HyDeploy

IMechE
19th March 2019

Lorna Millington, Future Role of Gas Manager

Cadent
Your Gas Network

HyDeploy: Hydrogen injection into the gas grid

To demonstrate for the first time that a blend of hydrogen and natural gas can be distributed and utilised safely & efficiently in the UK distribution network without disruptive changes for consumers.

Potential to save CO_{2e} of 120 million tonnes & £8 billion cumulatively by 2050

Northern Gas Networks

Cadent

Keele University

Progressive energy

HEALTH & SAFETY LABORATORY

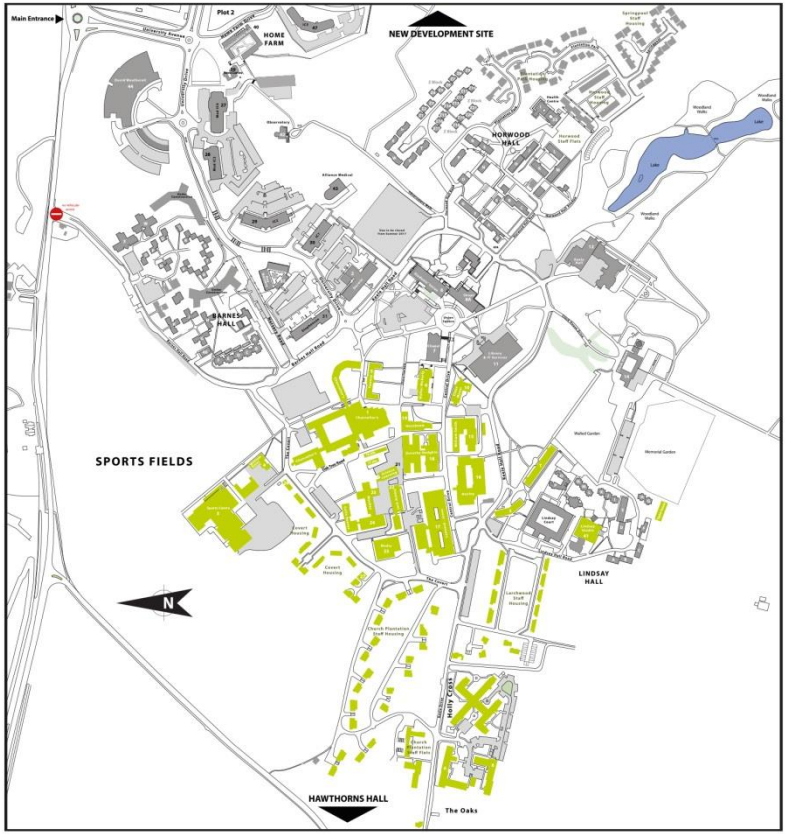
ITM POWER Energy Storage | Clean Fuel

The Keele campus: A small town on gas

Campus the size of a small town

- 101 residential houses
- 8 multi-residential buildings
- 17 office blocks & laboratories
- 7 recreational & service facilities

A licensed transporter & supplier.
Engaged with BEIS and HSE to use its energy network as a *‘Living Laboratory’.*



Phase 1

Engagement

Appliance Lab test

Onsite testing

Tightness testing

Specify & design H_2 equipment

Assessment of technical attributes with regard to safety & performance

Pre-development activities

HSE

Safety case

Phase 2

Commissioning & pre-injection processes

Installation: H_2 & infrastructure

Place orders

Phase 3

Operation

Analysis

Reinstate

Dissemination

HyDeploy

Exemption granted: 1 Nov 2018

Materials

Characteristics & Procedures

Lab testing of appliances

Field testing installations

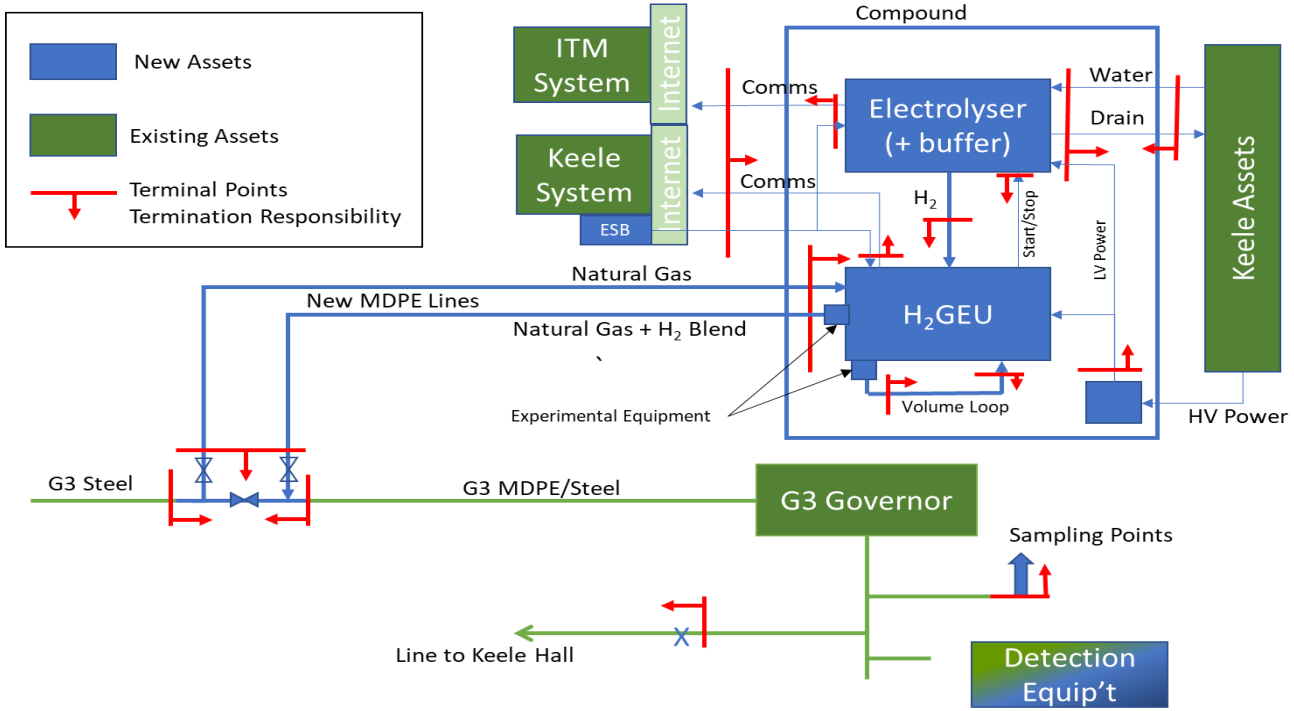
Equipment

European projects

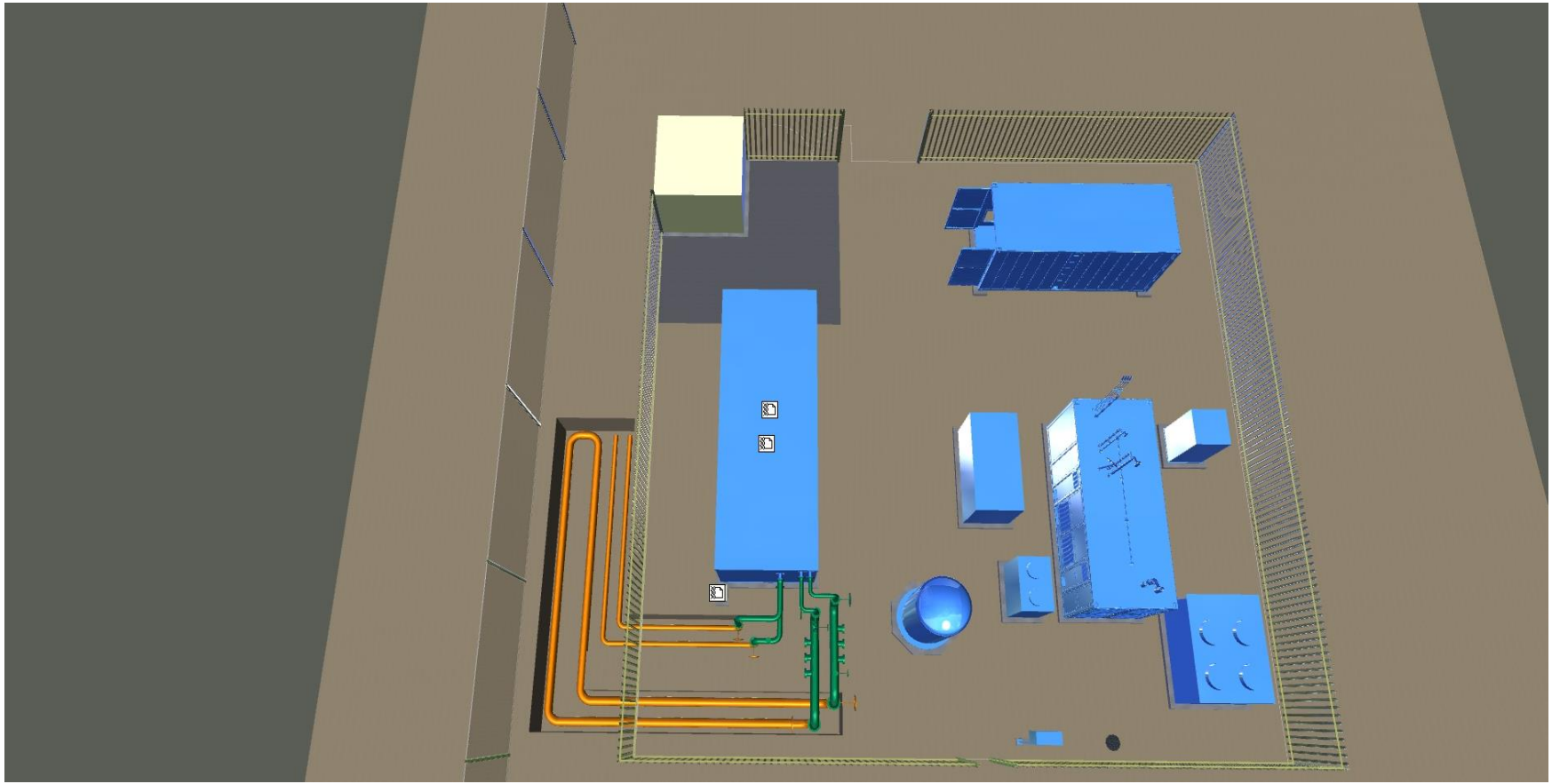
QRA

HyDeploy

Site layout

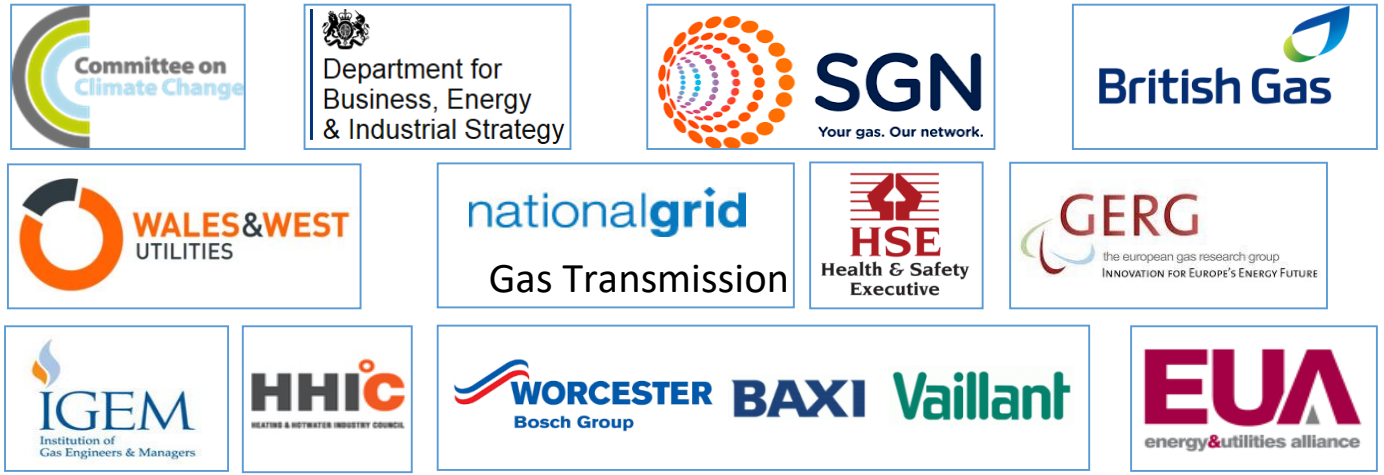


Site Layout virtual image



Strong stakeholder support

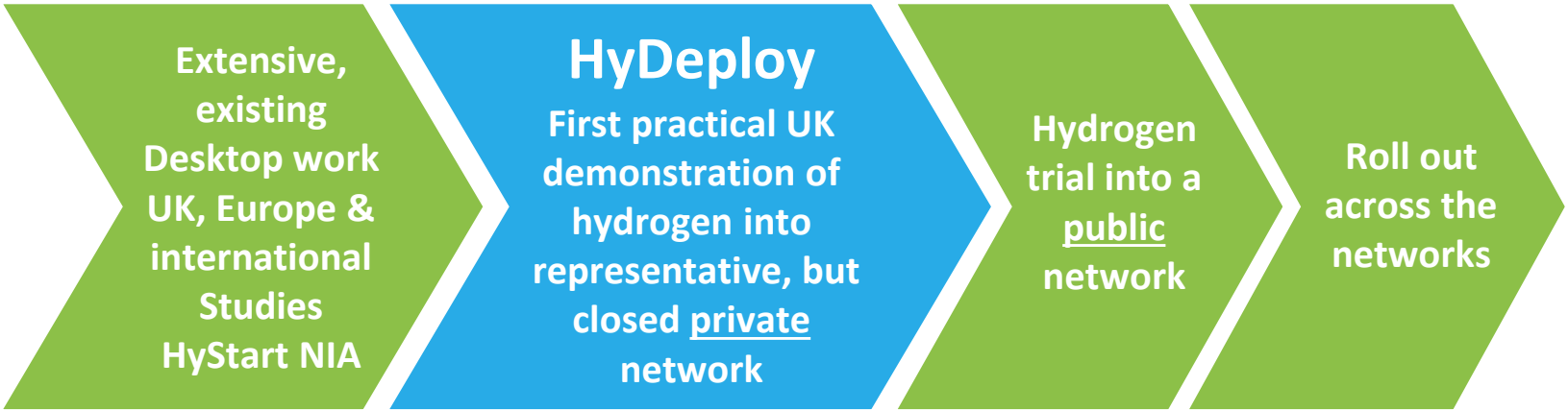
- Wide interest and support from across the industry
- Key stakeholders engaged through the Advisory Board
- Dissemination of findings ongoing throughout the project



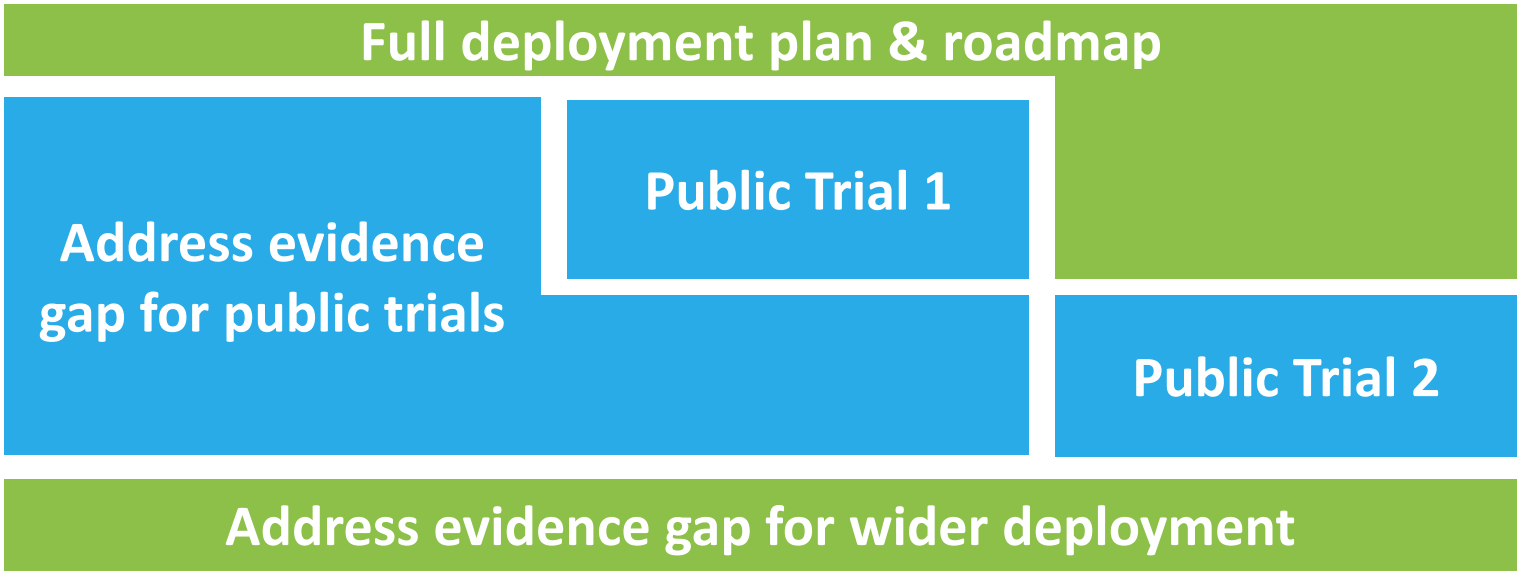
HyDeploy

HyDeploy: A demonstration project

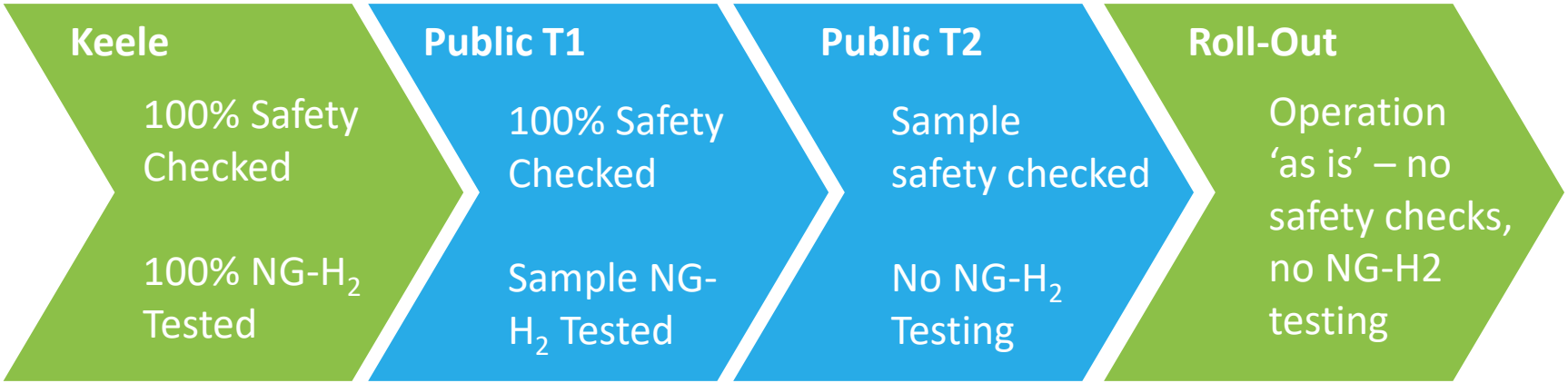
- HyDeploy: A reference work to be used by the industry now & into future.
- Build on existing work on the impact of H_2 on appliances & networks & best practice for running new gas trials.
- A closed private network is ideal for the first UK trial



HyDeploy



The importance of two public trials



- Need to **secure data** on representative installations.
- Need to **establish the evidence base**, that satisfies regulatory scrutiny, to enable future roll out without safety or blend checks
- Require evidence from **'non-compliant installation types'** to evidence 'no less safe on blend than natural gas'

HyNet North West

Delivering carbon Reduction savings in The North West of England

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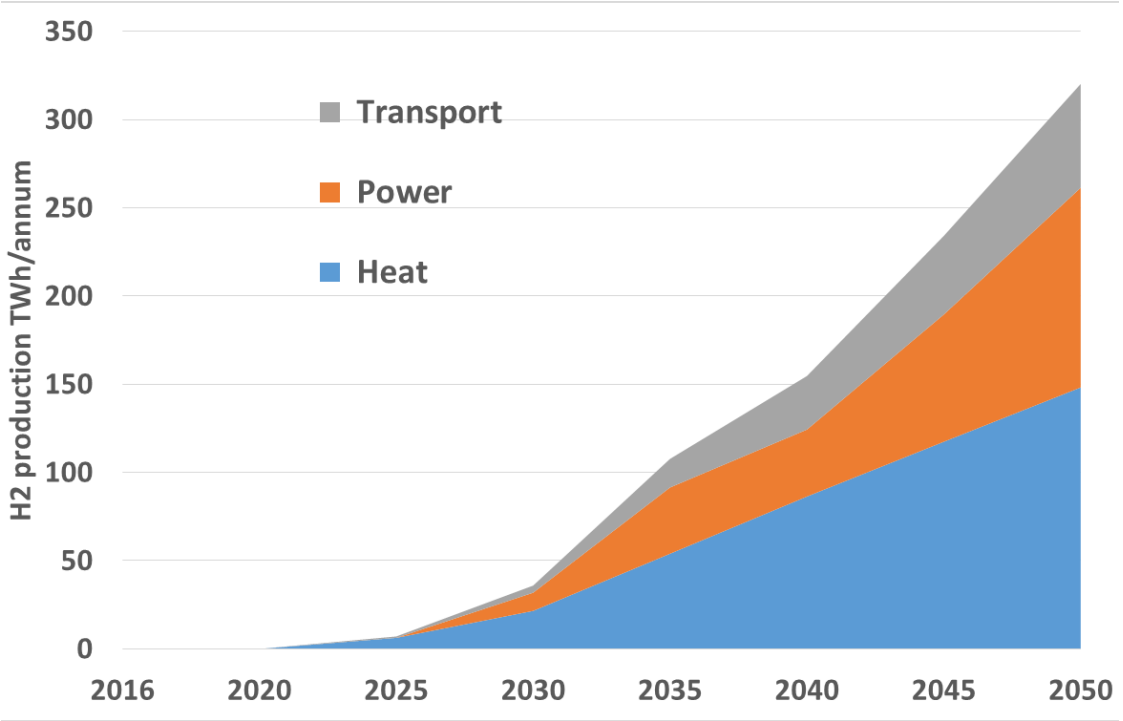
Your Gas Network

Meeting carbon reduction targets across the Cadent area – build out plan

Developing a plan which uses hydrogen with CCS where realistic & cost effective

Results are confirming

- Hydrogen can reduce heat & transport emissions now (residential use is deferred)
- First, Liverpool Bay, CCS Project can be operating by 2025
- 1st Project extended and 2nd Project at Humberside operating by c2030 to meet 2050 target
- Replicable to other projects elsewhere in UK
- Similar proposition in Europe etc



Key data for HyNet NW

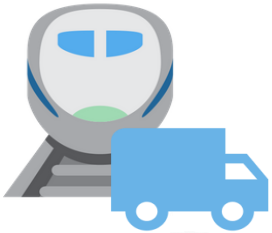
Parameter	Data
Peak displacement of natural gas use by industry	510 MW
Peak displacement of natural gas in the distribution network	380 MW
Number of customers receiving a (15-20%) hydrogen blend	2 Million
Total carbon dioxide (CO_2) abated per annum	1.1 Million tonnes
Total cost of Project infrastructure	£0.92 Billion

A North West hydrogen cluster

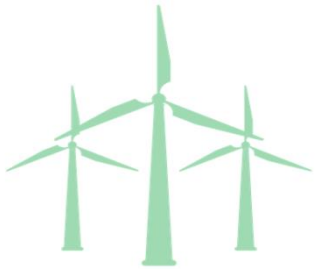
A major opportunity for new industrial growth

Blend for customers with minimal disruption

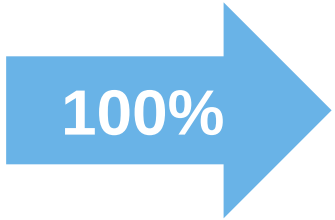
Up to 100% to industry for major emissions reductions



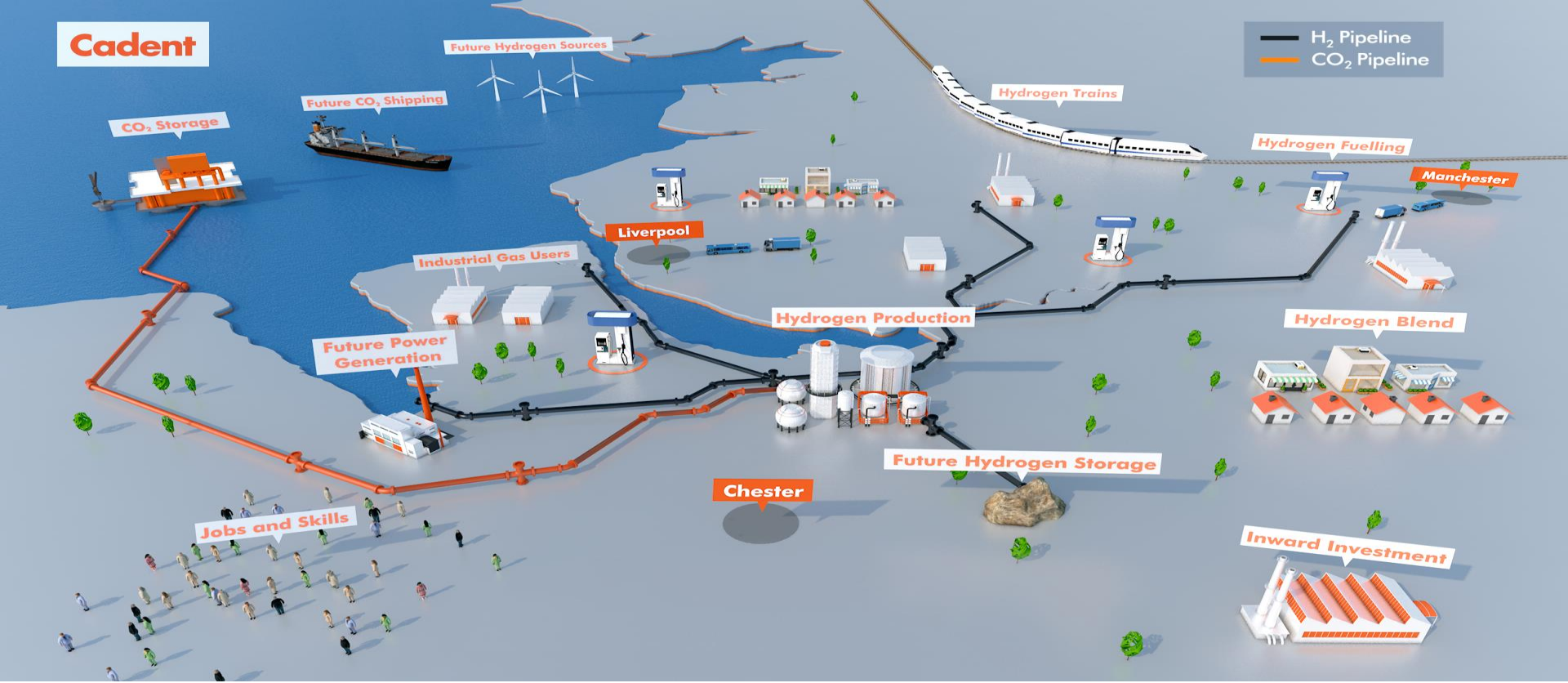
Low carbon transport when infrastructure in place



Use in power generation to produce low carbon energy



Move towards 100% hydrogen in distribution network



Hydrogen production at central plant between Runcorn and Ellesmere Port.
New hydrogen pipeline to supply industrial gas users & enable network injection for blend
Hydrogen ‘blended’ into distribution network to supply households.
Use of existing pipeline and offshore rig infrastructure for CO2 storage, creating extendable CCS infrastructure.

HyNet North West

Liverpool Bay (ENI): A low cost and practical option for UK's first CCS deployment

- Liverpool Bay can be operating by 2025
- Estimated storage capacity of 130 million tonnes.*
- Extension to Humberside, operating by c.2030
- Uses existing infrastructure due for decommissioning within this time frame.

Economy

Security and growth

- Protects energy intensive industry and jobs.
- Attracts inward investment.
- Stimulates investment in other renewable energy.
- Cost effective use of existing infrastructure.
- Exportable skills base for hydrogen and CCUS technologies.
- GVA of £17Bn to 2050 and creates 5,000 jobs by 2025

Environment

CO_2 savings and cleaner air

- Avoids 1 million tonnes of carbon dioxide emissions.
- Provides 5-6 TWh per annum of heat in Phase 1.
- Lower carbon heat for homes with minimal disruption to consumers.
- Hydrogen infrastructure can facilitate vehicle fuelling hubs for cleaner air.

Other Industry Hydrogen Projects

H21 Leeds City Gate

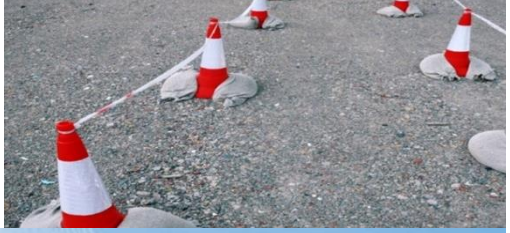
- Technical feasibility and economic feasibility of converting Leed's existing network to 100% Vol H2
- Run by NGN's internal H21 team
- 2017 NIC project supported by all GDN's

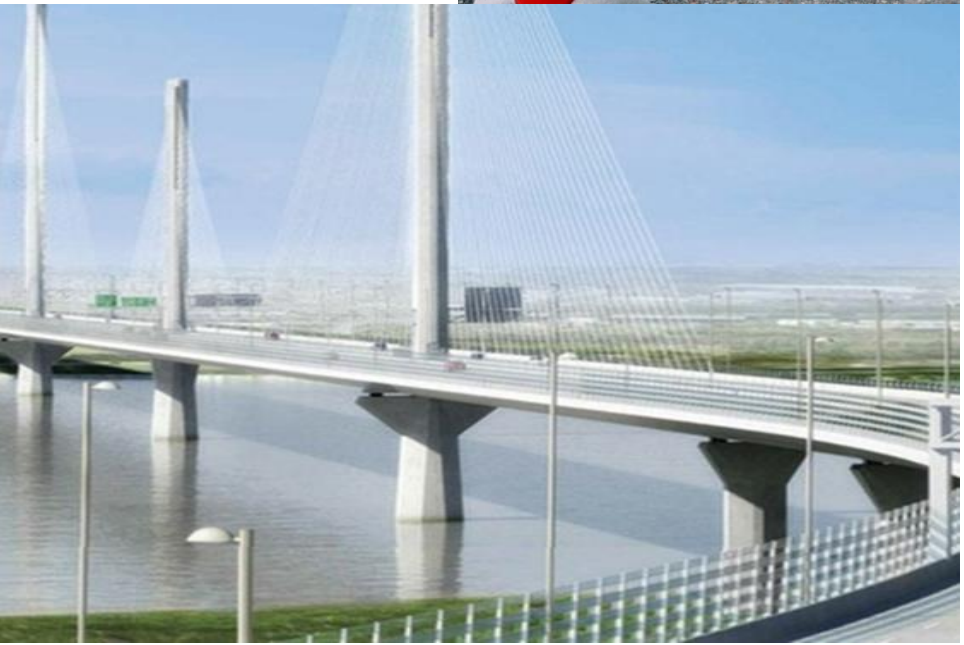
Hy4Heat

- Looking at the technical feasibility of 100% H2 downstream of the meter
- £25m commissioned by BEIS
- Looks at the practicalities of using H2 in homes

H100

- Looks to demonstrate the safe delivery of 100% hydrogen into a new network





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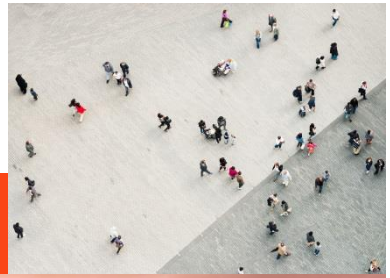

Thank you

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