East Coast Hydrogen

An Introduction to East Coast Hydrogen, a Hydrogen Pipeline Programme

"Bringing Hydrogen to You"

15th September 2021

Northern Gas Networks

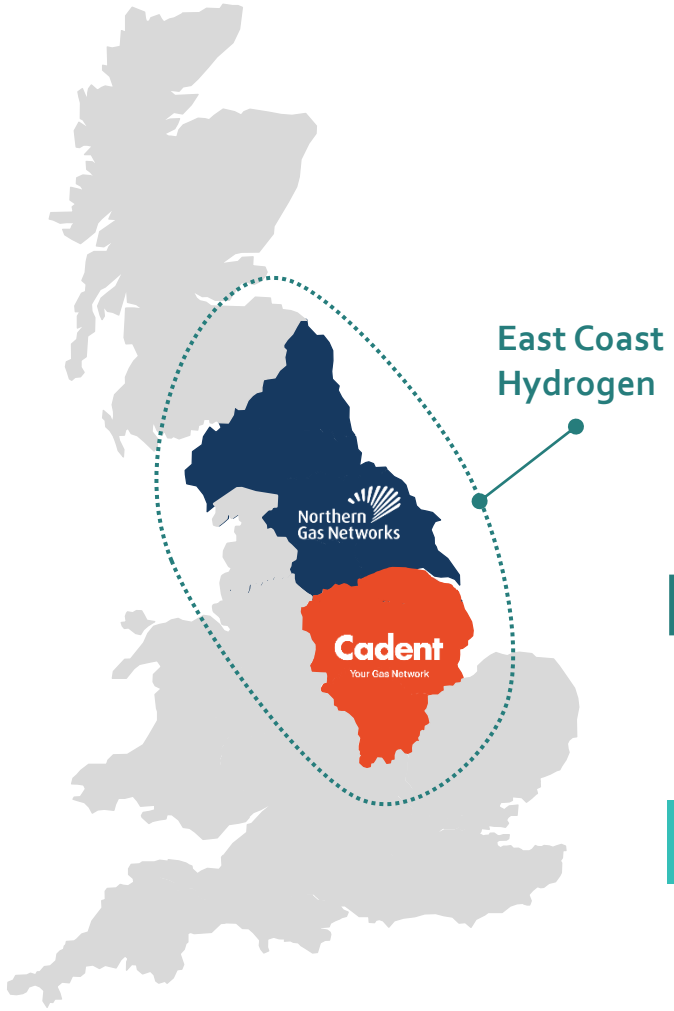
Cadent
Your Gas Network

nationalgrid

East Coast Hydrogen solves three major challenges

East Coast Hydrogen

East Coast Hydrogen is a major infrastructure proposal and we are at the start of an exciting journey. East Coast Hydrogen is currently delivering a Feasibility Report for publishing in November 2021. We then plan to commence the first of our four phases.



1 **Industrial Decarbonisation**

2 **Residential Decarbonisation**

3 **Resilience and Interconnection**

Delivered across 4 phases...

Phase 1 (2021- 2026)	Phase 2 (2024 – 2030)	Phase 3 (2028 – 2035)	Phase 4 (2030+)
Completion of the Pre-FEED, FEED study and development of 'shovel ready' projects	*Connection of Humber and Teesside clusters, and growth into South Yorkshire*	*Expansion from the industrial clusters into urban areas such as Yorkshire and Midlands*	*Connection of the network into further regions and future growth opportunities*

East Coast Hydrogen could decarbonise large proportions of the energy system

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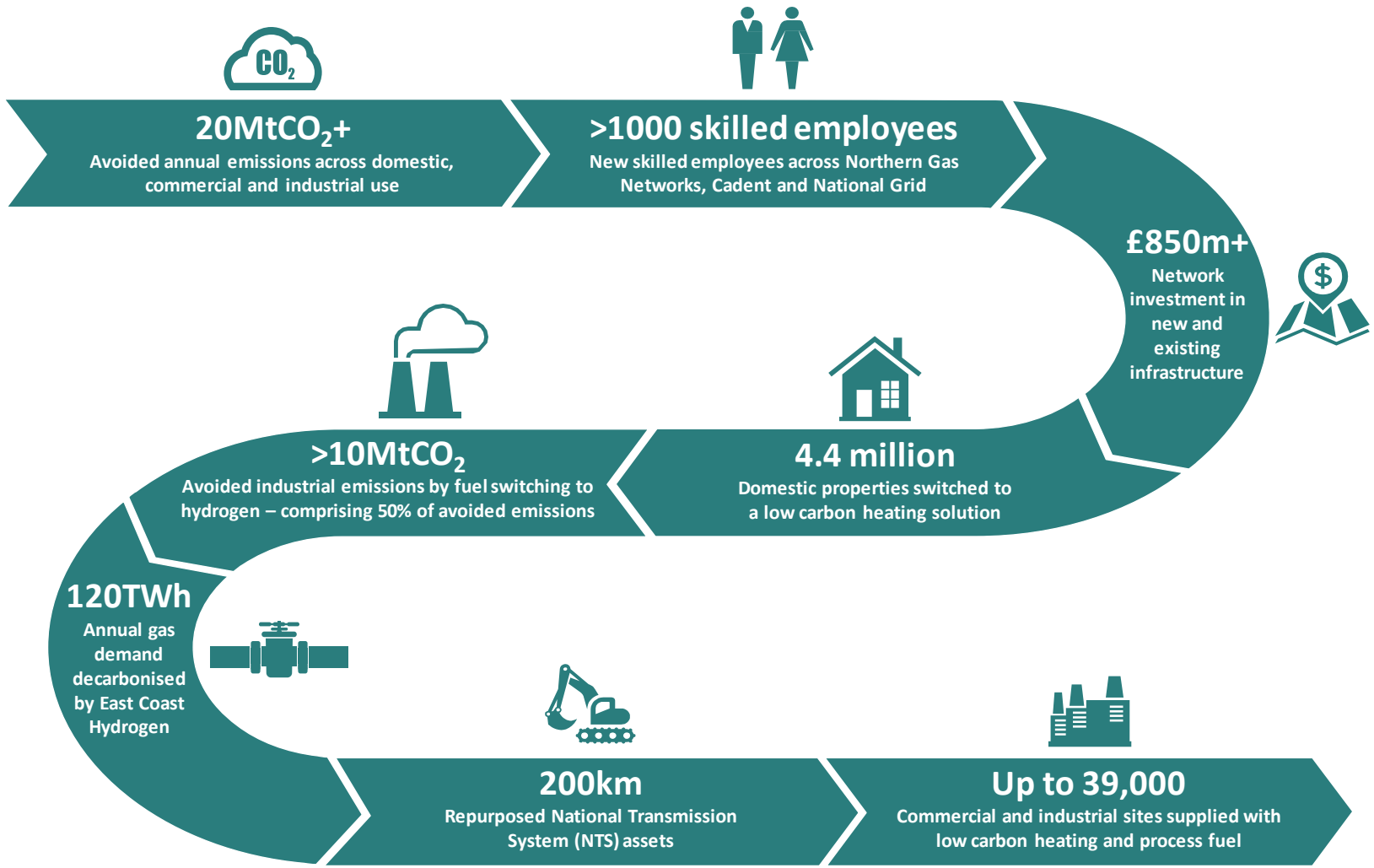
What will East Coast Hydrogen deliver?



Top East Coast Hydrogen industrial gas users

Site Name	Region	Annual gas demand (TWh)
Immingham Industrial	Humber	17.6
Saltend Power Station	Humber	14.8
ICI Billingham Industrial	Teesside	5.9
BP Saltend HP Industrial	Humber	1.6
BASF Industrial	Teesside	1.4
BOC Tees Industrial	Teesside	1.2
Goole Glass Industrial	Humber	0.5
Philips Tees Industrial	Teesside	0.1

Please note that the graphic provided is for illustration purposes only and demonstrates the combined 'East Coast Hydrogen' project. Data has been provided by the appropriate teams across Northern Gas Networks, Cadent, National Grid and builds upon assumptions within readily available documents from HM Government. The numbers displayed within the infographic have been developed at a macro level and will likely change as the project matures.

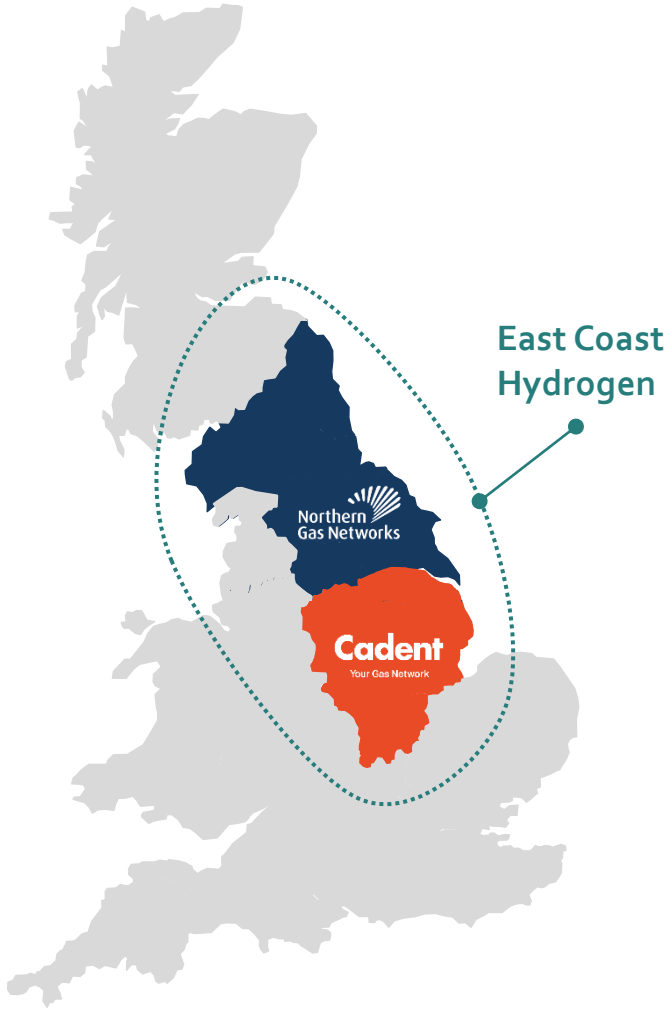
Assumptions: domestic emissions are based on an annual household gas use of 12,000kWh/year, mitigated emissions are calculated as the difference in Scope 1 emissions associated with gas consumption with emissions associated with hydrogen production, all hydrogen production is assumed to come from auto thermal reformation with a 95% CO2 capture rate, investment cost is currently calculated as the total cost of the new, feasible hydrogen transportation pipeline for the GDNs and the conversion cost of the Humber-Tees pipeline of the NTS excluding compressors, feeds etc. Skilled employees includes core employees only.

As the project develops, this data is likely to change for the production of the Feasibility Report due to; movement away from the 'worst' case of full blue hydrogen production, towards a mix including renewable forms of hydrogen; the assessment of fuel switching opportunities for individual forms of asset; and the scenarios assessed for conversion (i.e. beyond those of a new LTS).

East Coast Hydrogen is an infrastructure project

East Coast Hydrogen

East Coast Hydrogen is a proposal by Northern Gas Networks, Cadent, and National Grid to develop the UK's Hydrogen Network and simultaneously decarbonise a large proportion of the UK's homes and industry. ECH_2 includes the entire NGN region, the Cadent Eastern region and a proportion of the National Transmission System (NTS).



- **Hydrogen produced in the Humber and Teesside regions** will be connected utilising new and existing network infrastructure
- The hydrogen network will **power industrial decarbonisation, supply transport, and heat homes and businesses** within the region
- **Interconnection with production facilities, salt cavern storage, and neighbouring hydrogen schemes** will enhance the system resilience
- The hydrogen network will **grow into urban centres** such as North, West and South Yorkshire, Cumbria, the North West and Midlands
- This 15 year major UK infrastructure project will **bring together gas networks and large industrial players** to drive the hydrogen economy

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2021 - 2026
Phase 1 (Including FEED* Study)
Location
Infrastructure
*Front End Engineering Design
Tyne & Wear
Teesside cluster
Salt cavern storage
Humber Cluster
Theddlethorpe gas terminal
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Please note that the connecting lines are purely indicative of the approximate hydrogen distribution and transmission pipe locations and are not meant as a technical representation.


2024 - 2030
Phase 1 (Including FEED* Study)
Phase 2 (East Coast Clusters)
Location
Infrastructure
*Front End Engineering Design
Tyne & Wear
Teesside cluster
Salt cavern storage
West Yorkshire
Humber Cluster
South Yorkshire
Theddlethorpe gas terminal
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2028 - 2035
Phase 1 (Including FEED* Study)
Phase 2 (East Coast Clusters)
Phase 3 (Cumbria, Yorkshire & Midlands)
Location
Infrastructure
*Front End Engineering Design
Tyne & Wear
Cumbria
Dogger Bank offshore wind
Hydrogen production
Teesside cluster
Salt cavern storage
North Yorkshire
Hornsea offshore wind
West Yorkshire
Humber Cluster
South Yorkshire
Theddlethorpe gas terminal
East Midlands
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2030 +
Phase 1 (Including FEED* Study)
Phase 2 (East Coast Clusters)
Phase 3 (Cumbria, Yorkshire & Midlands)
Future Expansion Opportunities
HyNet
Location
Infrastructure
*Front End Engineering Design
Tyne & Wear
Cumbria
Dogger Bank offshore wind
Hydrogen production
Teesside cluster
Salt cavern storage
Endurance store
North Yorkshire
Hornsea offshore wind
West Yorkshire
Humber Cluster
Viking and Bunter stores
Merseyside cluster
South Yorkshire
Theddlethorpe gas terminal
East Midlands
Norfolk offshore wind
Future opportunities
Future opportunities
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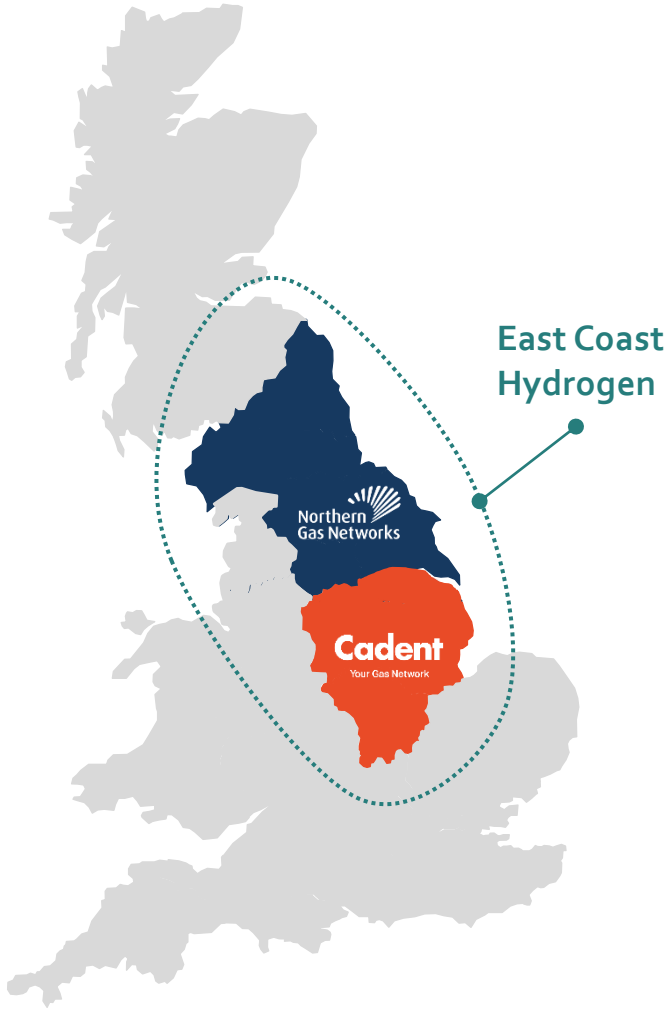
East Coast Hydrogen brings opportunity and benefits

East Coast Hydrogen

East Coast Hydrogen represents a unique opportunity to kick start the UK's Hydrogen Economy in line with the HMG's 10 Point Plan to 'build back better' and efficiently scale the hydrogen value chain through connecting new and existing assets.



- Act as a Blueprint for cross-network conversion of existing assets and the application of business models to provide investor confidence in the hydrogen opportunity
- Stimulate the transition of the gas industry to a Net Zero future and decarbonise a large proportion of the UK's homes and industry
- Build the supplier base and develop the skilled workforce required to support the UK's transition to Net Zero

East Coast Hydrogen will act as the first cross-network conversion project and provide valuable lessons learnt for subsequent hydrogen transition projects

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