why it matters: These analyses support policy and market decisions and help maintain fairness, accuracy and transparency during the transition



05

Case studies

X Case study: HyDeploy

- The HyDeploy initiative has seen Northern Gas Networks, Cadent, the Health and Safety Executive, Keele University, ITM Power, and Progressive Energy work together to demonstrate that blending of up to 20% hydrogen with natural gas could be done safely and efficiently, without requiring any modifications to existing household appliances or infrastructure.
- The trial was for 12 months starting beginning in August 2021 in Winlaton, Gateshead, Tyne and Wear for 668 domestic customers including a school and a church and was the first ever trial to add a hydrogen blend of 20% into a public network.
- Xoserve ensured that shippers and suppliers were easily able to identify any of their meter points that were participating in the trial and made sure that there were no impacts to downstream processes caused by the increased gas volumes being recorded.
- The project was successful in proving a safety case in the use of blended hydrogen in a public network leading to DESNZ endorsing hydrogen blending in December 2023.



X Case study: Real Time Settlement Methodology

Building on previous and ongoing projects aiming to facilitate the increased injection of green gasses with variable CVs into the GB gas network for decarbonisation purposes such as:

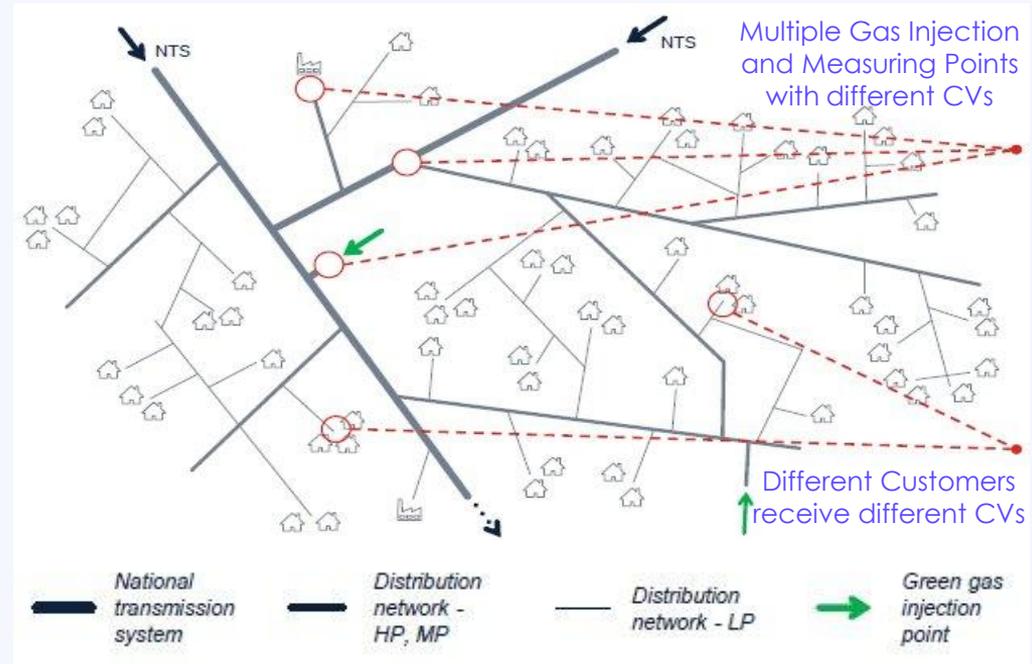
- Future Billing Methodology Project
- H100 Fife

Objective: Develop and demonstrate an integrated and flexible solution that enables the characterisation, settlement and billing processes of a multi gas grid with variable CV across the LDZ and the whole gas network

- **What it is:** A new approach to settlement using real-time data.
- **Why it matters:** Supports fair, transparent settlement as hydrogen and biomethane are blended into the system enabling decarbonisation

What data it uses: Customer meter data (CV)

A future multi gas grid with variable CVs across an LDZ





In conclusion: Towards net zero future

Collaboration

Net Zero

Innovation

Data & Systems

Regulation

- The transition to net zero will be complex, and no single pathway exists.
- **Collaboration** across gas, electricity, and policymakers will be essential.
- **Central Systems** are vital enablers of the transition
- **Data** can provide clarity, drive innovation, and ensures fairness.
- **Gas will remain part of the energy mix** - the challenge is ensuring it plays a low-carbon, sustainable role.



Thank you!

<https://www.xoserve.com/decarbonisation/decarbonising-gas/decarbonisation-knowledge-centre/>