

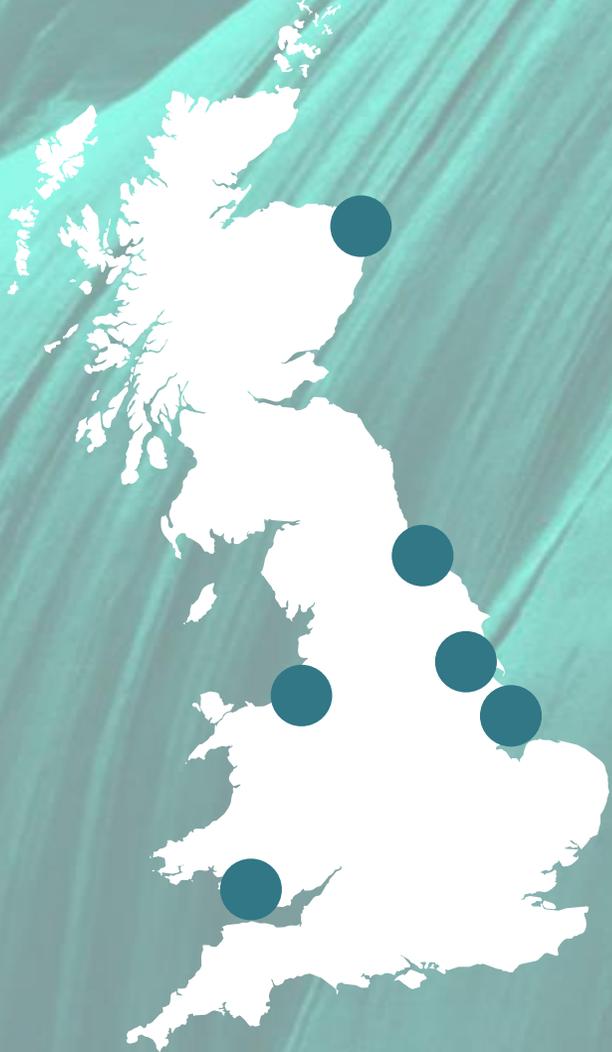
# CCUS APPG Meeting

## UK CCUS Clusters Session



Alex Cunningham MP  
CCUS APPG Chair

- Andy Lane* East Coast Cluster
- David Parkin* HyNet North West Cluster
- Pierre Girard* DelpHYnus
- Chris Williams* South Wales Industrial Cluster
- Phil Kirk* v Net Zero Humber Cluster
- Nick Cooper* Scottish Cluster



**CCUS**  
All Party Parliamentary Group

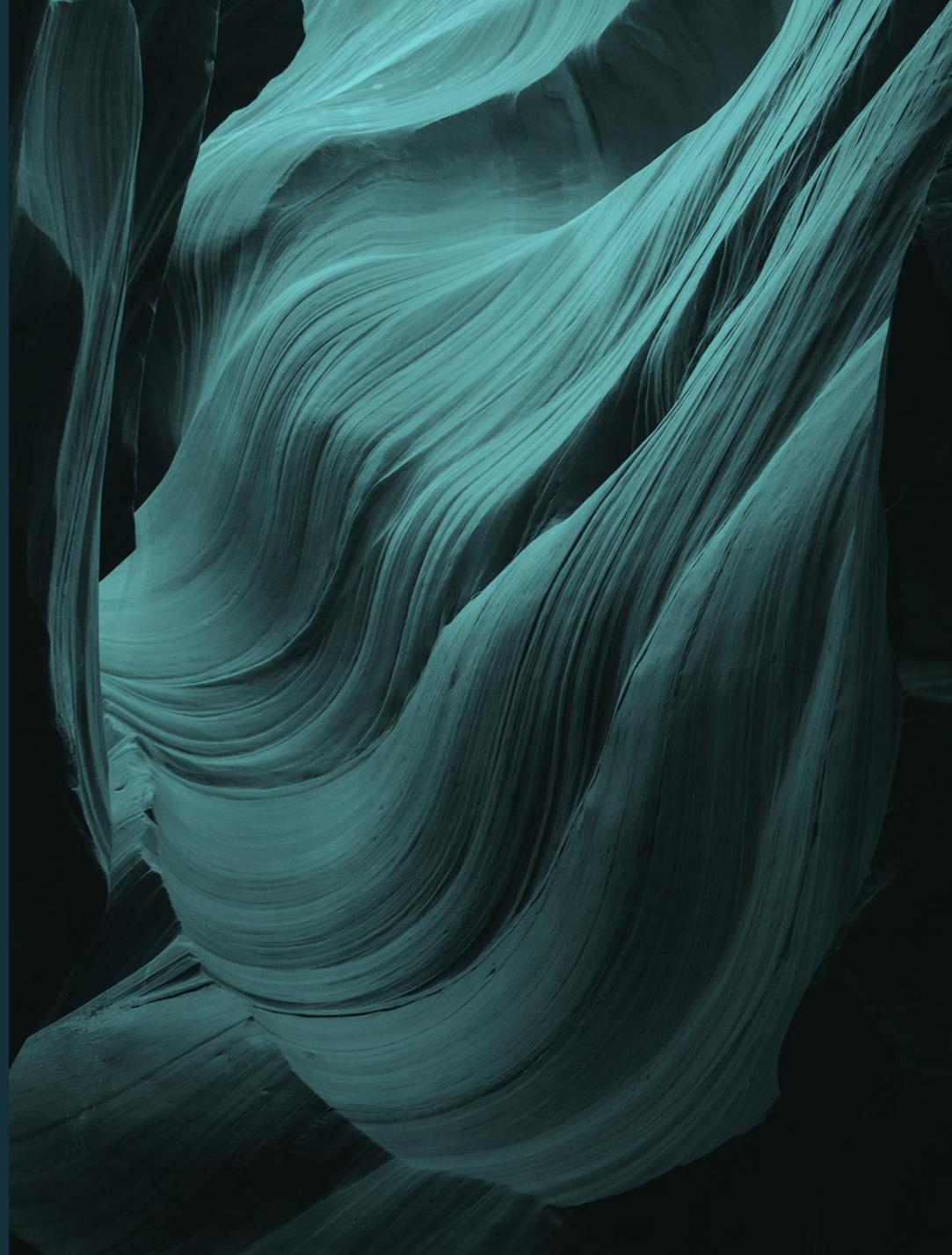


**Monday 22<sup>nd</sup> November 2021**  
**16:00-17:45**

# V Net Zero Humber Cluster

Phil Kirk

## Q&A



# EAST CO<sub>2</sub>AST CLUSTER

Andy Lane  
Managing Director  
Northern Endurance Partnership



# EAST CO<sub>2</sub> AST CLUSTER



Northern Endurance Partnership

NORTH SEA

MIDDLESBROUGH ●  
DARLINGTON ●

**PROJECTS IN TEESSIDE INCLUDING**

Net Zero Teesside

BOC bp VCF

kellas MIDSTREAM NZT Power suez

TV ERF 8 RIVERS

**UP TO 10 MTPA CO<sub>2</sub> CAPTURED**

● YORK  
● LEEDS

HULL ●  
SCUNTHORPE ●

● SHEFFIELD

**PROJECTS IN THE HUMBER INCLUDING**

**ZEROCARBON HUMBER**

drax equinor MITSUBISHI POWER

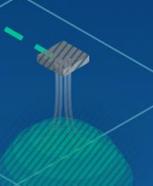
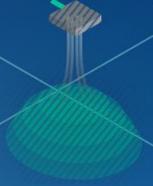
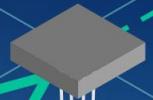
sse Thermal TRITON POWER uni per VELOCYS

**17+ MTPA CO<sub>2</sub> CAPTURED**



145km

103km



# East Coast Cluster offers unmatched scale and diversity, removing almost half of the UK's industry cluster emissions



## EAST CO<sub>2</sub>AST CLUSTER

Unites the Humber & Teesside to remove almost  
**50% of industry cluster CO<sub>2</sub> emissions** and  
deliver **25,000 jobs per year** to 2050



Enables the East Coast Cluster by providing the  
common infrastructure needed to transport CO<sub>2</sub>  
from emitters in the Humber & Teesside to secure  
offshore storage in the North Sea



### **ZEROCARBON HUMBER**

Delivers a net zero industrial cluster in  
the Humber region



### **Net Zero Teesside**



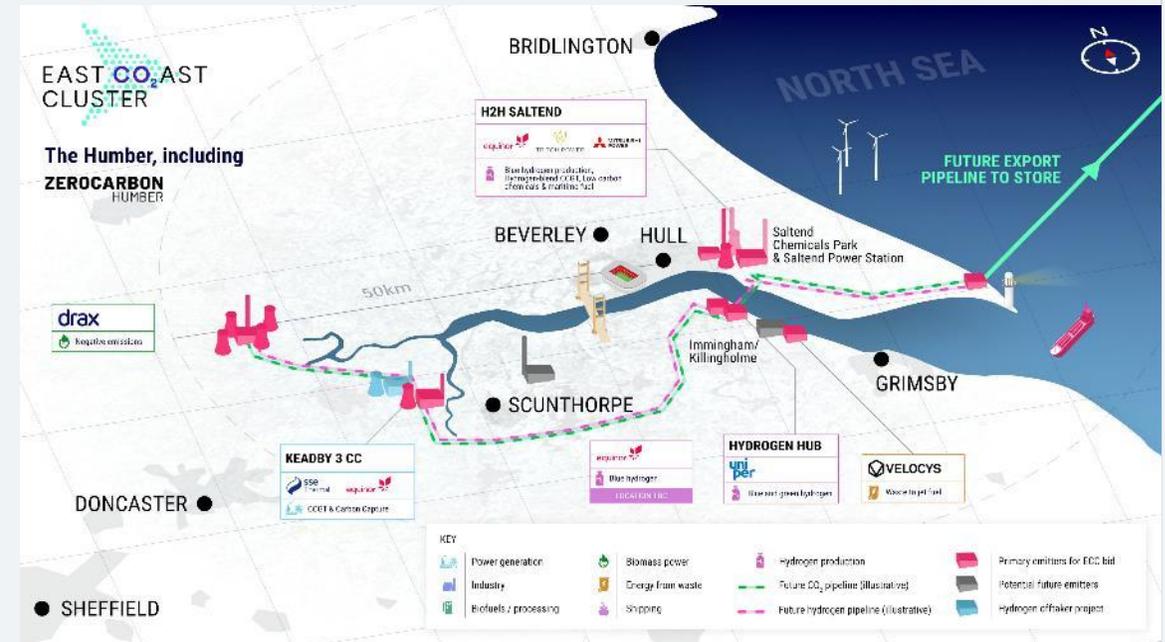
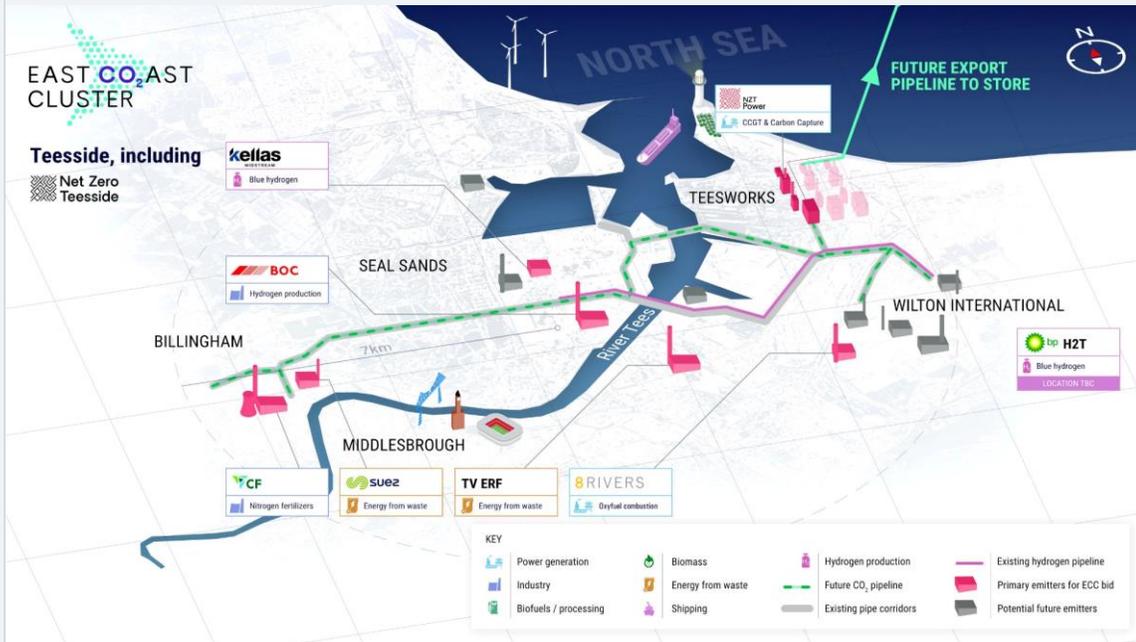
Delivers a net zero industrial cluster  
on Teesside

# Diversity is at the heart of the East Coast Cluster

Diversity of geography

Diversity of capture projects

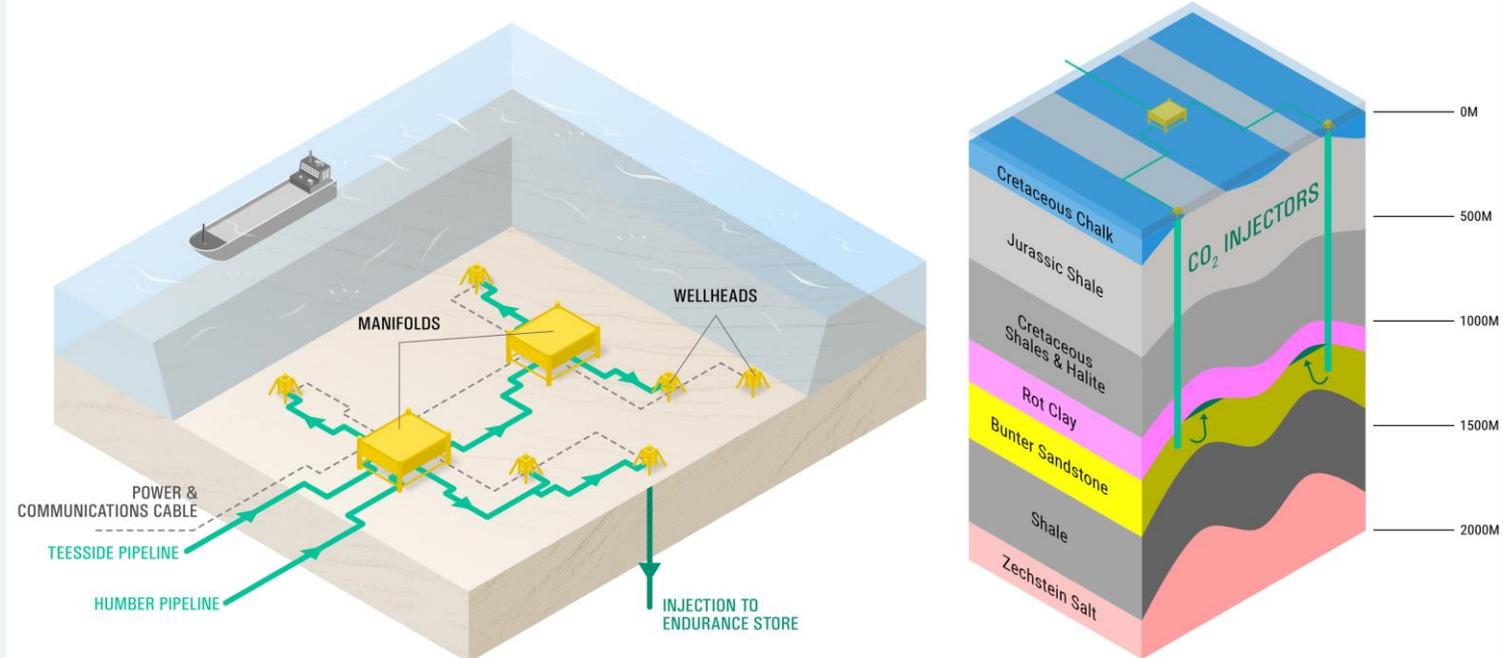
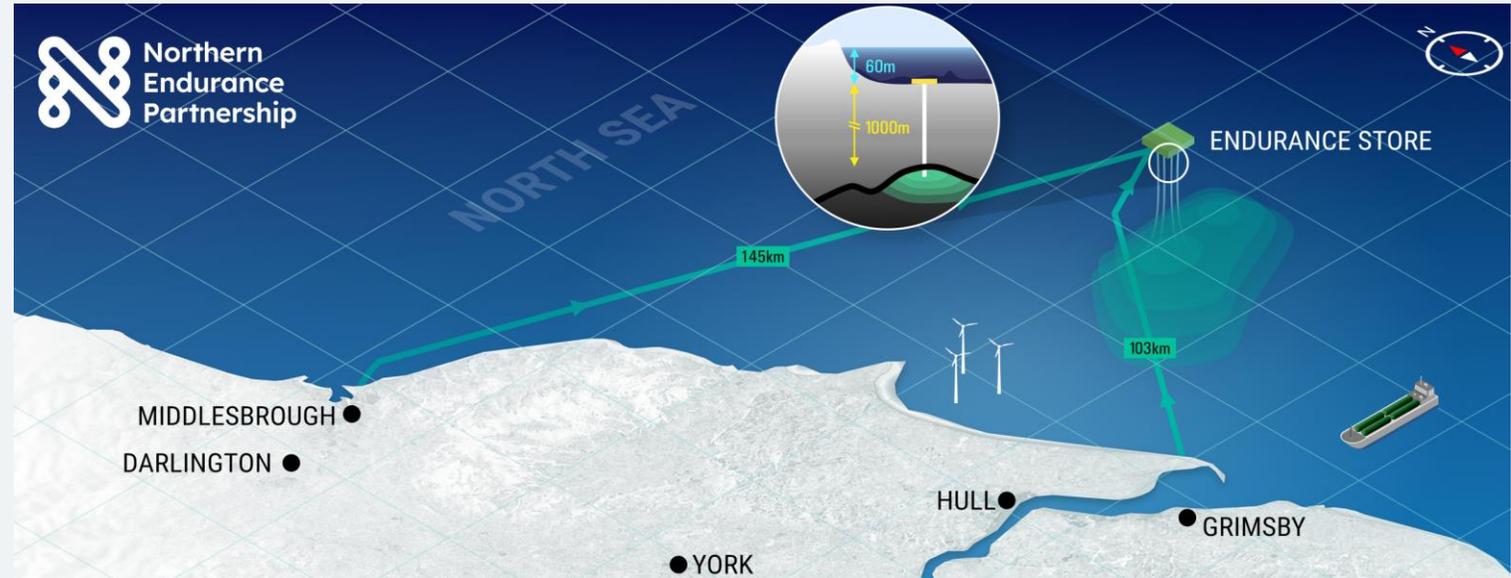
Innovative T&S technology



The East Coast Cluster brings together unrivalled expertise and experience in the delivery and operation of onshore and offshore energy infrastructure

# The Endurance Carbon Store – serving Teesside and the Humber

- First-of-a-kind offshore low carbon CCS infrastructure in the UK
- CO<sub>2</sub> injection into a saline aquifer is a worldwide proven concept
- Largest saline aquifer in southern North Sea – capacity to store 450m tonnes of CO<sub>2</sub> with potential to extend capacity to around 1 billion tonnes with nearby stores
- Includes CO<sub>2</sub> pipelines from Teesside and the Humber
- Compression and pumping systems to a common subsea manifold and well injection site at the Endurance store



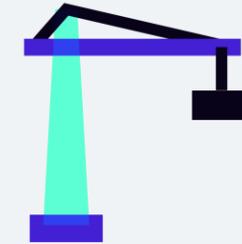
# Economic benefits: the headlines



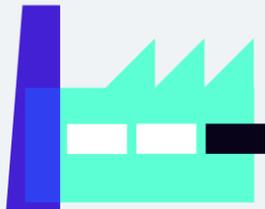
**25,000+**  
**jobs up to 2050**  
(average per annum)



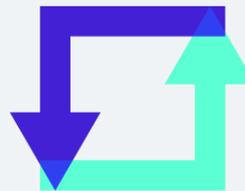
**~41,000**  
**jobs peak**  
in 2026



**Construction**  
**9,400** direct jobs/yr  
**12,300** indirect jobs/yr



**Operations**  
**2,200** direct jobs/yr  
**13,300** indirect jobs/yr



**25,000**  
**potential additional**  
induced jobs/yr

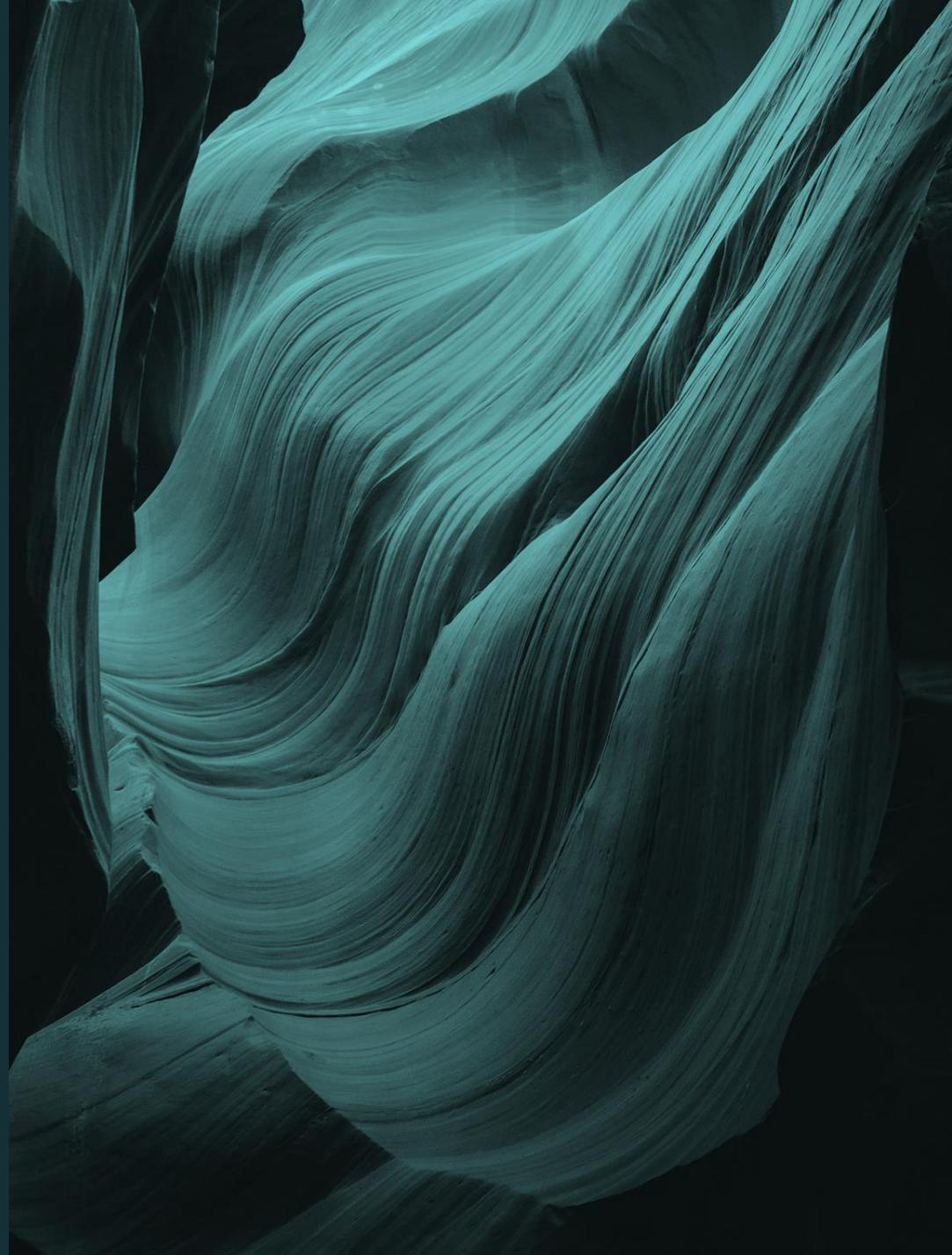


**£2bn+**  
**average GVA**  
up to 2050

# East Coast Cluster

Andy Lane

## Q&A



# South Wales Industrial Cluster (SWIC)

Date: 22/11/2021

Presenter: Chris Williams



**CLWSTWR DIWYDIANNOL**  
DE CYMRU

SOUTH WALES  
**INDUSTRIAL CLUSTER**



# UK Clusters

**GRAND CHALLENGE**

## What is the Industrial Clusters mission?

Our aim is to create a net-zero carbon industrial cluster by 2040 is a world first. We want to attract innovators, investors and problem solvers to create a low-carbon exemplar that others in the UK and internationally can learn from and replicate.

**"We will establish the world's first net-zero carbon industrial cluster by 2040 and at least one low-carbon cluster by 2030"**

**This will be achieved by:**

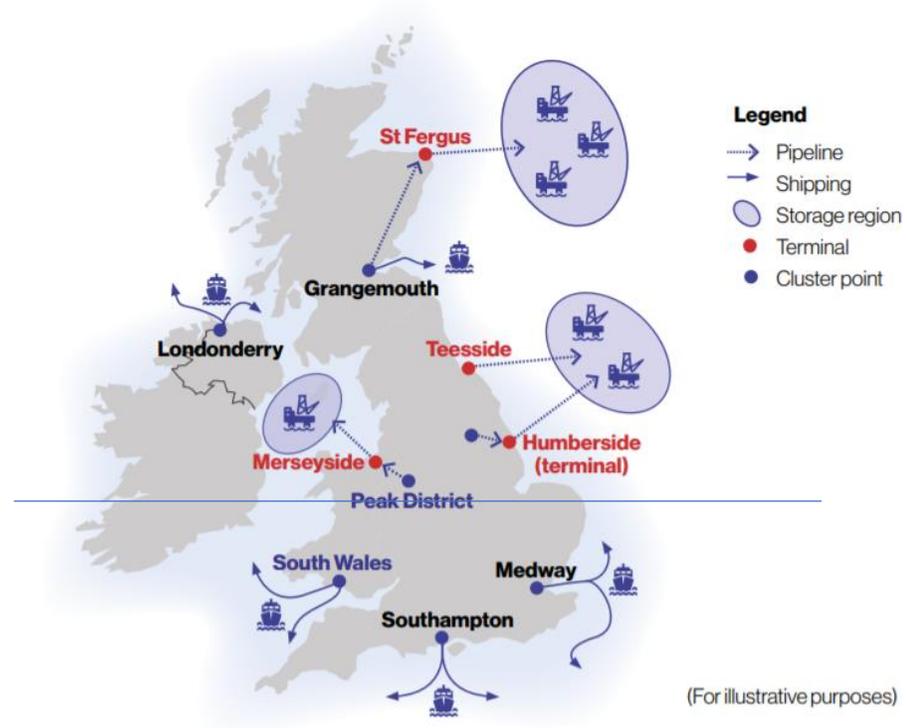
- Reducing emissions in one cluster to **net-zero by 2040**.
- In at least one cluster, by 2030:
  - The **low-carbon infrastructure** needed to support industrial decarbonisation will be in place and operational, attracting new investment and innovation.
  - Multiple industrial facilities** will already have reduced their emissions, by the greatest possible extent.
- Positioning UK clusters as top areas for global inward investment and driving demand for low carbon products and technologies by harnessing the power of markets, the public sector, universities and local communities.

**Largest industrial clusters by emissions**

Cluster	Emissions (MtCO <sub>2</sub> )
Grangemouth	4.3
Teesside	3.1
Merseyside	2.6
South Wales	8.2
Southampton	2.6
Humberside	12.4

The mission is backed by public investment through the **Industrial Strategy Challenge Fund**

Based on high-emissions sites in scope of the EU ETS - may not be exhaustive



[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/970229/Industrial\\_Decarbonisation\\_Strategy\\_March\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970229/Industrial_Decarbonisation_Strategy_March_2021.pdf)



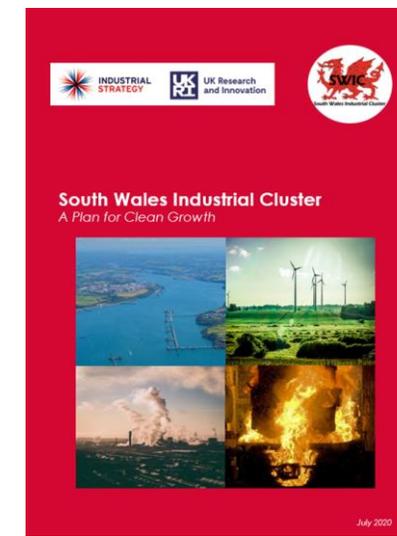
**CLWSTWR DIWYDIANNOL**  
DE CYMRU

**SOUTH WALES**  
**INDUSTRIAL CLUSTER**



# Developing a South Wales Industrial Cluster

- Steel, Oil, Cement, Chemicals, Nickel, Insulation, Paper, General Manufacturing
- Pembroke CCGT, Biomass and EFW stations
- 10 MTPA Industry + 6 MTPA Power



Key finding: it would be feasible for South Wales to transport its CO2 to other potential CCS hubs for permanent storage

Figure 31: Options for South Wales to ship CO2 to other ports<sup>19</sup>



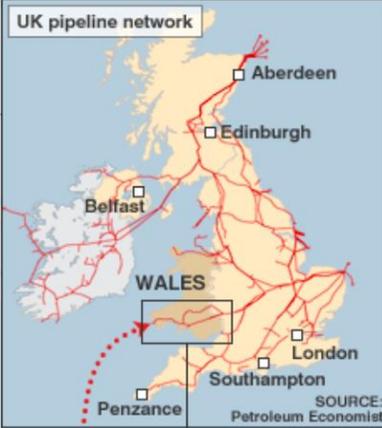
Figure 32: Unit costs of shipping CO2 from South Wales (undiscounted)



BEIS Element Energy Report



CLWSTWR DIWYDIANNOL  
DE CYMRU  
SOUTH WALES  
INDUSTRIAL CLUSTER



*“Developing the art of the possible for decarbonising South Wales”*

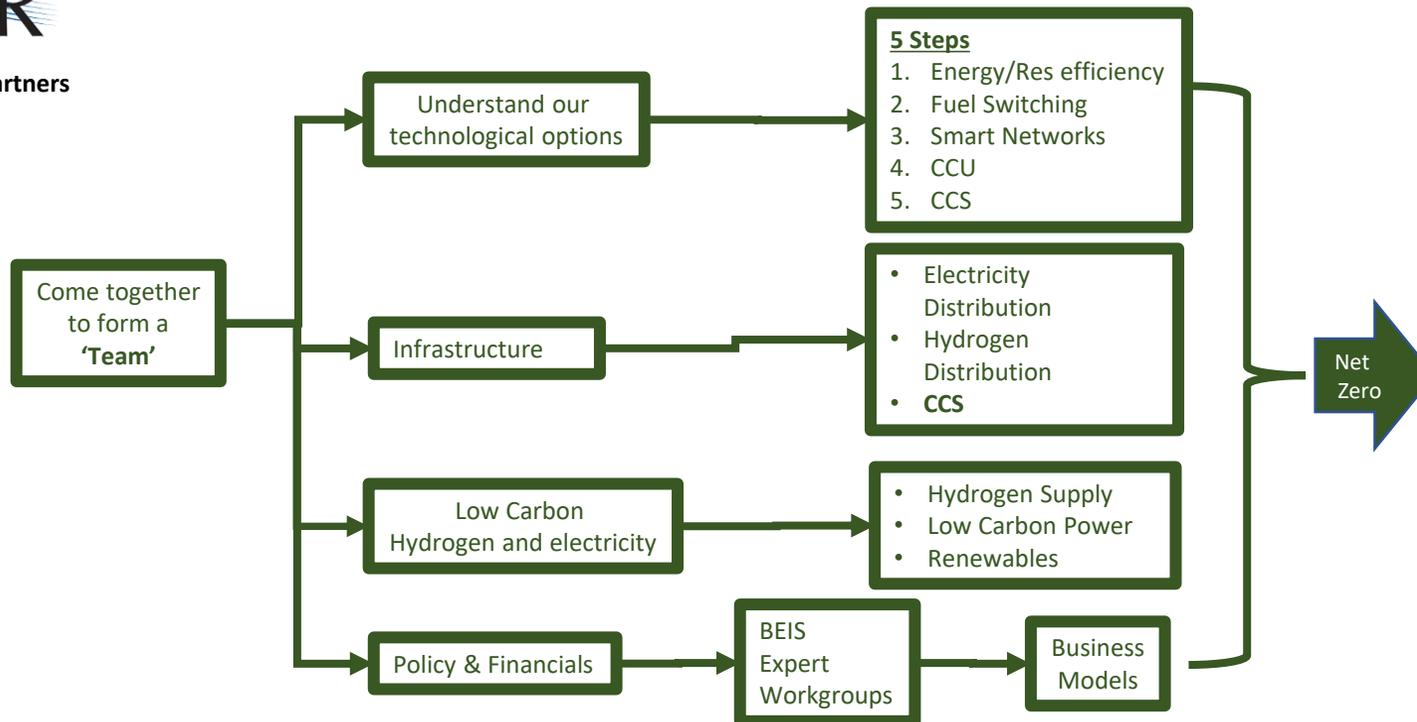


**CLWSTWR DIWYDIANNOL**  
DE CYMRU  
SOUTH WALES  
**INDUSTRIAL CLUSTER**





30 partners

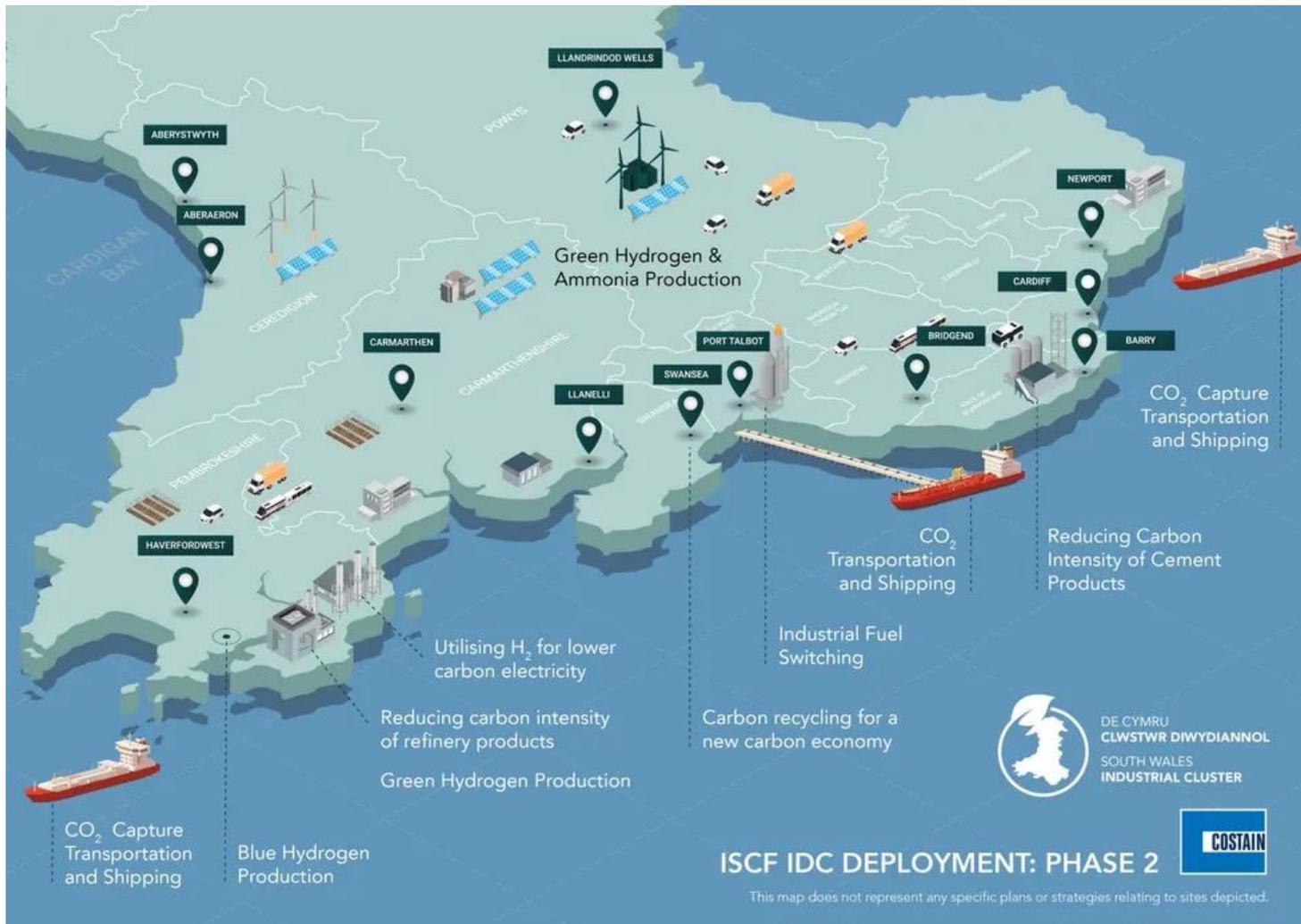


CLWSTWR DIWYDIANNOL  
DE CYMRU

SOUTH WALES  
INDUSTRIAL CLUSTER

- R&D
- Skills





# Deployment Project

Developing the Infrastructure to enable Industrial Decarbonisation

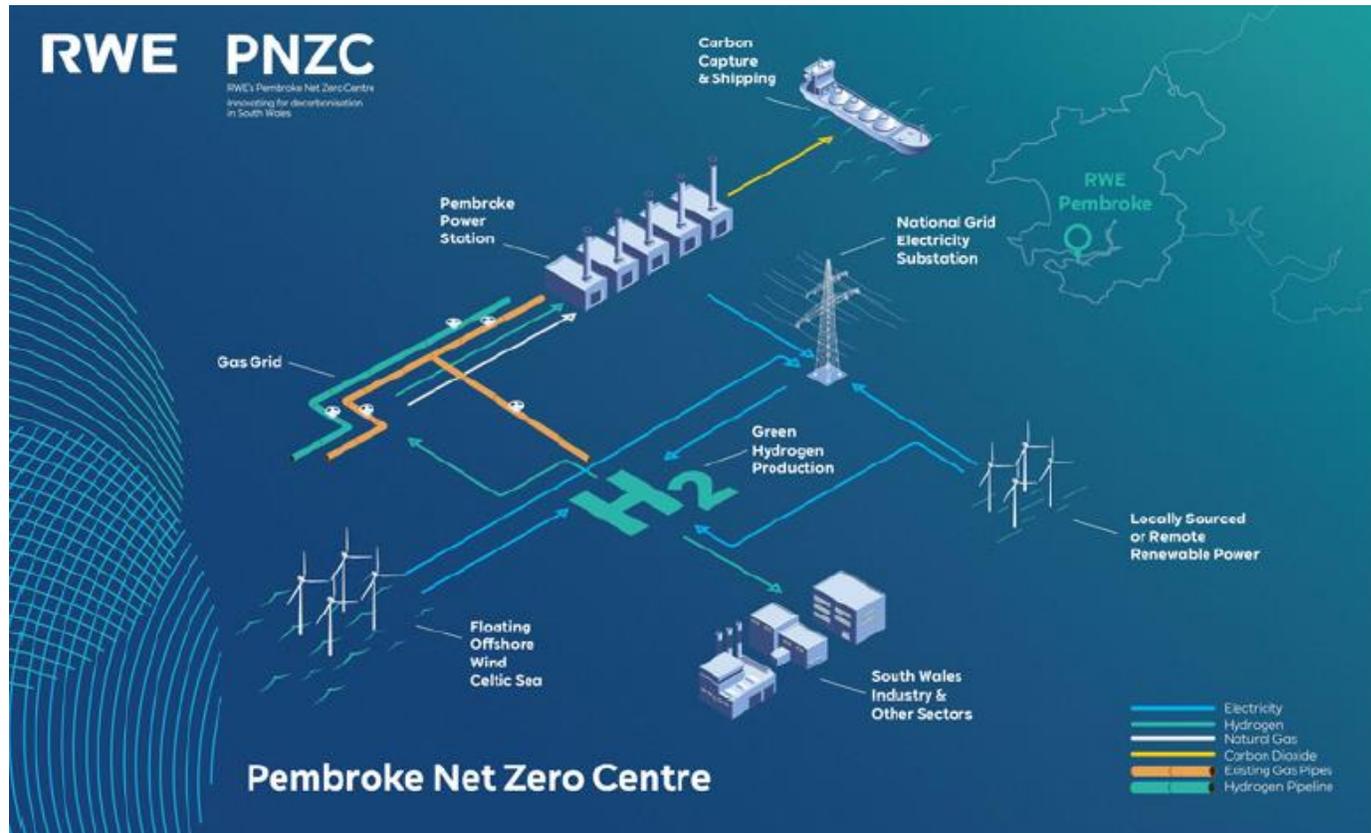
17 Partners



**CLWSTWR DIWYDIANNOL**  
DE CYMRU  
SOUTH WALES  
**INDUSTRIAL CLUSTER**



# Pembroke net zero centre



**CLWSTWR DIWYDIANNOL  
DE CYMRU**  
**SOUTH WALES  
INDUSTRIAL CLUSTER**



## Major Concerns with the Business Models being developed

### **1) Industrial Carbon Caption (ICC) business models for all clusters**

Fundamentally flawed so a real concern industry won't sign up

- This will delay the uptake of industrial CCS
- Risk losing our industries to ROW

### **2) Non Pipeline Transport (NPT) progress for the whole of the South of the UK**

(Particularly CO<sub>2</sub> shipping – we need a clear line of sight)

- multinational companies with investment decisions made outside of the UK
- UK is competing with other international locations for carbon sequestration, (policies are much more investable propositions)



**CLWSTWR DIWYDIANNOL**  
DE CYMRU

SOUTH WALES  
**INDUSTRIAL CLUSTER**



# Thank you



**CLWSTWR DIWYDIANNOL**  
DE CYMRU

SOUTH WALES  
**INDUSTRIAL CLUSTER**



# South Wales Industrial Cluster

Chris Williams

## Q&A





# The Scottish Cluster CCUS APPG presentation

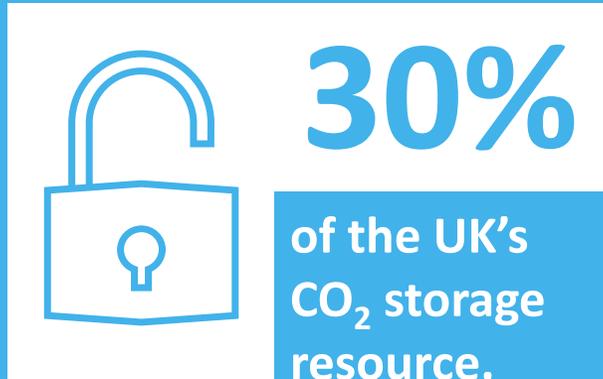
Nick Cooper, CEO Storegga  
22<sup>nd</sup> November 2021



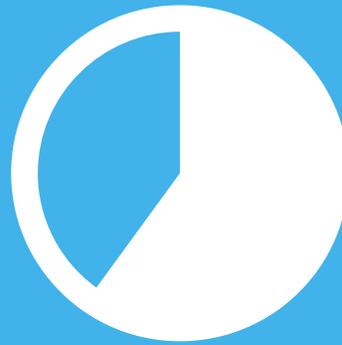
# The Scottish Cluster will help decarbonise industry and achieve net zero emissions



The Scottish cluster unlocks



Essential for hitting net zero targets.

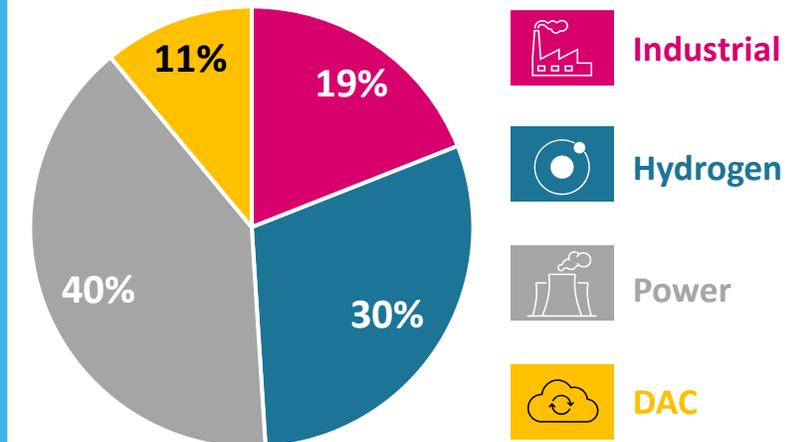


Potential to capture **60%** of the UK Governments 2030 target.

Partnering with major corporates to deliver CCS



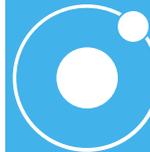
CO<sub>2</sub> sources by 2029...



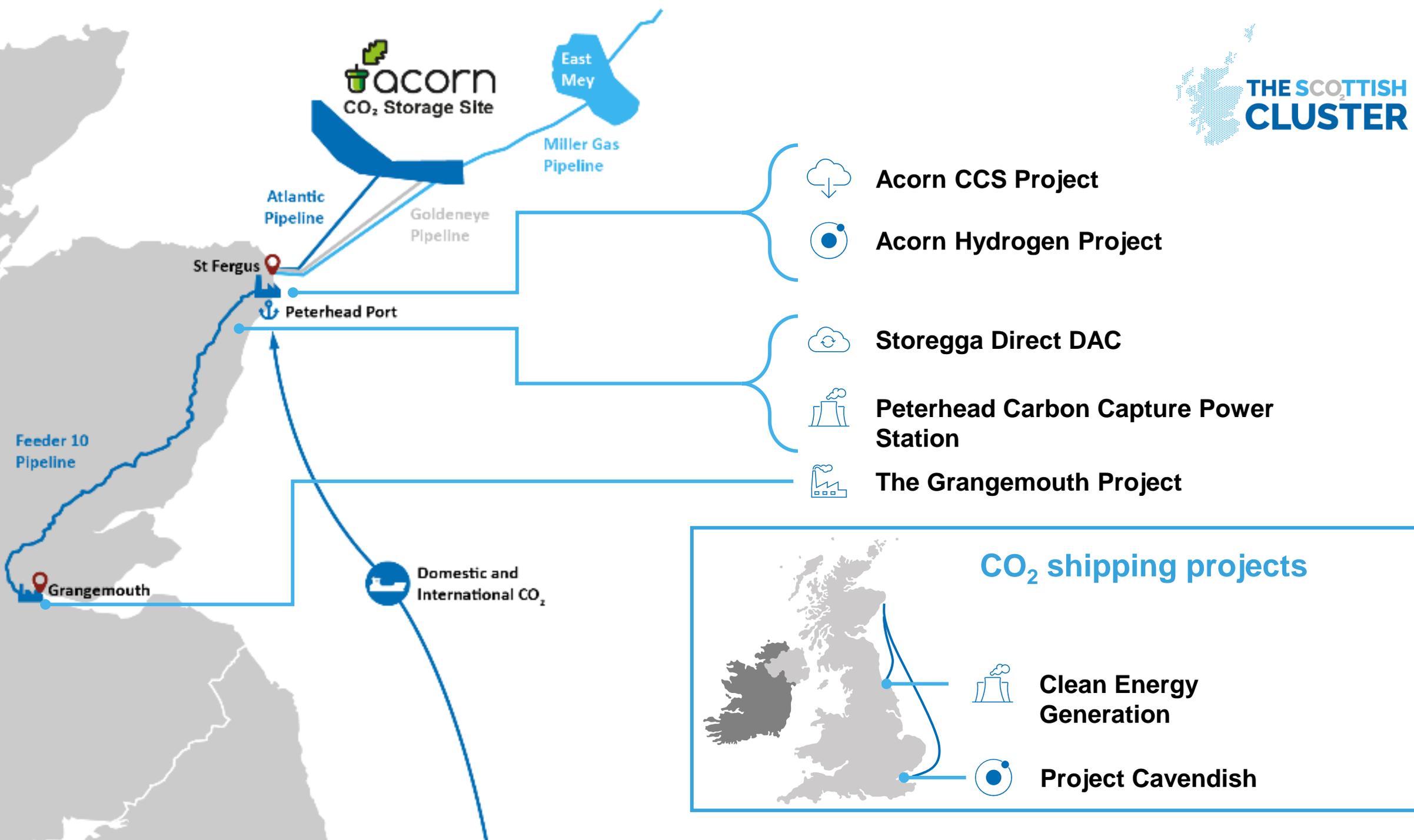
First large-scale Direct Air Capture (DAC) facility in Europe.

Cluster forecast to deliver

**1.3GW**



of low-carbon hydrogen by 2030.





## Deliverable

Multiple pipelines, stores and a shipping option designed for maximum deliverability from day one, with built-in resilience tackling Scotland's largest industrial emitters.

2023

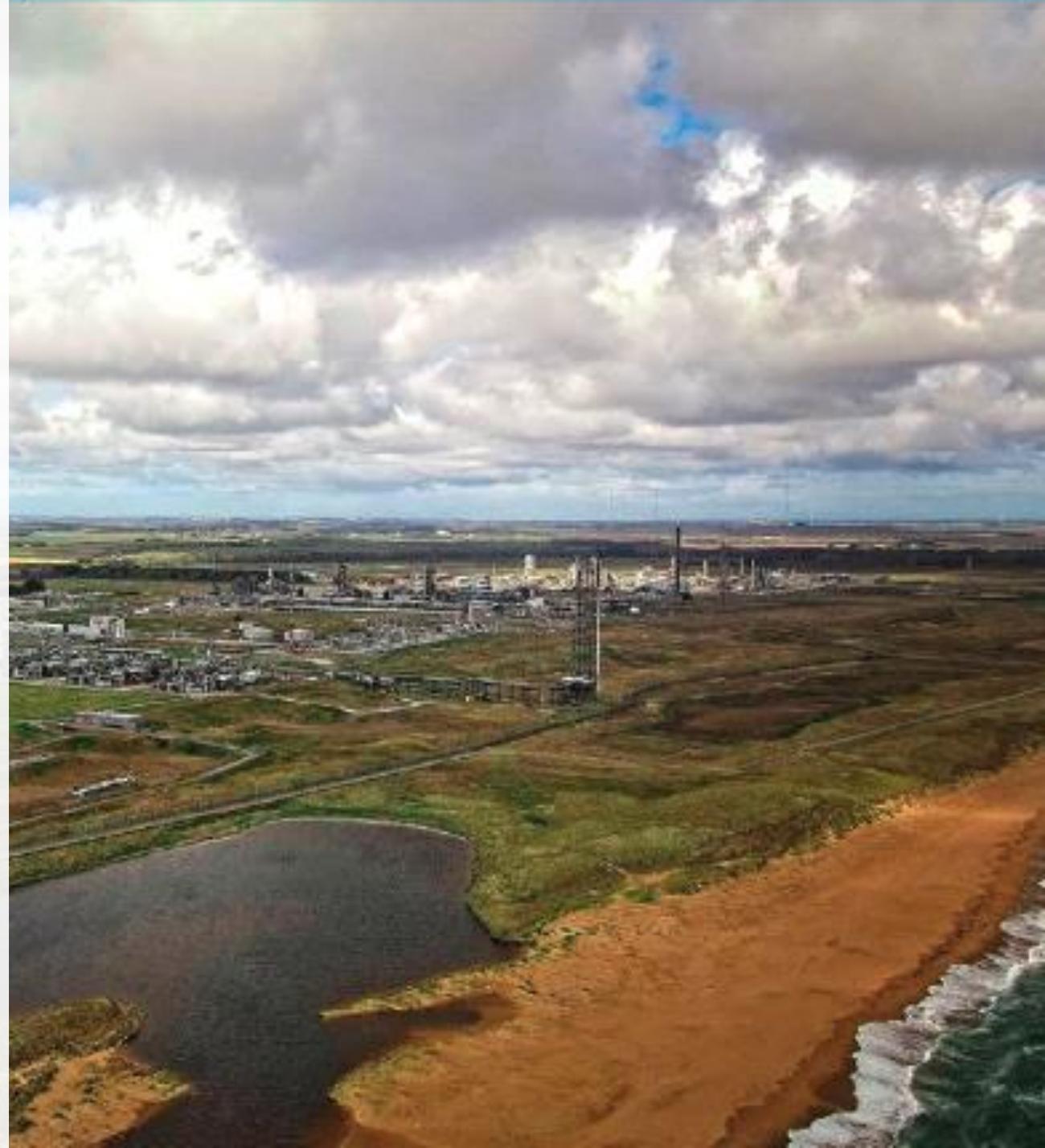
Investment

2025

Commissioning of projects

2026

Begin commercial operation



# In its first phase, the Cluster delivers strategic investment

The Cluster will contribute

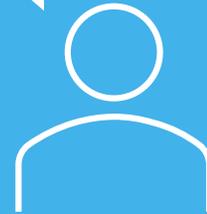
**£1.4**  
billion per  
year

in GVA on average,  
between 2021 & 2050.

The Cluster will support an average  
of

**15,000**

jobs per year to 2050  
across the UK,  
harnessing the skills of  
the oil and gas sector.



Longer-term expansion of the cluster would  
unlock further economic benefits:



Safeguarding of UK  
industrial jobs.



The Grangemouth site alone  
currently supports 2000 direct  
employees, with around 14,000  
indirect jobs



Improved trade balance  
from importing CO<sub>2</sub> for  
storage

Job creation  
can begin as  
early as 2022,  
on its current  
timeline.

The construction phase alone supporting  
on average:

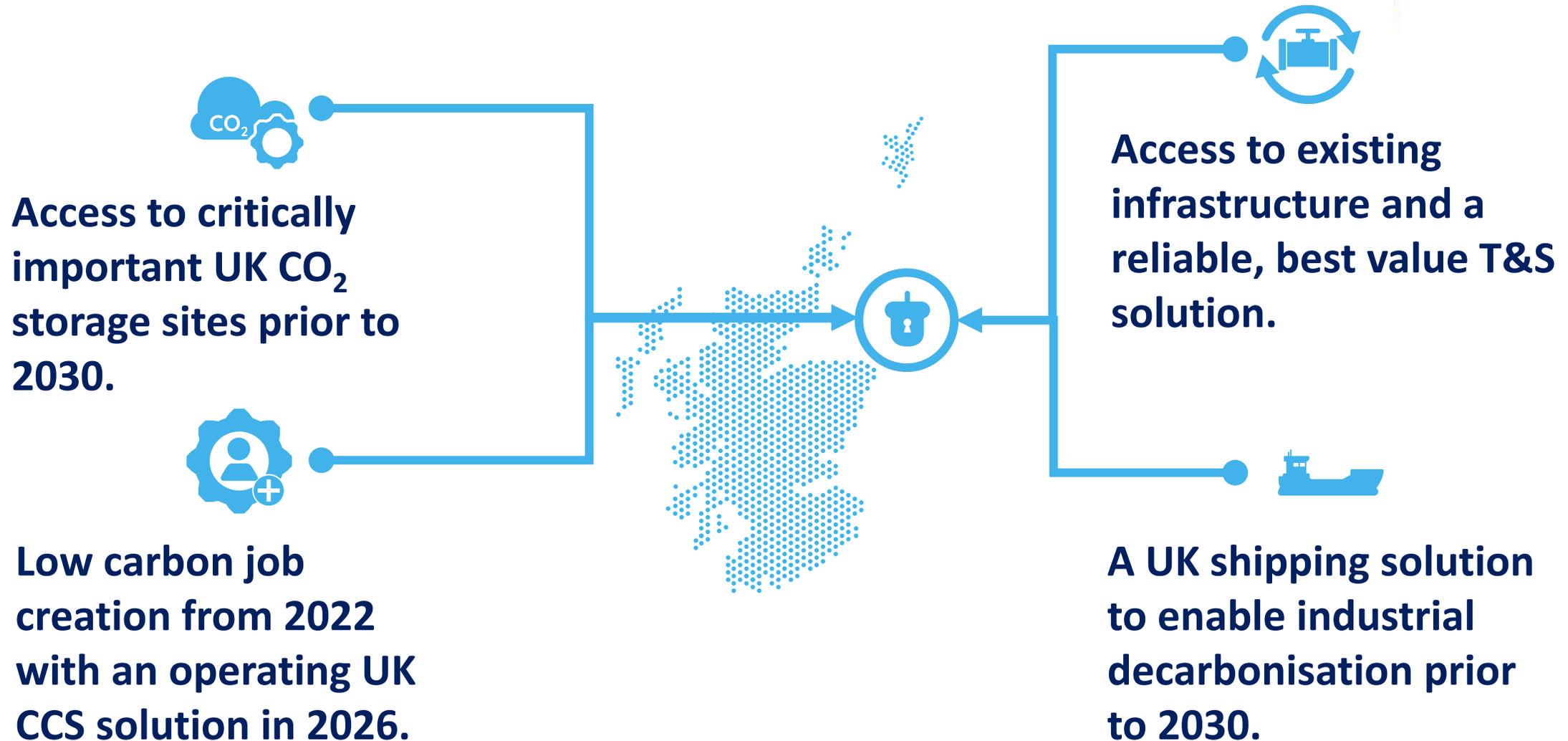


7,000 jobs



£490m a year of GVA during this  
period.

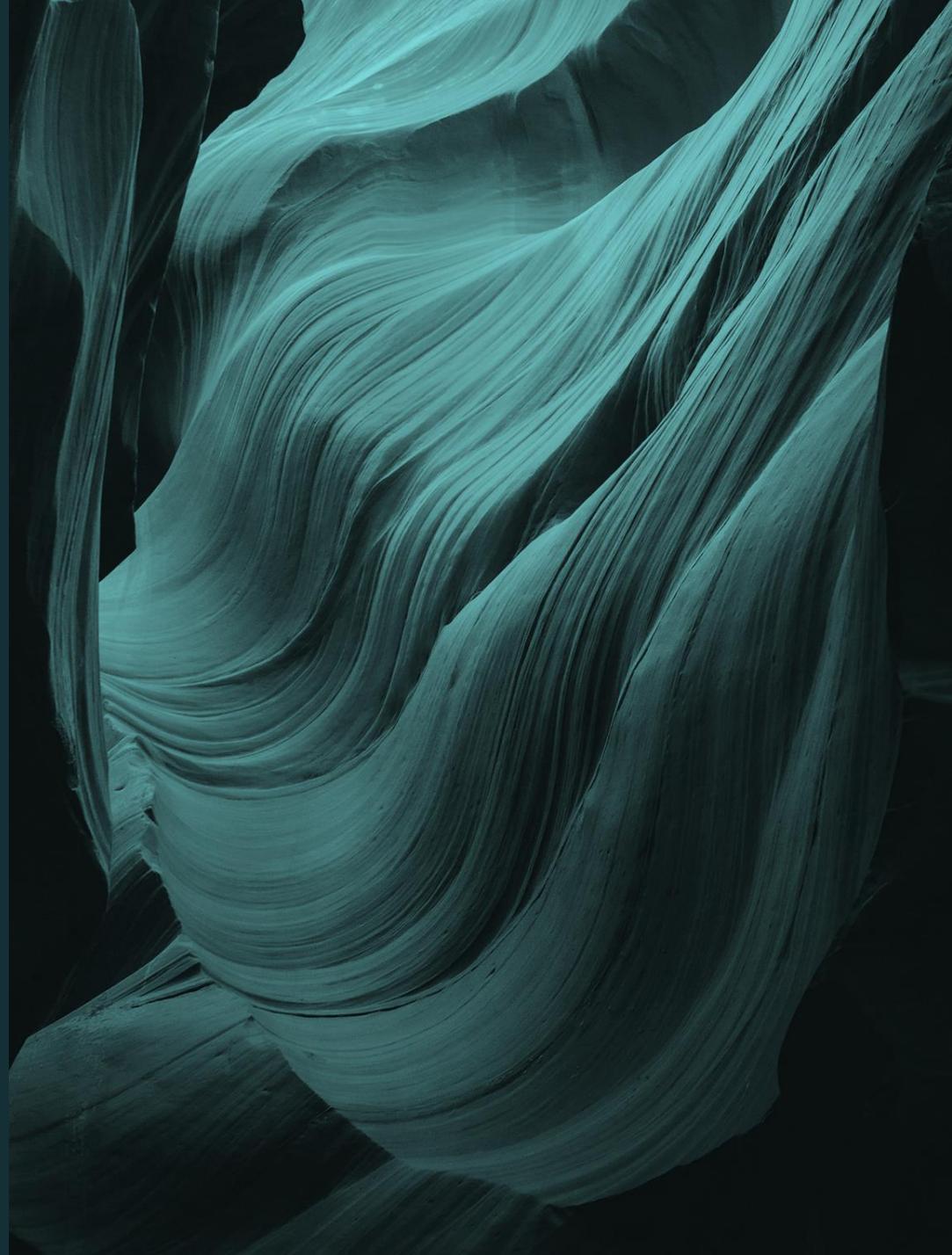
# Progress is needed now to unlock all these benefits



# Scottish Cluster

Nick Cooper

## Q&A

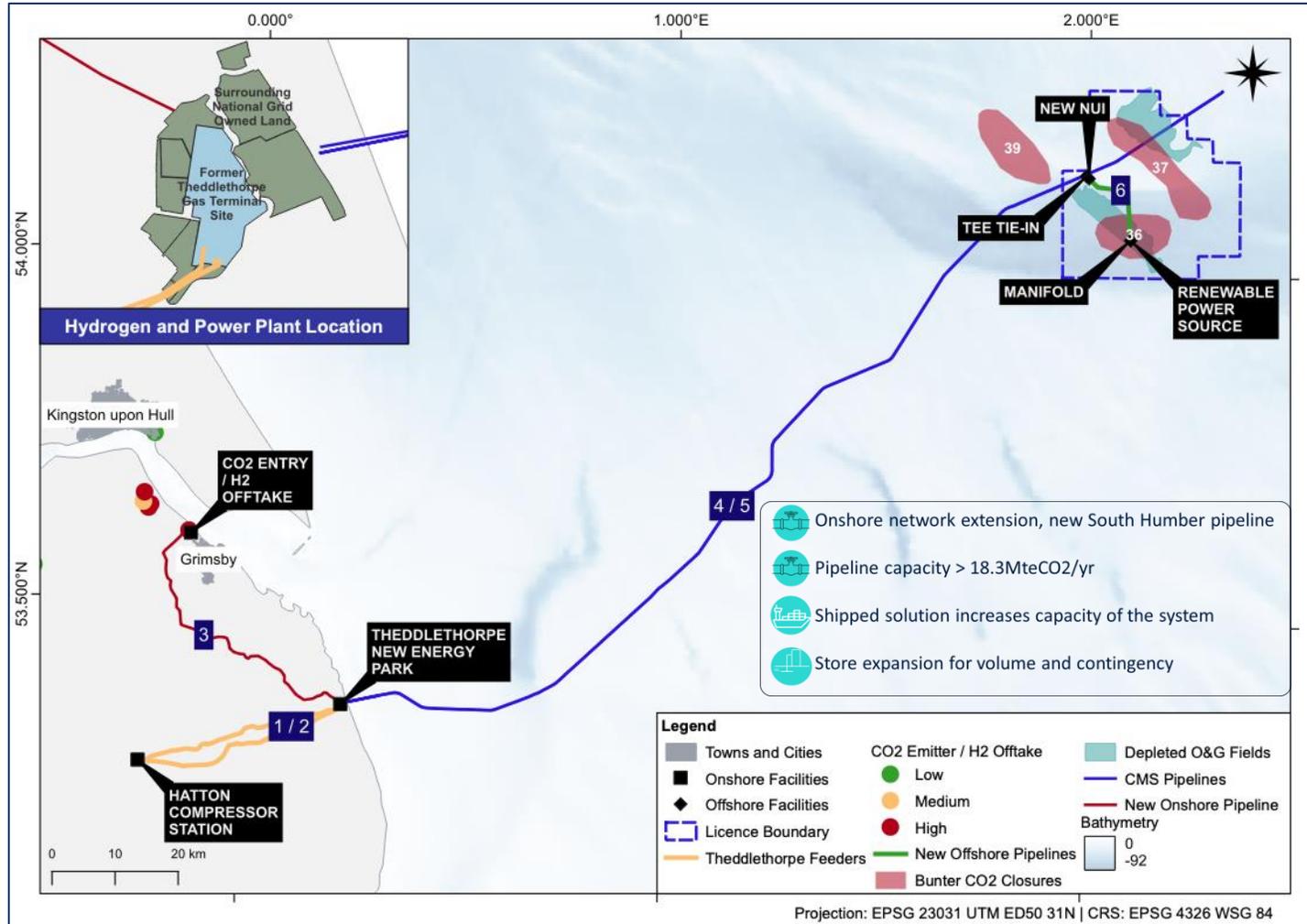


# DelpHYnus CCUS - APPG

NOVEMBER 22<sup>ND</sup>, 2021

# DELPHYNUS: STARTING WITH COST COMPETITIVE BLUE HYDROGEN

## INITIAL CONCEPT SUPPORTING UK TARGETS FOR HYDROGEN PRODUCTION AND CO2 STORAGE, ASSET REPURPOSING AND COST-COMPETITIVE IMPLEMENTATION



#	Opportunity
1/2	Repurpose existing TGT feeder lines
3	New CO <sub>2</sub> offtake S. Humber emitters (additional stores)
4/5	Repurpose existing CMS pipelines, H <sub>2</sub> piggyback
6	Bunter saline aquifer storage

### Phase

- 1
- 2
- 3

2027

- Blue H<sub>2</sub> plant (600 MW) at TNEP
- Power island electrical supply
- Repurpose 2 x feeder lines from Hatton
- CO<sub>2</sub> transported via repurposed CMS pipeline
- CO<sub>2</sub> injected and permanently stored

2028

- 2<sup>nd</sup> H<sub>2</sub> train installed at TNEP (1.2 GW)
- Additional unit installed at power island
- H<sub>2</sub> pipeline to East Coast Hydrogen / connect S. Humber

2029

- 3<sup>rd</sup> H<sub>2</sub> train installed at TNEP
- Production increase to 1.8 GW

### Government 10 Point Plan

- Material contribution to UK Gov't 10 Point Plan:
  - Point 2: Driving the growth of low carbon Hydrogen – DelpHYnus 1.8GW of 5GW target
  - Point 8: Investing in CCUS – DelpHYnus >45% of 10MteCO<sub>2</sub>/yr government aim
  - With potential to further decarbonise other parts of the UK with NPT

### TNEP - Showcase for New Energy

- Revitalised Theddlethorpe site
- TNEP centre focussed on the development of new technologies
- Showcase low carbon hydrogen production and CCUS
- In time - develop green hydrogen production technologies

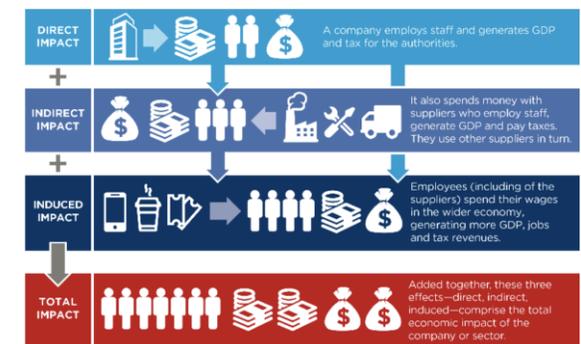
### Local Area and Humber

- Humber becomes a 'Superplace' – a world leading decarbonised industrial cluster
- DelpHYnus will safeguard jobs in energy intensive industries and assist in the energy transition

### Job Information



Direct & Indirect Jobs		
	2025	2030
Direct	400	80
Indirect	3200	1700
Induced	1200	600
Overall	4800	2400



# NEPTUNE ENERGY WELL POSITIONED TO LEAD DELPHYNUS TRANSPORTATION AND STORAGE

## EXTENSIVE CCS EXPERIENCE. FOCUS ON LOW CARBON SOLUTIONS



### Significant CCS Experience

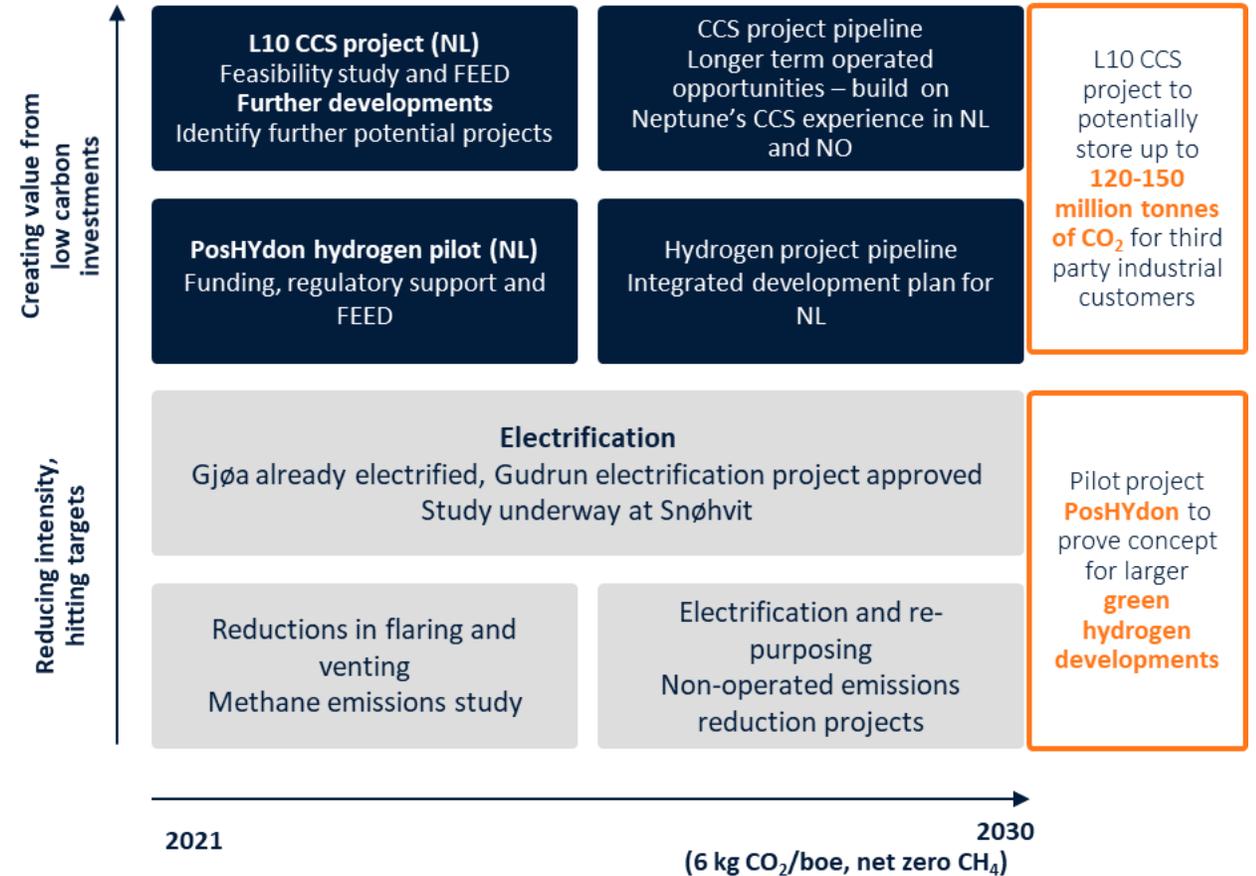
- K12-B: 14 years CO2 injection
- L10: Large-scale offshore CCS project
- Norway: Partner in Snøhvit

### Relevant capabilities: project development & operations

- Cygnus offshore gas facility c.6% of UK gas supply
- Pipeline operator in the Southern North Sea (NL & UK)

### Subsurface expertise

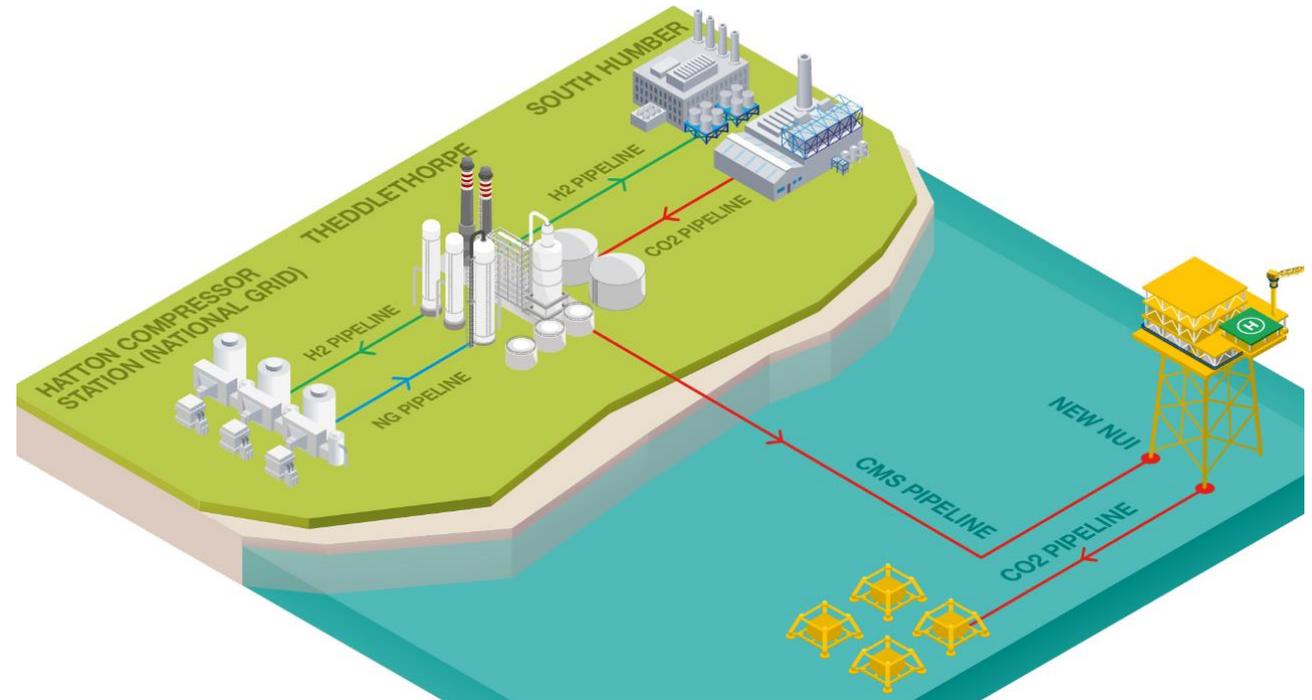
- Detailed understanding of potential stores in the AOI



# DELPHYNUS : STARTING WITH COST COMPETITIVE BLUE HYDROGEN WITH MUCH MORE TO OFFER

## ENABLING ACCELERATED, LOW COST, FUEL SWITCHING AT SCALE ... AND MORE

- Significant CO<sub>2</sub> storage capacity, at low cost
  - Re-purposing assets – lower environmental impact solution and cost savings
- Large scale Blue H<sub>2</sub> production, using technology and experience
  - First production possible in 2027
  - Technology, experience and scalability by adding further trains
- With a number of potential future developments:
  - Shipped solution for CO<sub>2</sub> captured further afield
  - Potential to be part of a comprehensive Hydrogen network
- **What next?**
  - Storage Licence application submitted to OGA in May 2021. Award expected by the end of 2021
  - Focus on preparation for Track 2, open for business to accommodate large scale NPT enabled decarbonisation





NEPTUNE

---

ENERGY

# DelpHYnus

Pierre Girard

## Q&A



# HyNet North West

CCUS APPG

November 2021



# HyNet: Demand led

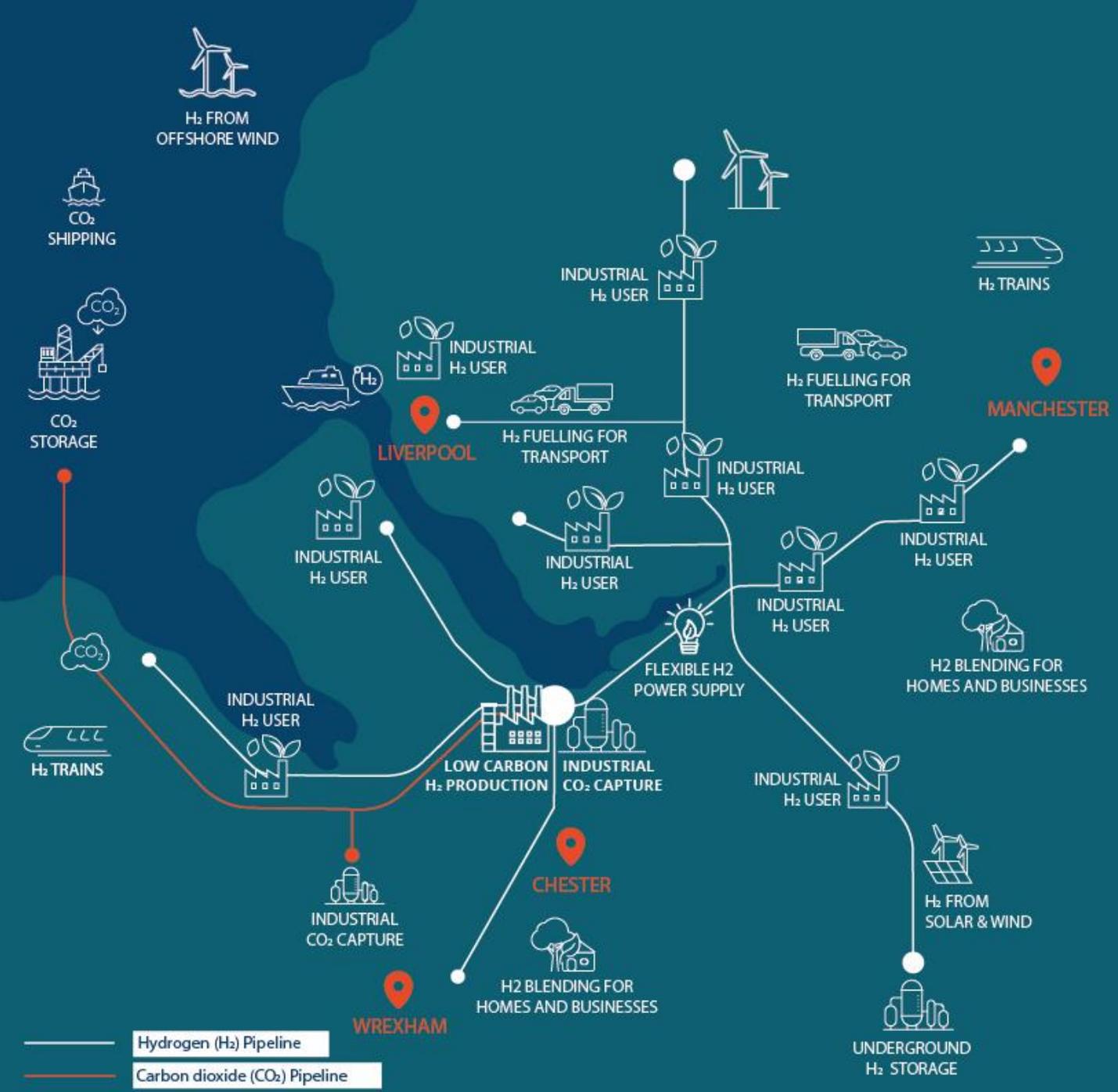
→ unlocking new low-carbon growth opportunities for the automotive, chemical, shipping, glass, food, material, and energy sectors



# HyNet: Delivers against the Ten Point Plan

- Hydrogen Production: 1GW by 2025, 5GW by 2030. HyNet delivers:
  - 4GW of demand intent from 20 major industrial companies plus network blending
  - Fully integrated production, distribution and storage to meet demand
  - Industrial fuel switching large scale trials
  - 'HyNet Homes' – hydrogen village / town
- CCS Capacity: 10MTPA by 2030. HyNet delivers:
  - 11MTPA of demand intent from 12 major industrial companies
  - Progressive, no-regrets expansion of CCS capacity to meet demand





# Elements of HyNet North West

As part of the HyNet North West project, we will build:

- Low-carbon hydrogen production plants
- A hydrogen pipeline network and salt caverns in which hydrogen can be stored ready for use
- Facilities to capture CO<sub>2</sub> emissions
- Underground pipelines to transport CO<sub>2</sub> emissions to permanent safe storage

# HyNet: Committed consortium

HyNet is a collaboration of separate, integrated organisations that have joined together to decarbonise the North West and North Wales region.

Each partner is led by industry experts working collaboratively across the network of hydrogen production, distribution, usage and storage as well as carbon capture and storage.



# HyNet: Wider benefits

- Transforms North Wales and the North West by building on the region's rich industrial heritage to provide a lasting legacy for generations to come.
- Benefits at the local, regional and national level.
- Taps into the area's industrial experience and scientific expertise to create a hotspot for innovation and growth.

**Levelling Up:**  
protecting  
businesses who  
want to act now;  
creating 6,000 local  
permanent jobs

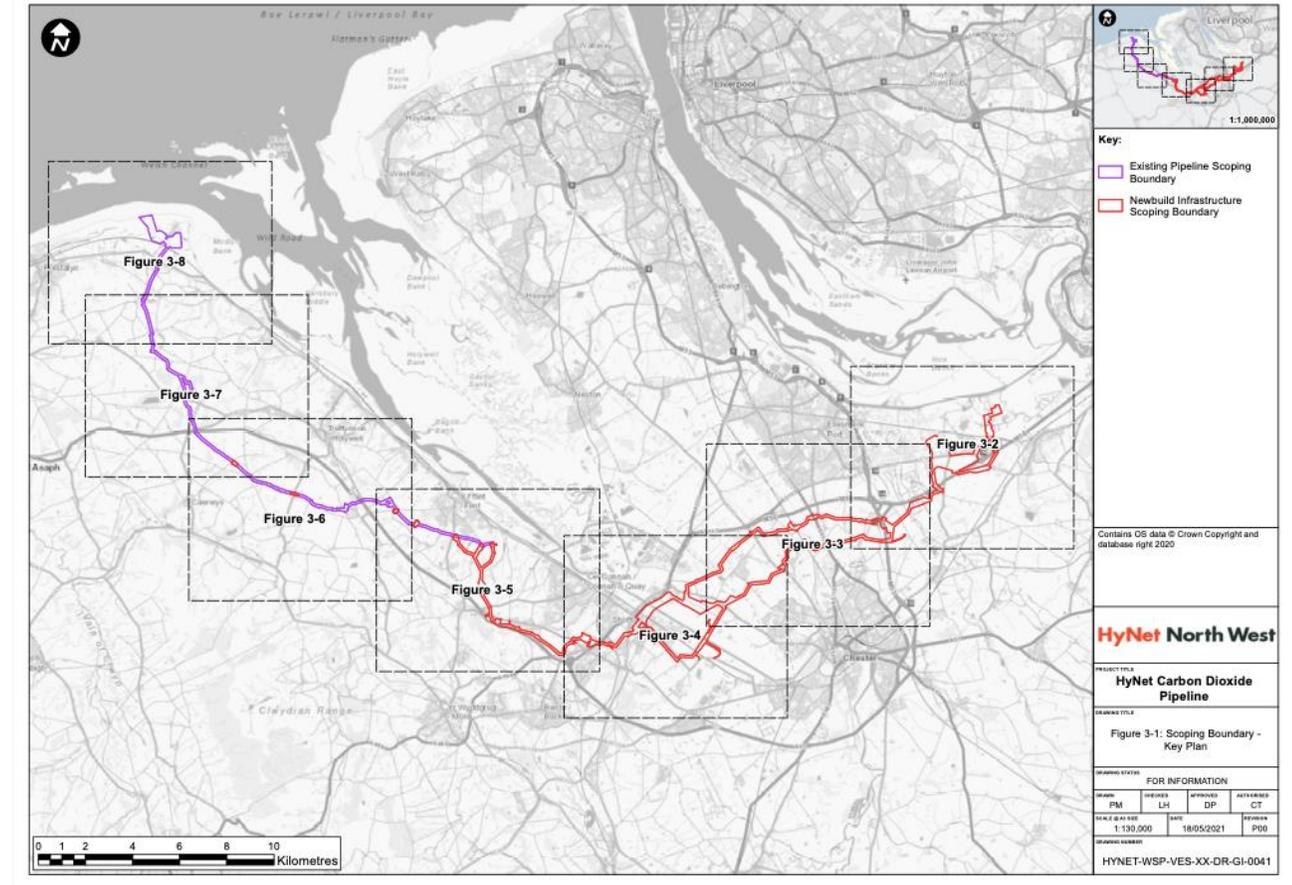
**Green Growth:**  
£17 billion  
economic impact  
in the NW and  
North Wales

**Emissions:**  
Reducing the  
region's carbon  
emissions by a  
quarter over 5  
years

**Global Leadership:**  
Creating the UK's first net  
zero industrial cluster -  
establishing the region as  
a world leader in clean  
energy innovation; creating  
an attractive place in which  
to operate and invest.

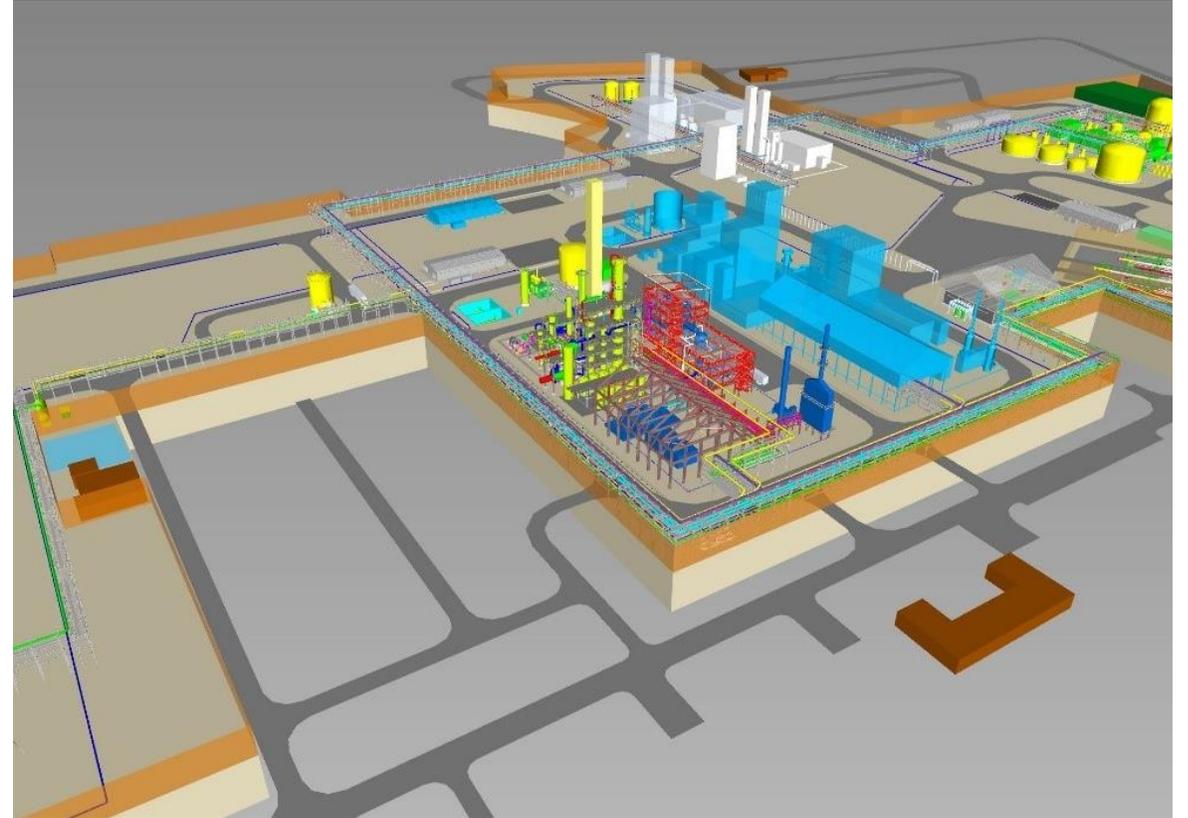
# HyNet: Momentum and deliverability

- CO<sub>2</sub> Transport and Storage (Eni):
  - Storage Licence awarded for Liverpool Bay
  - Offshore facilities FEED design in progress
  - CO<sub>2</sub> Onshore Pipeline FEED design and DCO consenting in progress
- Capture Plants:
  - Core emitters (CF, Hanson, Essar, Viridor) in progress
  - New emitters (ABSL, Fulcrum, BIG, Peel) commencing feasibility work
  - Peak Cluster commencing early stage pipeline routing assessment



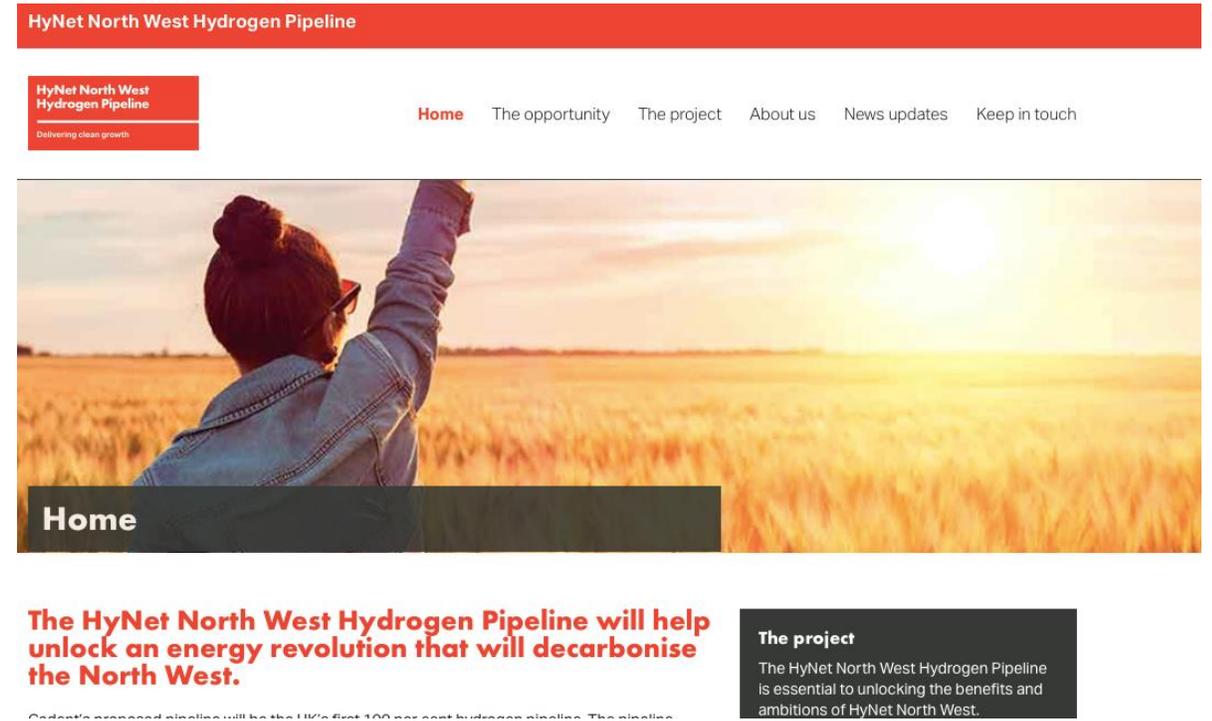
# HyNet: Momentum and deliverability

- Hydrogen production (Essar / Progressive):
  - FEED complete
  - TCPA planning permission submitted
  - Hazardous substance consent submitted



# HyNet: Momentum and deliverability

- Hydrogen system:
  - Integrated design between production / distribution / storage
- Hydrogen distribution (Cadent):
  - Project 'soft-launch'
  - FEED and DCO consenting in progress
  - Consultation Q1 2022
  - 25x Offtake MoUs executed
- Hydrogen storage (INOVYN):
  - FEED underway
  - DCO planning consent in place for natural gas storage – being amended for hydrogen storage



# HyNet: Key messages

## Game Changing

- 100% of CCS target
- 80% of H<sub>2</sub> target
- 50% of regional natural gas use displaced
- 25% of regional emissions abated

## Fast & Deliverable

- Operational from 2025
- Storage licence awarded
- H<sub>2</sub> production FEED completed
- Fully integrated H<sub>2</sub> value chain
- Demand led

## Affordable

- Well-characterised storage reduces risk
- Infrastructure re-use reduces cost by ca.50%
- Low cost capture from industrial sources
- Optimised H<sub>2</sub> production

## Green Growth

- Attracts new investment (e.g. Viridor / Fulcrum / ABSL)
- Delivers 6000 jobs
- Provides infrastructure for LCR / GMCA / CWaC to deliver Net Zero targets



# HyNet North West

CCUS APPG

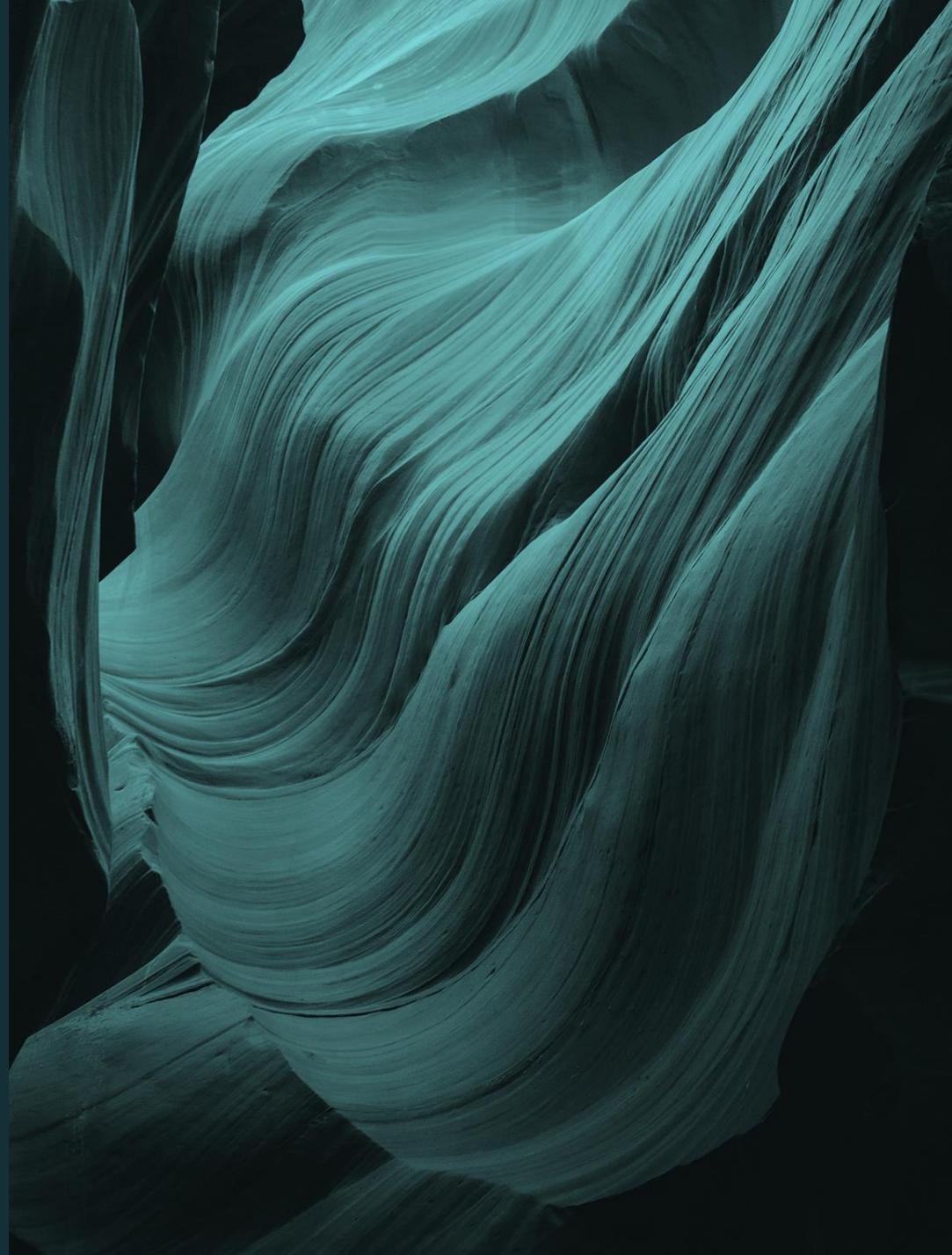
November 2021



# HyNet North West

David Parkin

## Q&A



# CCUS APPG Meeting

## UK CCUS Clusters



Alex Cunningham MP  
CCUS APPG Chair

*Andy Lane* East Coast Cluster

*David Parkin* HyNet North West Cluster

*Pierre Girard* DelpHYnus

*Chris Williams* South Wales Industrial Cluster

*Phil Kirk* v Net Zero Humber Cluster

*Nick Cooper* Scottish Cluster



**CCUS**

All Party Parliamentary Group

**Monday 22<sup>nd</sup> November 2021**

**16:00-17:45**