



NGN Energy Futures Update

May 2022

H21 Programme of Projects

The H21 programme seeks to demonstrate the suitability of the existing natural gas infrastructure to distribute 100% hydrogen



H21 Timeline



Progress so far

- Since 2017/18 we have undertaken two projects building evidence of the safety case that Government require to make a decision on hydrogen for heat.



2016

- Northern Gas Networks, produced the H21 Leeds City Gate feasibility study.
- Based on a blueprint of the city of Leeds, this pioneering industry first concluded it was technically possible and economically viable to decarbonise the UK's gas distribution networks by converting them from natural gas to 100% hydrogen.



H21 Progress to Date - Phases

Mini distribution network that will test operational procedures on hydrogen at **DNV Spadeadam**



An unoccupied and undisturbed section of our network trialled with hydrogen at **South Bank, Teesside**.

1a

Leakage Testing



Comparing leakage rates between natural gas and hydrogen at **HSE-SD Buxton**

1b

Consequence Testing



Establishing the consequence of hydrogen leaks at **DNV Spadeadam**

Operational Procedures

2a

Unoccupied Trial

2b

H21 Phase 2a – Micro-Grid



- The project will provide the next stage of quantified safety-based evidence to confirm the gas distribution networks of GB are suitable to transport 100% hydrogen.
- The H21 Phase 2 NIC will underpin any future move towards a community trial, which is essential prior to network wide conversion.

H21 Phase 2a: Procedures Review & MTP

HSE SD procedures Review

- Purging
- Ignition Sensitivity
- venting
- Gas Characteristics
- PPE
- Human Factors
- Risk Assessment
- Models and Software



HSE SD, DNV & NGN collaborative Test Plan

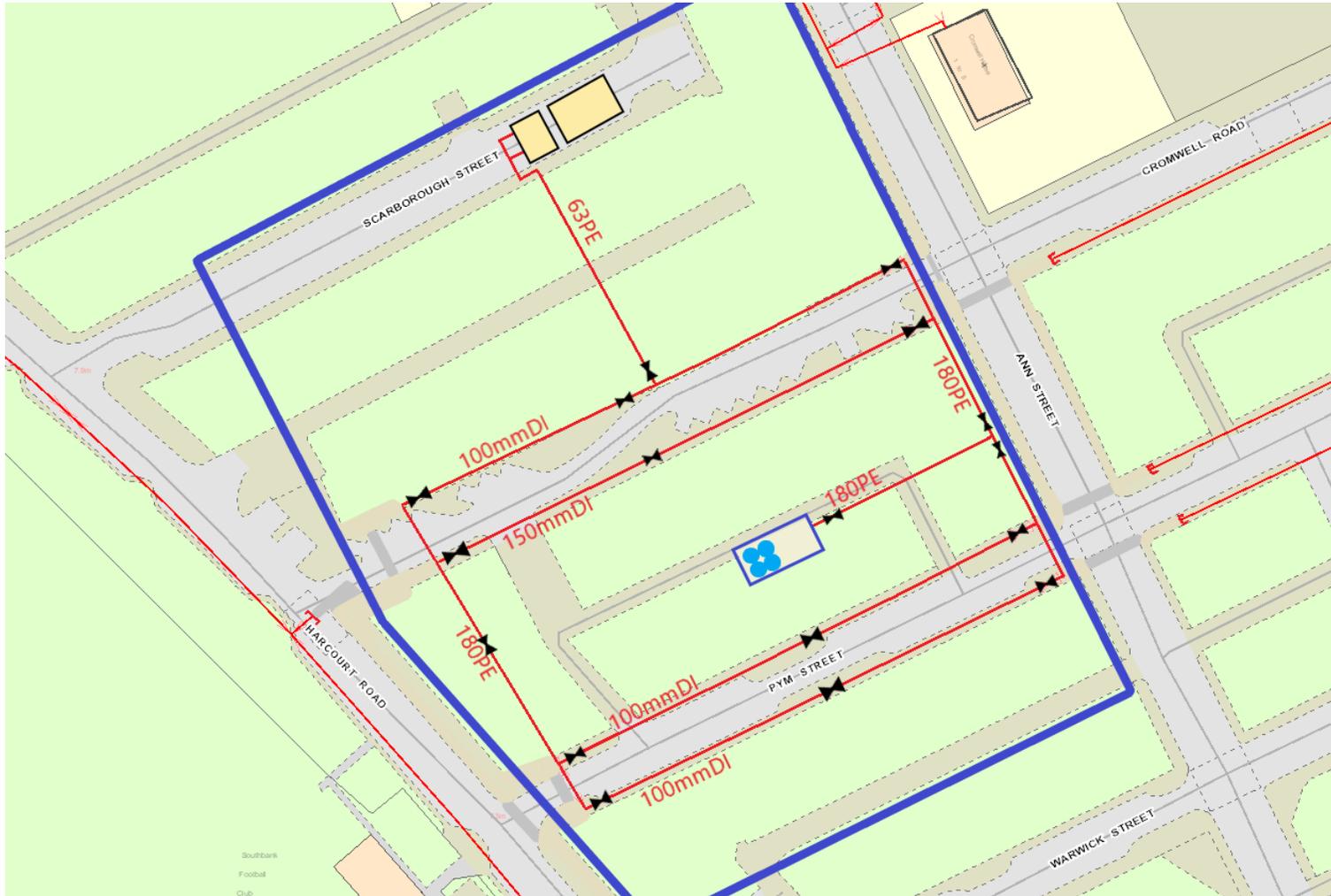
- Emergency Response
- Finding leaks
- Accessing leaks
- Repair
- Planned Live Gas Operations
- Isolation
- Purging
- Pressure regulation / maintenance
- Modelling / validation

H21 Phase 2b: Unoccupied Trial

To establish confidence in repurposing of the existing network to carry 100% hydrogen, an unoccupied network operations trial will be undertaken on an existing, undisturbed section of the gas network at South Bank, Redcar.



H21 Phase 2b: Site Layout



- 550m buried network mains
 - 150mm DI
 - 100mm DI
 - 180mm PE
 - 63mm PE
 - 32mm PE
- H2 storage, odorant & pressure reduction compound
- Site cabins
 - System control
 - Welfare
 - Boiler operation
 - PPE store

H21 Phase 2b: Downstream Installation



- 2 x meter installations
- 1 x Baxi system boiler installation
- 1 x Vaillant combination boiler installation
- Providing heating and hot water to facilities on site

H21 Phase 2b: Test Plan



Indirect Purging	Finding Leaks	Accessing Leaks	Live Gas Operations	Flow Stop	Modelling
Commissioning	Gas detection	Atmospheric sampling	Under pressure drilling	Squeeze off	Low flow
Decommissioning	Barholing	Breaking surface	Branch saddle drilling	Bag stop	Medium flow
Branch purging	Rock Drilling	Dispersion monitoring	Live service insertion	Foam bag	Pressure differential assessment
Conversion style purging	Comparative NG assessment		Live mains insertion	Service isolation	

HyDeploy @ Winlaton, Gateshead



To demonstrate 20% blend into an existing gas network can be done safely with public acceptance

- Located in the North East outside Gateshead (Winlaton)
- Isolated network for **20% injection**
- **670** trial properties
- Trial commenced **August 2021** due to be completed **next month**
- Customer research work undertaken

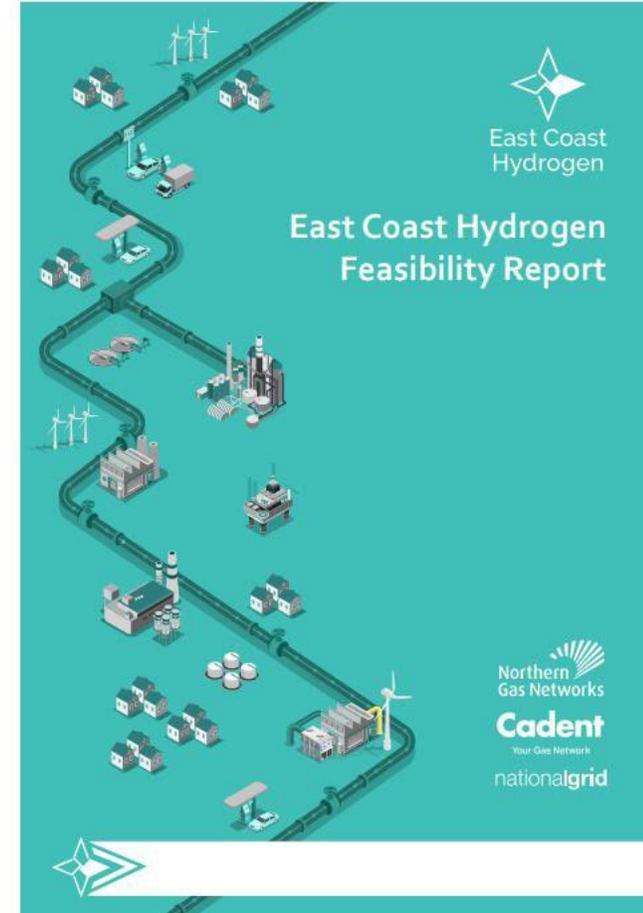
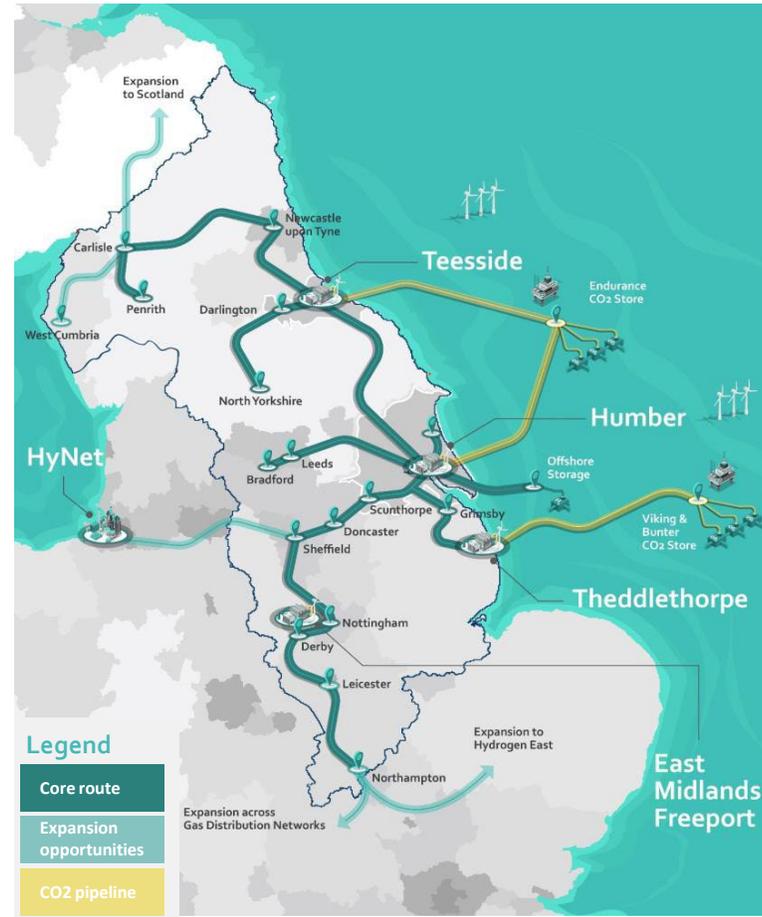
East Coast Hydrogen Recap

 **Connect hydrogen supply with hydrogen demand** across multiple end use cases

 **Transport hydrogen** through repurposed and new build pipelines

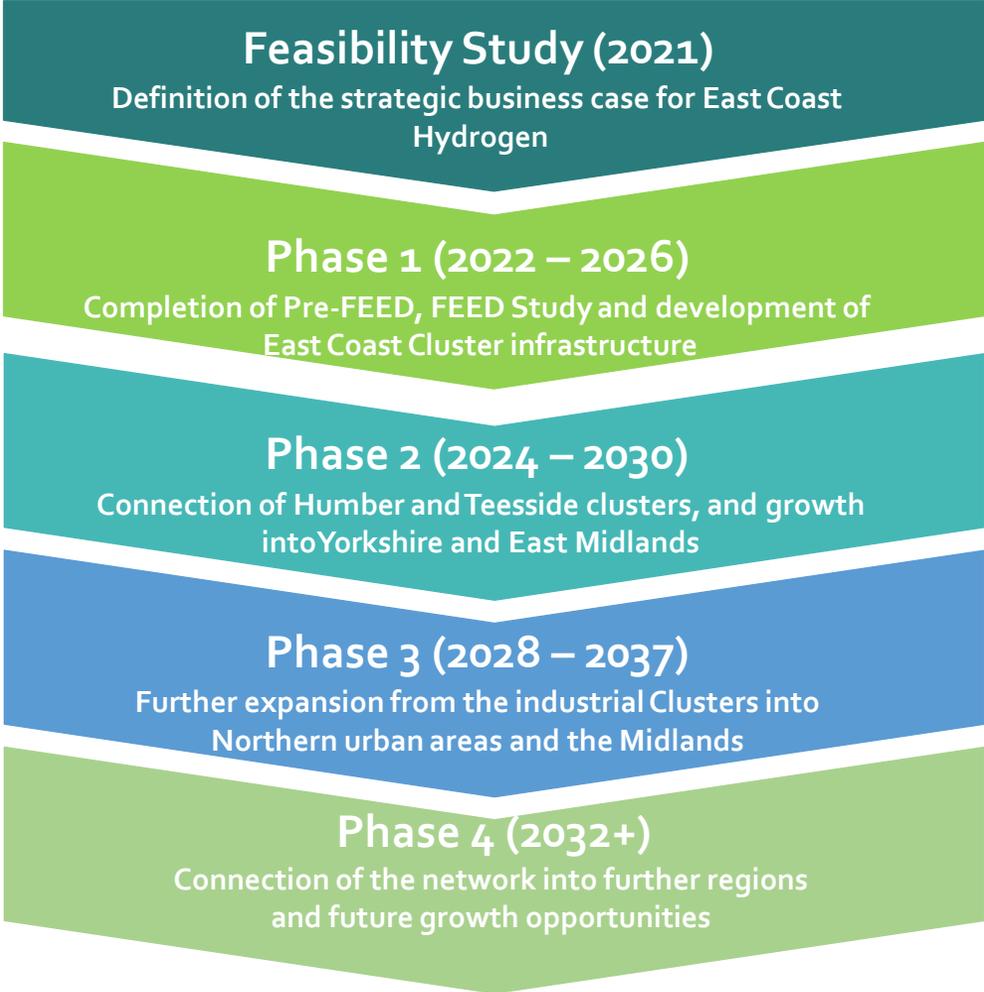
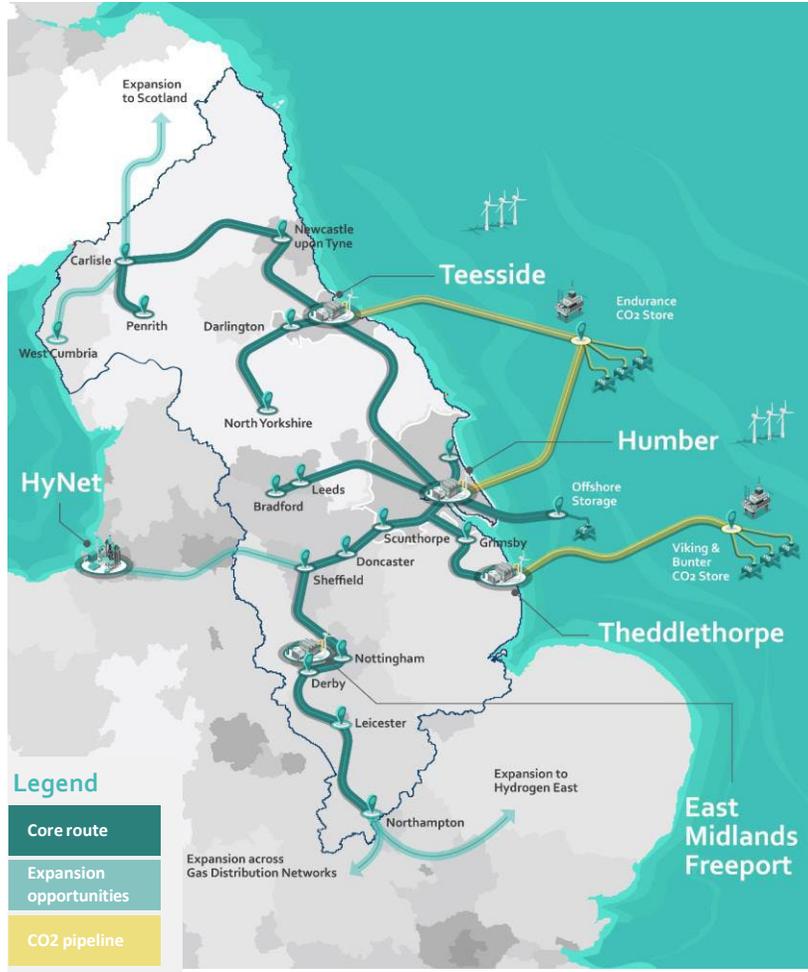
 **Build resilience** with interconnectivity and storage facilities

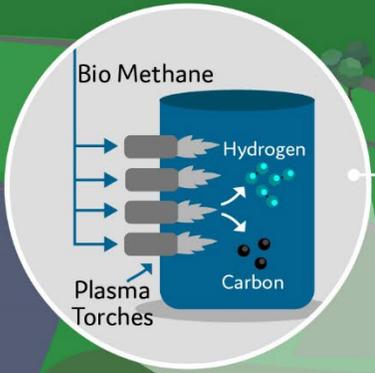
 **Support efficient market growth** by balancing supply and demand



East Coast Hydrogen – Project Phases

East Coast Hydrogen is a long term project that will be carried out in multiple, discrete phases to decarbonise industrial processes and domestic heating in the East Coast region.





Turquoise hydrogen is produced by splitting methane into hydrogen and solid carbon via a process called methane pyrolysis

Bran Sands Bio Methane Plant

Turquoise hydrogen production facility



Semcorp underground salt cavern storage

Wilton International is one of the UK's leading process manufacturing clusters and is ideally suited for energy intensive industrial business

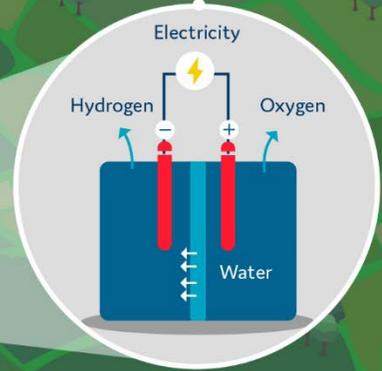
Wilton International

Electrolytic hydrogen production facility



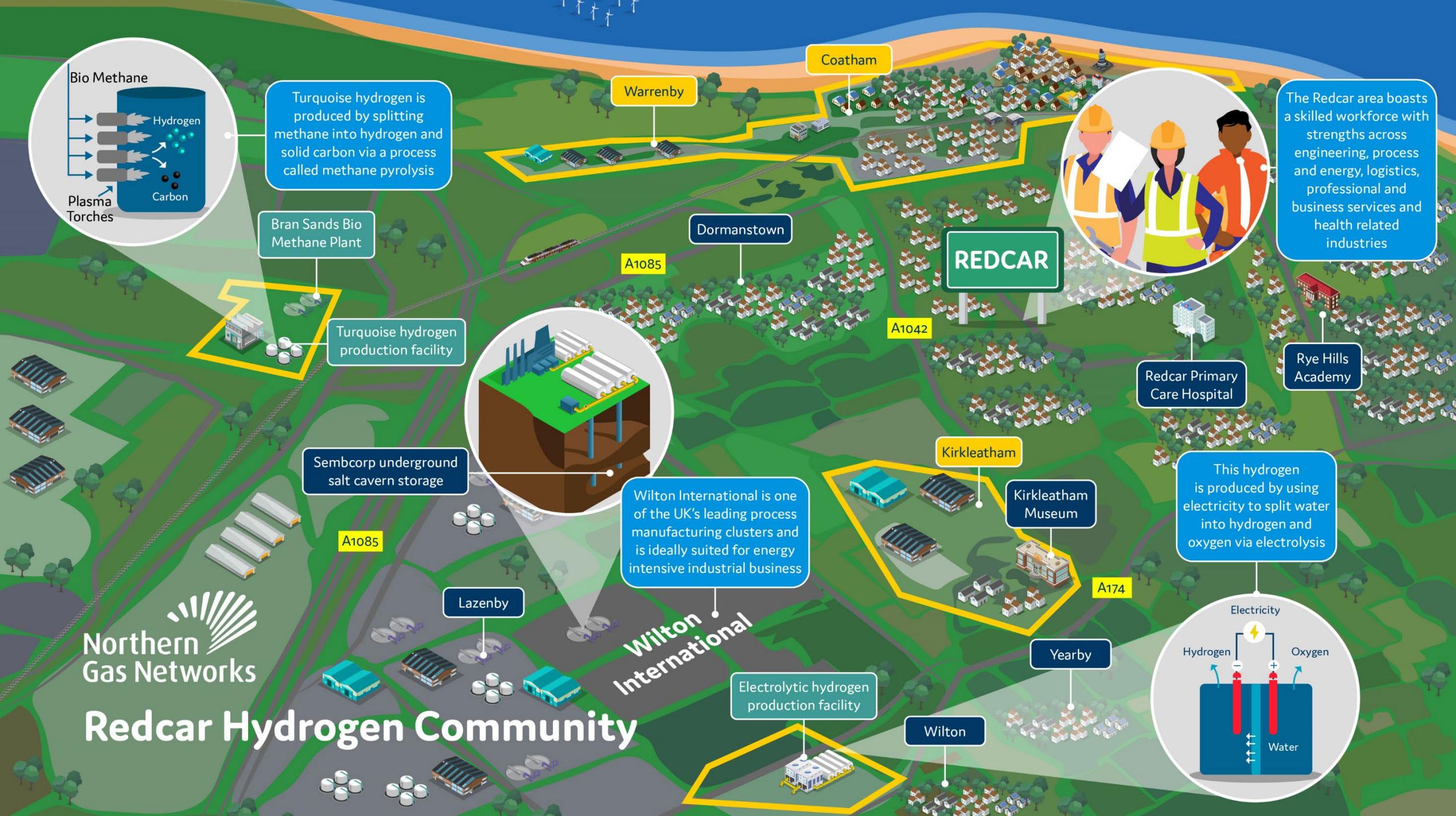
The Redcar area boasts a skilled workforce with strengths across engineering, process and energy, logistics, professional and business services and health related industries

This hydrogen is produced by using electricity to split water into hydrogen and oxygen via electrolysis

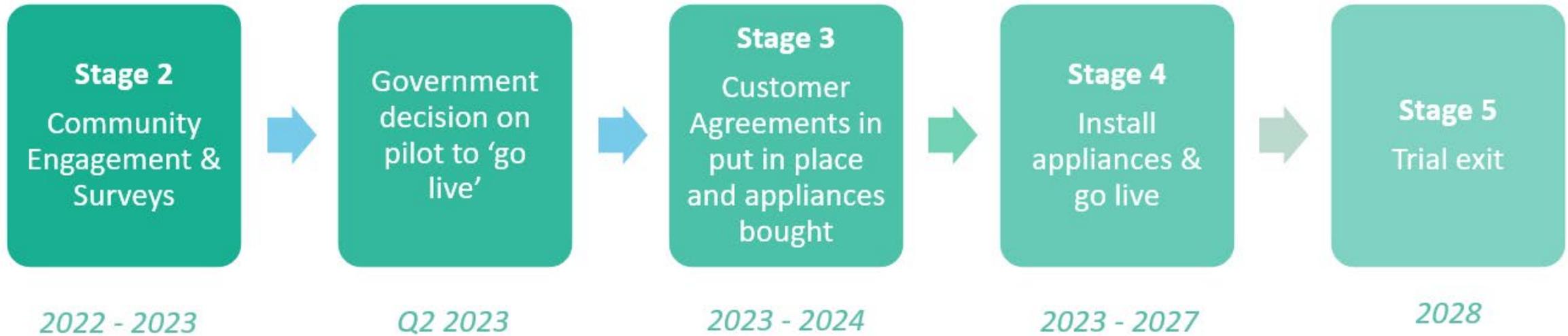


Northern Gas Networks

Redcar Hydrogen Community



Project Lifecycle – Customer Perspective



Extensive public engagement in partnership with the Council

