HUMBERZERO

HICP

UK Research and Innovation

HEY Hull and East Yorkshire Local Enterprise Partnership

CATCH

Together

It is possible!

Introduction to Humber Industrial Cluster Plan

Jonathan Oxley

www.humberindustrialclusterplan.org

HICP

Together it is possible!

HICP project partners

BRITISH STEEL

PHILLIPS 66

drax

equinor

sse Thermal | For a better world of energy

VPI

centrica storage

nationalgrid ventures

Strategic Observers

Harbour Energy

Singleton Birch

PRAX

EP SHB

uniper

HEY Hull and East Yorkshire Local Enterprise Partnership

CATCH

UKRI UK Research and Innovation

The Humber: A 2030 Vision for Industrial Decarbonisation

HICP

px SALTEND CHEMICALS PARK

PENSANA's £100m rare earth processing facility is a world's first that produces earth oxides used in the manufacture of powerful permanent magnets.

INEOS operates a modern world-scale chemical plant producing ethyl acetate.

TRICOYA VENTURES operates the world's first Tricoya® wood elements manufacturing plant.

EQUINOR is developing the HYDROGEN TO HUMBER (H2H) SALTEND blue hydrogen production plant, which will provide around 600MW of low carbon hydrogen to decarbonise industrial users.

The **VIVERGO** Fuels plant will manufacture Bioethanol in early 2022 and help cut transport CO2 emissions by up to 750,000 tonnes per year.

TRITON POWER

ZERO CARBON HUMBER is a partnership formed to make the Humber the world's first net zero carbon industrial cluster through the production of low carbon hydrogen and CCS.

World-leading researchers from across the **UNIVERSITY OF HULL** are tackling global challenges/climate change and pioneering low-carbon innovation and offshore wind energy, including at its specialist Energy and Environment Institute (EEI) and Aura consortium.

DRAX

DRAX is set to run the world's first carbon negative power station with the largest decarbonisation project in Europe, reducing its emissions by more than 100%.

The River Humber is the **LARGEST** deep water estuary on the UK East Coast

RIVER HUMBER

PORT OF HULL

ABP's Port of Hull is home to Europe's **LARGEST** offshore manufacturing, logistics and port facilities on a site equivalent to 78 football pitches thanks to the £310m joint investment by **ABP** and **SIEMENS GAMESA**

The Humber has seen **£40bn** investment over the last eight years (2013 - 2021)

NORTH SEA

SSE THERMAL and **EQUINOR** are developing plans for one of the world's largest hydrogen storage facilities at the existing Aldbrough site. Aldbrough Hydrogen Storage could be storing low-carbon hydrogen by 2030.

The **EAST COAST CLUSTER**, a collaboration between ZERO CARBON HUMBER, NET ZERO TEESSIDE and NORTHERN ENDURANCE PARTNERSHIP, stands ready to remove 50% of the UK's industrial cluster CO2 emissions.

BP, ENI, EQUINOR, NATIONAL GRID, SHELL and **TOTAL** formed the **NORTHERN ENDURANCE PARTNERSHIP (NEP)** to develop offshore carbon dioxide (CO2) transport and storage infrastructure in the UK North Sea, with BP as operator.

SSE RENEWABLES, EQUINOR & ENI **DOGGER BANK**

The Humber Freeport is one of eight areas in the UK – a 45km area expanding across both banks of the Humber, bringing **c 7,000** jobs, and making the region a **GLOBAL GATEWAY**

The Humber is home to 6 offshore wind farms including the world's **LARGEST**, Hornsea One, with a further 2 in construction and 3 in development.

ØRSTED HORNSEA FOUR

ØRSTED HORNSEA TWO

ØRSTED HORNSEA THREE

ØRSTED HORNSEA ONE

The **HUMBER OFFSHORE WIND CLUSTER** is the UK's most established offshore wind cluster.

The £200m **YORKSHIRE ENERGY PARK** combines on-site clean energy generation, data storage, education, R&D alongside business in a high quality campus setting and is to create c.4480 gross jobs.

ØRSTED WESTERMOST ROUGH

CENTRICA STORAGE is developing a project to convert the Rough gas storage reservoir into what would be the world's first and largest low carbon offshore hydrogen storage facility.

EASINGTON

CENTRICA STORAGE

RWE HUMBER GATEWAY

BRITISH STEEL's ambition is for low-embedded carbon steel production with a phased reduction of CO2 intensity. Its Low-Carbon Roadmap will deliver net zero steel by 2050 and significantly reduce CO2 intensity by 2035.

SINGLETON BIRCH has its own Anaerobic Digestion facility which generates 70% of the site power consumption and has teamed up with **ORIGEN** to develop a new way of producing lime to remove carbon dioxide from the atmosphere.

The almost £500m **ABLE** Marine Energy Park (AMEP) is a bespoke port facility for the Renewable Energy Sector, potentially Europe's largest new port development.

KEADBY 3

BRITISH STEEL

SSE THERMAL and **EQUINOR** are developing a new CCS-equipped power station, Keadby 3 Carbon Capture Power Station, which could be operational by the mid-2020s, and the world's first major 100% hydrogen-fired power station, Keadby Hydrogen Power Station, which could be operational by 2030.

The Humber Ports are the UK's busiest trading complex, handling **77m** tonnes of cargo worth **£75bn** each year

PORT OF IMMINGHAM

PORT OF GRIMSBY

NATIONAL GRID VENTURES' HUMBER LOW CARBON PIPELINES project is set to create an onshore network of underground pipelines for the Humber to transport captured Carbon Dioxide and Hydrogen as part of the ZERO CARBON HUMBER project.

HUMBERSIDE AIRPORT

Project Oyster is the innovative 'marinised' electrolyser project for renewable hydrogen production. It is integrated with offshore wind turbines and located at the **ØRSTED** East Coast Hub.

The Humber is the **UK'S ENERGY ESTUARY**

FAST FACTS

The Humber is home to Europe's **LARGEST** bio-mass power station with potential for **16Mtpa** of BECCS - 1/4 of the UK's total target figure.

c. 50,000 new jobs created across the Humber industrial clusters as a result of deployment of CCS and hydrogen technologies.

The Humber has a Hydrogen store capacity of **10,000Gw** hours.

Deploying CCA and hydrogen technologies in the Humber would deliver a peak of **£3.2 billion** per year in direct, indirect and induced GVA.

Humber ambition to be first industrial cluster to reach net zero by 2040.

RWE TRITON KNOLL

ØRSTED RACE BANK EXTENSION

ØRSTED RACE BANK

The Humber boasts an immense offshore CO2 storage capacity: **28m** tonnes per year by 2030

The Viking Area carbon stores are high-quality depleted gas reservoirs that can be filled with captured CO2 and have over **300 MT** of storage potential

c 20,000 new jobs created across the Humber industrial clusters with the onset of Hydrogen economy

THEDDLETHORPE

ØRSTED LINCS

GLID LYNN AND INNER DOWSING

The **V NET ZERO HUMBER CLUSTER**, a collaboration between HARBOUR ENERGY, HUMBER ZERO (PHILLIPS 66 and VPI IMMINGHAM), EP UK INVESTMENTS and PRAX Lindsey Oil Refinery, will capture, safely transport and securely store up to more than 50% of the existing industrial emissions in the Humber region.

IMMINGHAM

PRAX Lindsey Oil Refinery is a world-class supplier of quality fuels. It has the capacity to process up to 113,000 barrels of oil a day.

HUMBER ZERO is an industry-led decarbonisation project to remove up to 8 million tonnes of Carbon Dioxide (MT/CO2) partners include PHILLIPS 66 & VPI IMMINGHAM.

PHILLIPS 66 Refinery is recognised as one of the best in the world and is key in the supply chain for battery technology development, with capacity equivalent to 1.3 million EVs per year today, with plans to expand.

UNIPER is developing a large-scale hydrogen production hub at its Killingholme site, with around 700MW blue hydrogen production and around 100MW green hydrogen production.

VPI IMMINGHAM is one of the largest combined heat and power plants in Europe, capable of generating 1,240mw and up to 930 tonnes of steam per hour.

CATCH is a leading cluster engagement partnership supporting the energy intensive industries on their journey to net zero.

The UK's flagship renewable green hydrogen project, **GIGASTACK**, aims to create a blueprint for the deployment of industry-scale renewable hydrogen from offshore wind.

The **EPUK** energy centre will use 600,000 tonnes of waste materials per year to produce enough low-carbon electricity to power 50,000 homes.

GREAT CENTRAL LIBRARY WAREHOUSE

The **UNIVERSITY OF LINCOLN** is at the forefront of the UK's decarbonisation agenda, partnerships are wide in providing evidence-based, sustainable, and forward-thinking solutions in all forms of decarbonisation and the hydrogen economy.

KEY

- HUMBER INDUSTRIAL CLUSTER PLAN PARTNERS
- REGIONAL DEPLOYMENT PROJECTS
- HYDROGEN
- CO2
- DOGGER BANK OFFSHORE CABLE CORRIDOR
- HORNSEA OFFSHORE CABLE CORRIDOR
- NORTHERN ENDURANCE PARTNERSHIP PIPELINE
- CO2 PIPELINE
- HYDROGEN PIPELINE

PIPELINES ARE INDICATIVE

Marketing Humber delivered by BoroBolders

UK Research and Innovation

CATCH

HEY Hull and East Yorkshire Local Enterprise Partnership

HICP

Turning the tide on the UK's Energy Estuary towards clean, green growth!

Together

It is possible!

HUMBERZERO

Project Overview – 20th July 2022

Summary

What is Humber Zero?

Humber Zero is a large-scale, industry led project to remove up to 8 million tonnes of CO_2 from the Immingham industrial area every year by around 2030.

Industrial Partner

VPI Immingham LLP

Industrial Partner

Phillips 66 Ltd

Government investment

Innovate UK

UK Research and Innovation

HUMBERZERO

Immingham Industrial Hub

VPI Immingham CHP

- 1.2 gigawatts capacity - up to 5 per cent of UK peak time energy supply
- Electricity to homes and businesses via National Grid
- Steam to neighbouring refineries – 930 tonnes per hour
- Uses off-gas from Humber Refinery to generate electricity

Phillips 66 Ltd

- 36m litres processed per day – 20 per cent UK domestic fuel supply
- UK's first production of sustainable aviation fuel
- Europe's only producer of battery coke
- Emerging energy and refinery of the future

HUMBERZERO

In numbers

Benefits of Humber Zero

Initial capture of

3.8 Mtpa

by 2027

Skills, technology

FOAK

and export potential

Potential capture of

8 Mtpa

by 2030

Creates around

200

permanent jobs

Creates around

2,500

construction jobs

Sustains around

20,000

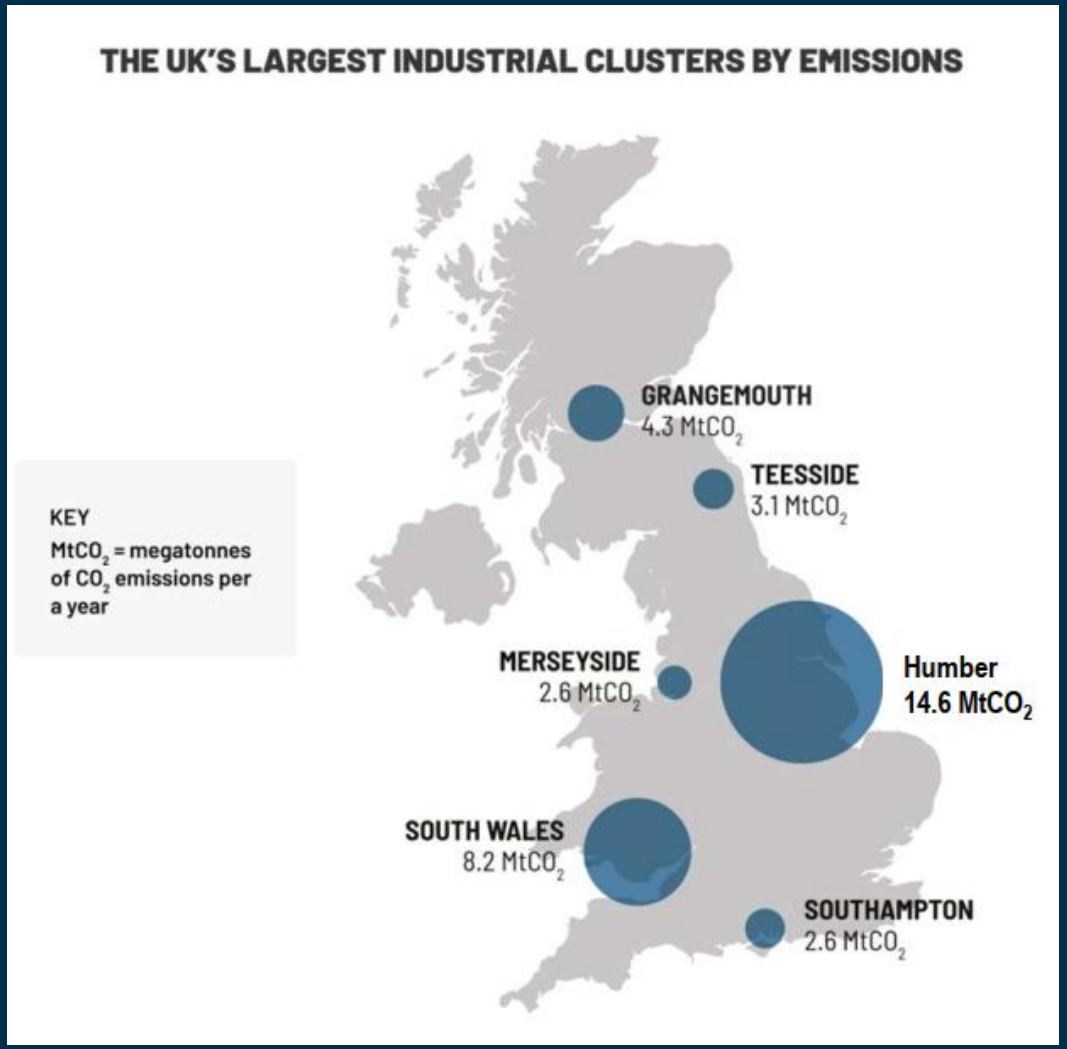
jobs in industry

HUMBERZERO

Location and objectives

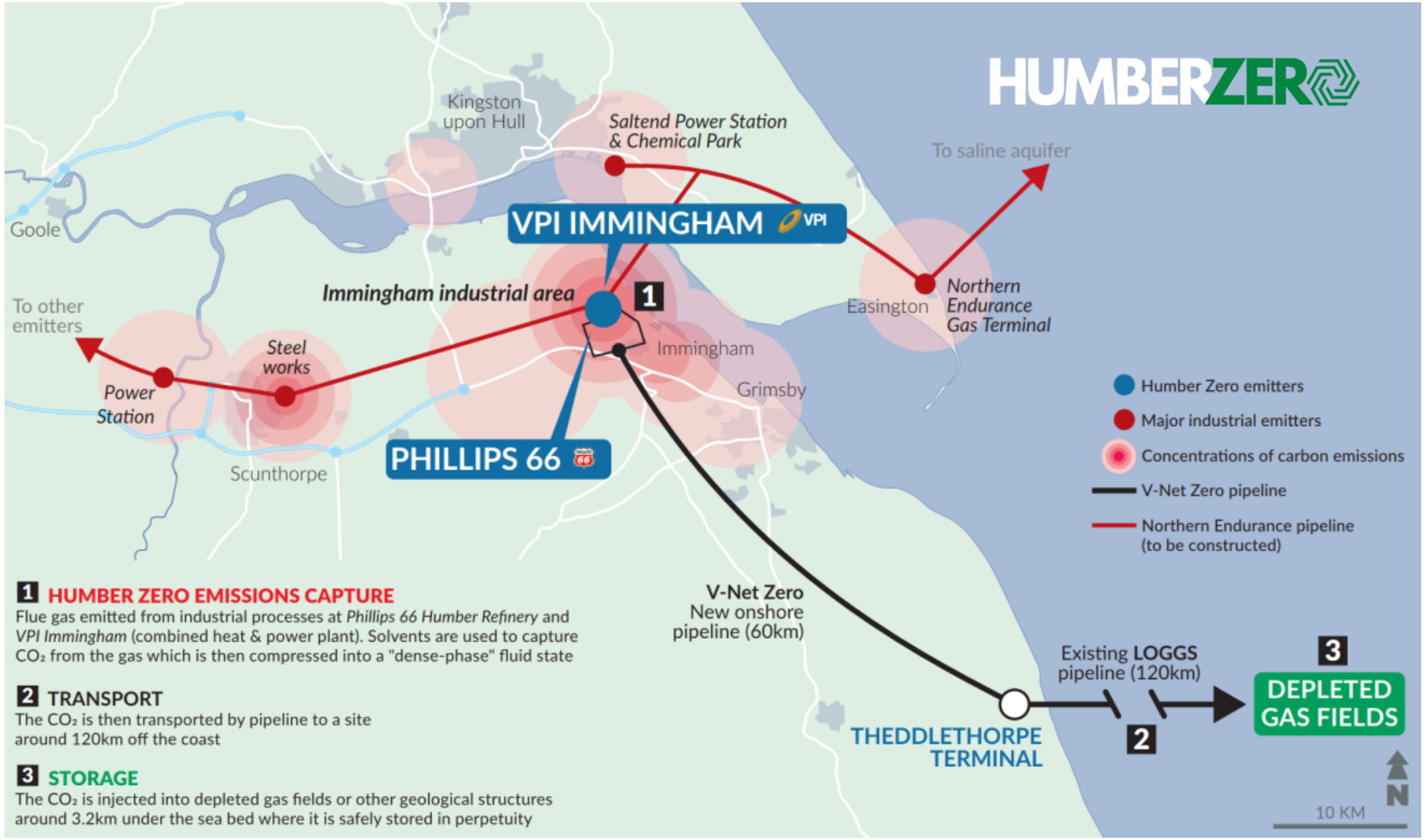
Why the Humber?

- Highest industrial CO_2 emissions in the UK.
- Around 60,000 people employed in manufacturing.
- 10 per cent of all jobs in Humber region are in energy intensive industry.
- Energy intensive industries are 20 per cent of region's economy.
- UK Government promoting Levelling-Up agenda
- Skills and expertise transferable to green transition and technology.
- Competitiveness of region and UK.



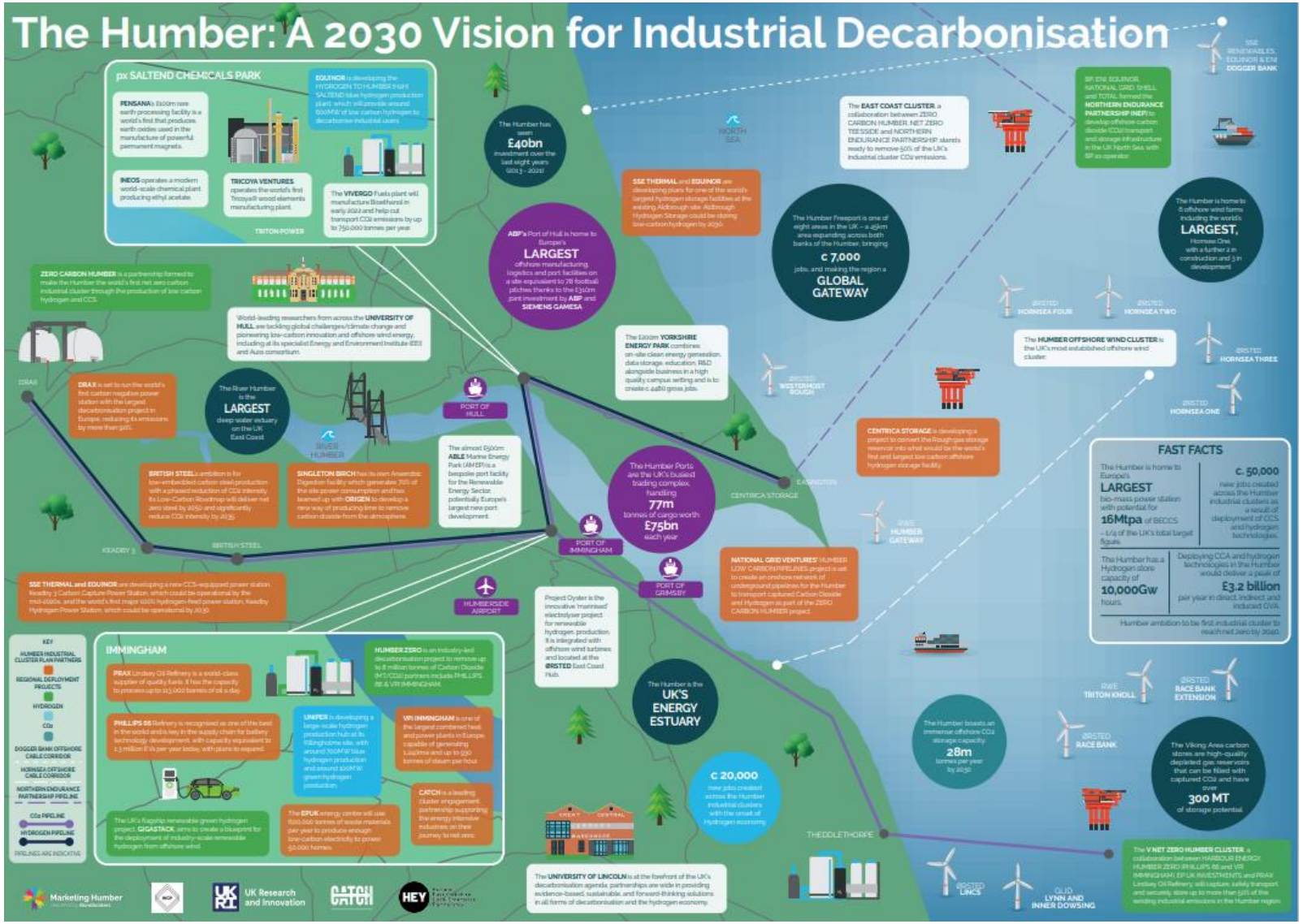
HUMBERZERO

Carbon Capture and Storage in the Humber



HUMBERZERO

The Humber Industrial Region



HUMBERZERO

Carbon Capture Technology

Shell Cansolv

HUMBERZERO

THE CARBON CAPTURE PROCESS

1 Flue gases from the **Emission Source** are pre-treated and fed into the bottom of the **Absorber Tower**

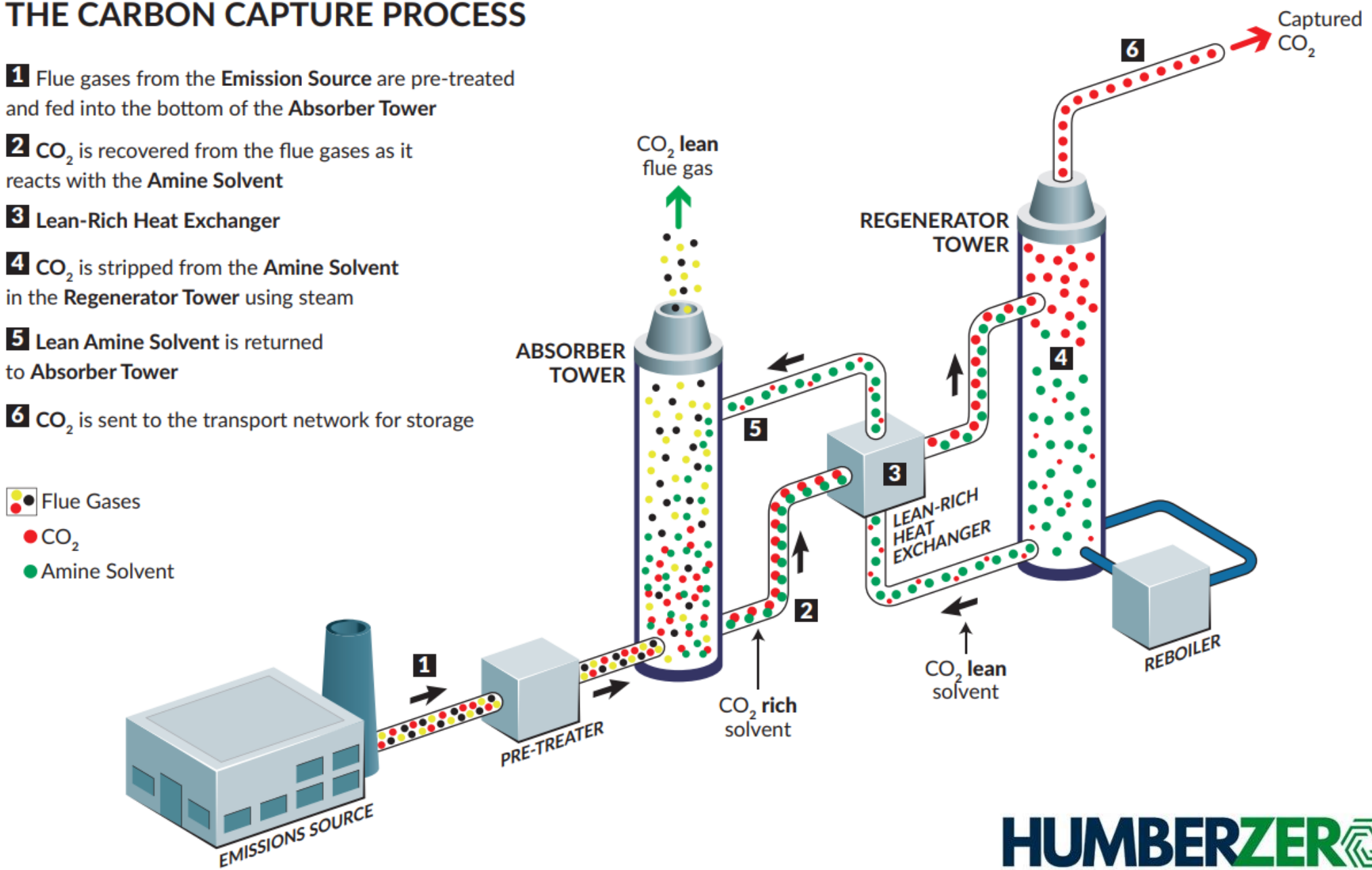
2 CO_2 is recovered from the flue gases as it reacts with the **Amine Solvent**

3 **Lean-Rich Heat Exchanger**

4 CO_2 is stripped from the **Amine Solvent** in the **Regenerator Tower** using steam

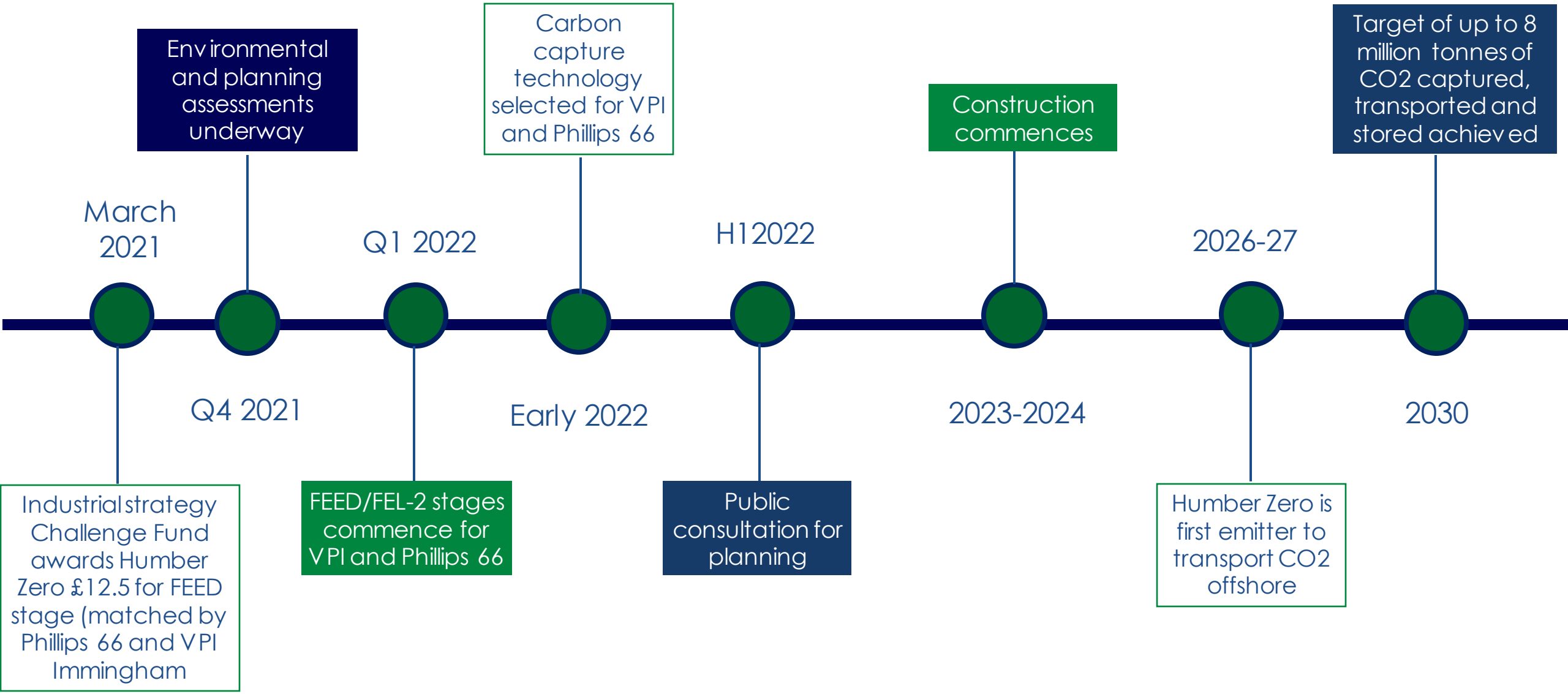
5 **Lean Amine Solvent** is returned to **Absorber Tower**

6 CO_2 is sent to the transport network for storage



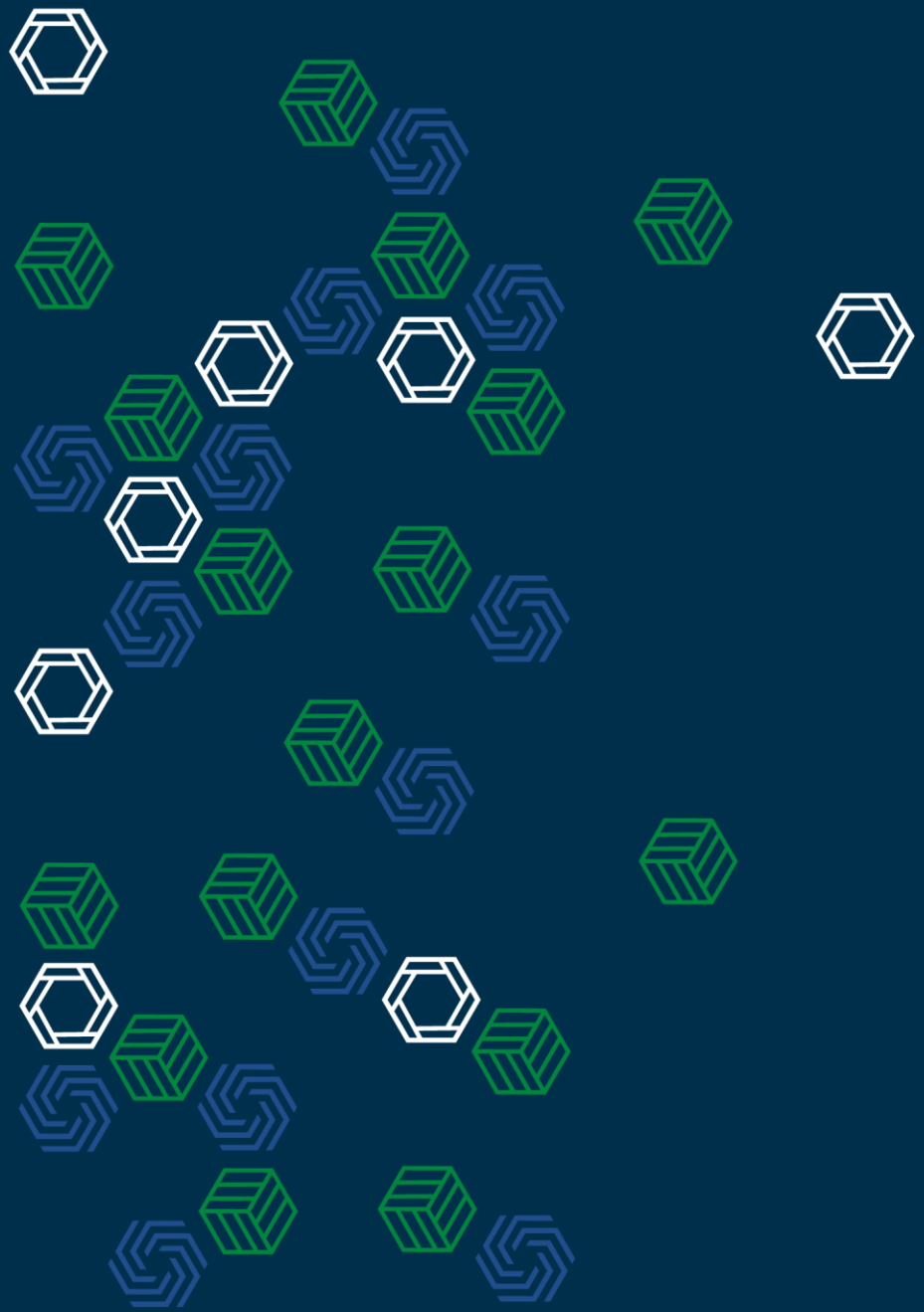
HUMBERZERO

Proposed project Timeline



The timeline is provisional and is dependent on Phillips 66 Limited & VPI LLP receiving all consents required and successfully negotiating a carbon capture business model with the government and respective companies taking final investment decision.

HUMBERZERO



Culture

HSE, EDI and Knowledge Sharing

- Health, Safety and Environmental Performance
- COMAH considerations
- Large-scale construction project
- Regulatory Oversight

- Equality, Diversity and Inclusion

- Knowledge Sharing
- Levelling Up
- Benefits and learnings to the UK supply chain

HUMBERZERO

Skills for the Energy Transition

Business

Culture

Competitiveness

Safety

Green Skills

STEM

Construction

Business, Industry and Infrastructure

Energy Transition

Innovation

Collaboration

Problem Solving

Humber Zero

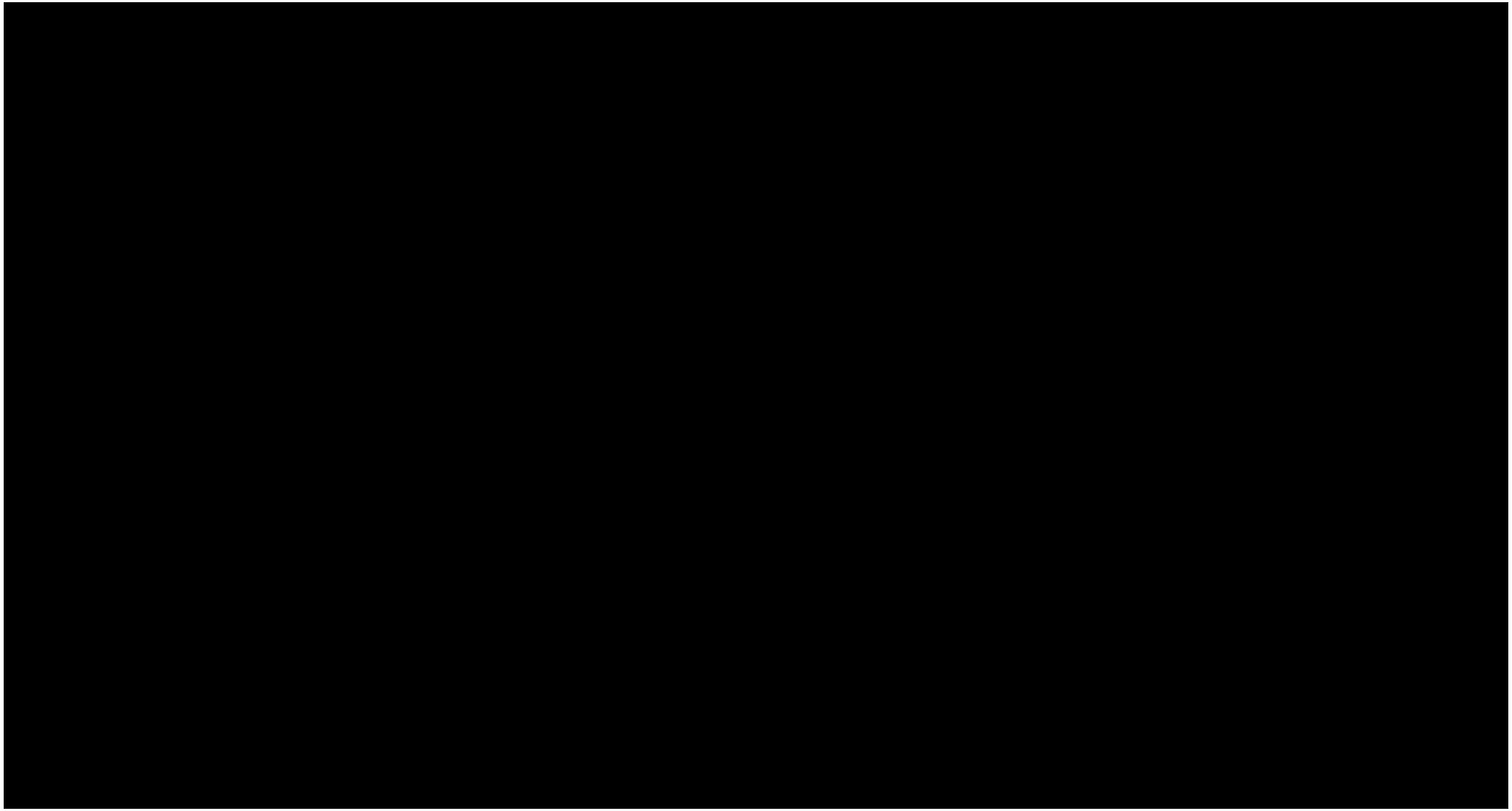
Local Outreach

Engaging with business, academia, associations and government

Public communication

HUMBERZERO

Developing New Skills in Lincolnshire



HUMBERZERO

Thank You and Questions

HUMBERZERO