

The Scottish Cluster:

# Ready to Deliver Industrial Decarbonisation

SCOTTISH  
CLUSTER



# The Scottish Cluster context

## Department for Energy Security and Net Zero CCUS vision:

The Acorn CO<sub>2</sub> transportation and storage (T&S) system and National Gas SCO<sub>2</sub>T Connect pipeline will enable timely and efficient decarbonisation of Scotland, the UK and beyond.

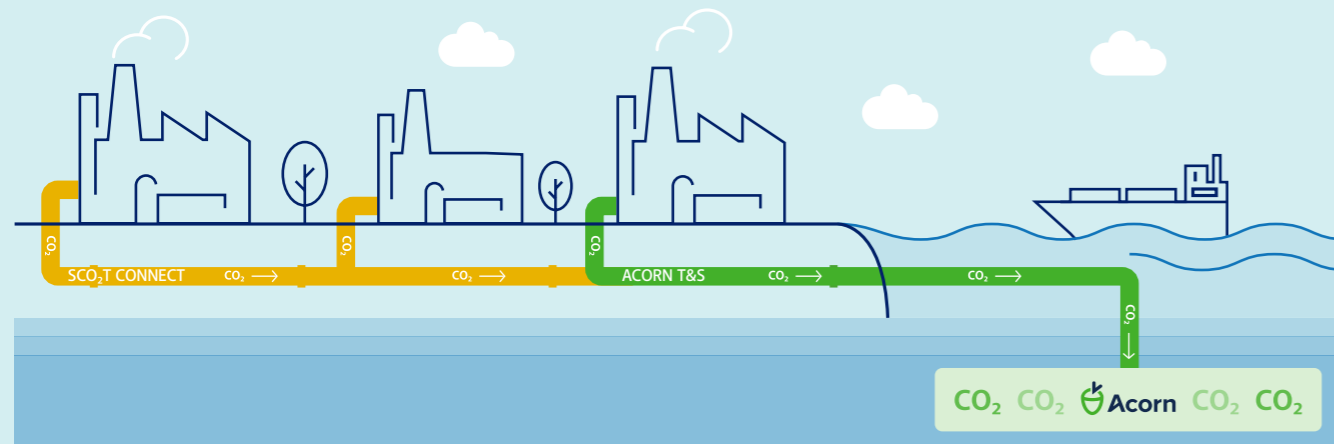
Working together, Acorn and National Gas will provide a CO<sub>2</sub> transport and permanent storage solution to a range of diverse emitters in Scotland and the rest of the UK, who are all committed to timely and cost-effective decarbonization.

The Scottish Cluster, with Acorn at its core, and the Government can collectively make a major contribution to UK Net Zero commitments, directly supporting ambitions for clean energy, green prosperity and value for money.

**“Early deployment of CCS must be delivered with urgency - CCS is a necessity not an option for reaching net-zero GHG emissions.”<sup>1</sup>**

UK Climate Change Committee (CCC)

# The Scottish Cluster connects



### Scottish Cluster Customers

- A diverse group, encompassing industrial carbon capture, power generation, low-carbon hydrogen production, energy from waste and power BECCS.
- Longstanding and ongoing engagement with 9 initial potential emitter customers, who are committed to seizing the Scottish Cluster opportunity.
- Additional customers looking to connect to Acorn in future phases via pipeline or non-pipeline transportation.
- Wide geographic spread enables a sustainable future for UK industry across Scotland, protecting jobs and supporting communities.

### SCO<sub>2</sub>T Connect Project

- National Gas owns and operates 7600km of onshore high pressure natural gas pipelines across Great Britain.
- SCO<sub>2</sub>T Connect is a first of a kind onshore CO<sub>2</sub> network aimed at linking industrial emitters in central Scotland to the Acorn Project at St Fergus.
- Exploring repurposing an existing, major onshore natural gas pipeline to CO<sub>2</sub> service, providing economic, schedule and environmental benefits.
- New build pipelines will connect the emissions hubs in Grangemouth and Fife and provide expansion opportunities.
- Additional expansion opportunities in the Central Belt.

### The Acorn Project

- Acorn is the Scottish Cluster leader.
- Acorn will own and operate the T&S system utilising world class geological CO<sub>2</sub> storage with three CO<sub>2</sub> storage licences already in place.
- Stores are connected to the Scottish mainland by repurposing of oil and gas pipelines.
- Access to Peterhead Port – a deep water port with potential to unlock CO<sub>2</sub> import for both domestic and international emitters.

# The Scottish Cluster delivers

## Emissions Reductions and Carbon Budgets



The Scottish Cluster and the Government can collectively make a major contribution to UK Net Zero commitments, directly supporting ambitions for clean energy, green prosperity and value for money.

## Energy Security



The Scottish Cluster will enable new clean power generation from gas, BECCS and energy from waste, supporting UK energy security. The Cluster will support the decarbonisation of St. Fergus terminal – which will continue to be a key component in UK energy supply.

## Supporting an Energy Transition



The Scottish Cluster enables clean industrial and power market development, and the positioning of the UK as a clean energy leader. Most immediately, there are opportunities within the cluster for clean hydrogen production and negative emissions technologies such as BECCS.

## Scottish Communities



The Scottish Cluster will provide real benefits for local communities in Scotland, with the Cluster working constructively with all stakeholders to protect jobs and create value, recognising Scotland's role in decarbonising the UK as a whole.

## Job Creation and Protection



The Scottish Cluster is expected to make a 17.7 billion contribution to UK economic output up to 2050<sup>2</sup> (as GVA). It would create thousands of new jobs – up to 10.8k in development and construction and 4.7k in operations phase, as well as safeguarding 18,800<sup>2</sup> that would otherwise be lost.

## National and International Reach



Non-pipeline transportation (NPT) options for transporting CO<sub>2</sub> could expand Acorn's reach even further, beyond Scotland, enabling growth opportunities from other emitters across the UK and internationally.

# The Scottish Cluster offers

## Rapid Decarbonisation



A route to connect Scotland's major emitters and hard to abate sources. 90% of Scotland's largest emitters are within 50km of Acorn or SCO<sub>2</sub>T Connect infrastructure<sup>3</sup>.

## Scalability



The option to deliver the Acorn transport and storage system through a modular approach, expanding in phases from the North East outwards, to be a UK hub for CO<sub>2</sub> storage.

## Commitment to deliver



Scottish Cluster partners are credible and qualified organisations who have invested significantly to be ready to deliver these major projects.

<sup>3</sup> Acorn CO<sub>2</sub> Supply Option Report.

# The Scottish Cluster needs

**We are eager to work with Government to seize the Scottish Cluster opportunity to maximise progress towards UK and Scotland Net Zero targets and deliver the best possible value for money.**

We look forward to building on the constructive engagement with Government, NSTA, and Ofgem to date, and working together to deliver a Scottish Cluster that contributes to UK growth and delivers clear local and UK-wide benefits.

### Policy

Early clarity and commitment to Net Zero policy and the continuation of the CCUS funding framework, including Track-2.

### Progress

A clear, end to end process and timelines for delivering the Track-2 Clusters together with regulatory and commercial progress.

### Parameters

An understanding of the key drivers and evaluation criteria enabling us to meet the needs of all stakeholders, recognising the need to ensure value for money at every stage.

<sup>1</sup> The Climate Change Committee (2019) p178, 'Net Zero: the UK's contribution to stopping global warming', [www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming](http://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming)  
<sup>2</sup> Biggar Economics: Economic Impact of the Scottish Cluster Summary Report October 2023.

# The Scottish Cluster map

## The Acorn Project



"We, the leaders of the Acorn project, stand ready to work in partnership with government, National Gas Transmission and our customers to accelerate and deliver the Scottish Cluster and thus the decarbonisation of industry and power in Scotland and beyond. To meet the full potential of the Scottish Cluster, however, clarity on process and timelines for Track-2 is critical. We look forward to engaging with our government stakeholders to bring momentum to the project and make the Scottish Cluster a reality."

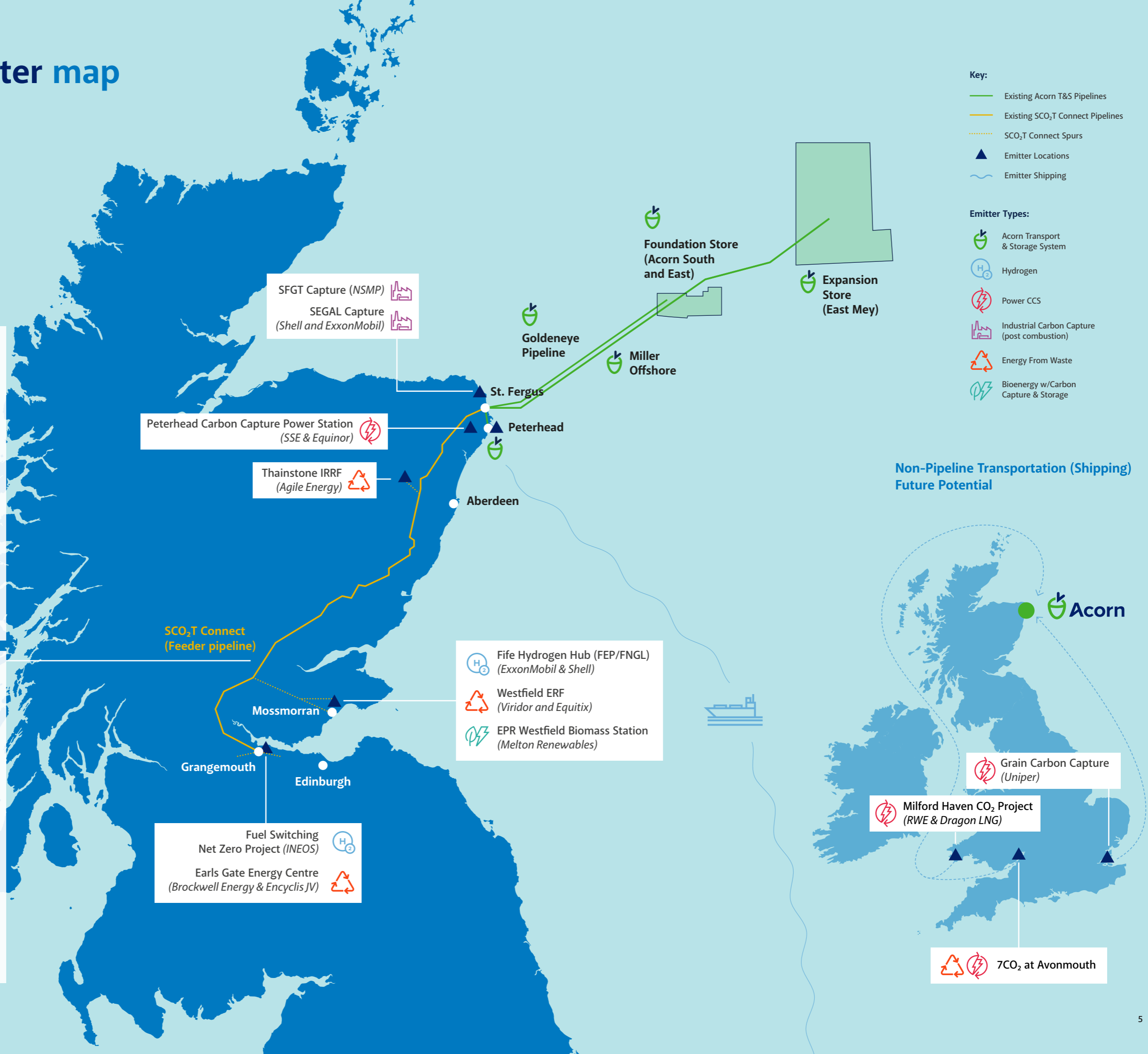
Steve Murphy, Chief Commercial Officer, Storegga  
 Simon Roddy, Senior Vice President, Upstream UK, Shell U.K. Limited  
 Gustavo Baquero, EVP Strategy, Business Development & Energy Transition, Harbour Energy  
 Sayma Cox, CEO, North Sea Midstream Partners

## SCO<sub>2</sub>T Connect Project



"National Gas is committed to the decarbonisation of our energy networks and believe the deployment of CCS infrastructure will play a key part in the transition to Net Zero. The Scottish Cluster has all of the components to successfully decarbonise strategic industrial and power generation sites in Scotland and deliver a tangible step forward towards UK Government ambitions for carbon abatement. National Gas, working hand in hand with the Acorn Project, is keen to build on our strong relationships with government and energy regulators to progress the Scottish Cluster, however it's critical to understand the next steps for the Track-2 process and the delivery of an unbundled regulatory model to maintain project momentum and investor confidence."

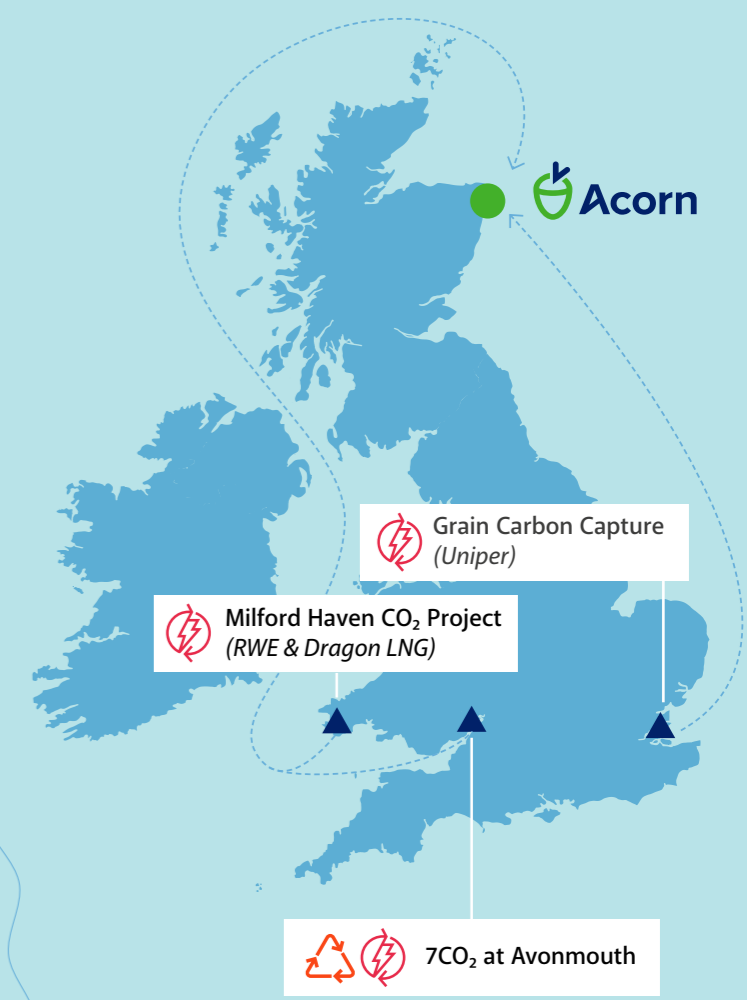
Martin Cook, Chief Commercial Officer



- Key:**
- Existing Acorn T&S Pipelines
  - Existing SCO<sub>2</sub>T Connect Pipelines
  - SCO<sub>2</sub>T Connect Spurs
  - Emitter Locations
  - Emitter Shipping

- Emitter Types:**
- Acorn Transport & Storage System
  - Hydrogen
  - Power CCS
  - Industrial Carbon Capture (post combustion)
  - Energy From Waste
  - Bioenergy w/Carbon Capture & Storage

## Non-Pipeline Transportation (Shipping) Future Potential



# The Scottish Cluster connects

The Cluster connects Scotland's main points of industrial CO<sub>2</sub> emissions with a secure, permanent offshore store. It can also provide CO<sub>2</sub> management services for new low carbon industries;



## Peterhead Carbon Capture Power Station

### Dispatchable power with carbon capture

Being developed by SSE Thermal and Equinor, the proposed low-carbon power station in Aberdeenshire would have an electrical output of up to 900MW. It could become Scotland's first flexible power station equipped with carbon capture technology – backing up renewables and helping to deliver a clean power system. In doing so, it would repurpose a historic site, generate significant benefits for the regional economy and secure and create good jobs.

“Power CCS has a clear role to play in the journey to net zero but if we're to build momentum then we need to see clarity and action from UK Government. In doing so, we can secure a low-carbon future for Scotland.”

Finlay McCutcheon  
Managing Director, SSE Thermal



## Fuel Switching Net Zero

### Low carbon hydrogen with carbon capture

The INEOS Grangemouth net zero roadmap has identified fuel switching to hydrogen as the next major step towards achieving net zero carbon emissions by 2045. Low carbon hydrogen production with carbon capture, underpinned by access to the Acorn T&S system infrastructure to transport carbon dioxide via existing pipelines and store safely in subsea rock formations, will enable this to happen.

“INEOS Grangemouth is committed to being net zero by 2045, making products essential for everyday life and to allow others to decarbonise, and providing highly-skilled, well-paid employment. This cannot be realised without carbon capture and storage; therefore, Acorn T&S system is critical to delivering this future.”

Colin Pritchard  
Sustainability Director, INEOS Grangemouth



## Fife Hydrogen Hub (FEP/FNGL)

### Low carbon hydrogen with carbon capture

The Fife Hydrogen Hub, with CO<sub>2</sub> transportation and storage via the Acorn project, has the potential to produce low carbon hydrogen at a scale that could both reduce emissions at Mossmorran, and support a future hydrogen economy in the region.

“Large-scale projects, like the Fife Hydrogen Hub, require certainty and confidence in policy to unlock potential investment from industry. With its technical capabilities and global expertise in delivery of major projects, ExxonMobil is well-positioned to deliver the benefits of lower emissions technology.”

Michael Foley  
ExxonMobil UK Low Carbon Solutions Executive



## Thainstone IRRF

### Energy from waste with carbon capture

A waste management facility developed by Agile Energy on a brownfield site at Thainstone near Inverurie, Aberdeenshire. The project will extract recyclates from the waste and generate electricity for the grid, plus district heating for the neighbouring communities of Inverurie and Kintore.

“We have an opportunity to lead the world in decarbonisation and we must collaborate to achieve our national industrial targets. Vision, support and clarity from government is required to maintain momentum.”

Alf Robertson  
Managing Director, Agile Energy



## Westfield ERF

### Energy from waste with carbon capture

The Westfield Energy Recovery Facility will use state-of-the-art technology to recover energy from waste. Under construction in the Westfield Development Site, Fife and on schedule for commencement of operations in April 2025, the facility will treat 238,000 tonnes a year. Carbon capture at Westfield will help Viridor to realise its commitment to Net Zero by 2040.

“Carbon Capture is essential to Viridor's Net Zero Pathway. We are already investing in DESNZ's Track-1 and are committed to further roll-out. In the Scottish Cluster we are working proactively alongside partners to capture over 200,000 tpa of CO<sub>2</sub> at Westfield, with the opportunity to develop two further projects, totalling another 500,000 tpa during 'build-out', contributing meaningful capture volumes (of which c. 50% are GGRs) towards Government's capture targets.”

James Eyton  
Head of CCUS, Viridor



## SFGT Capture

### Industrial carbon capture

NSMP's Gas Terminal at St Fergus in North East Scotland provides critical infrastructure to process North Sea and West of Shetland gas before it enters the National Gas transmission network. The SFGT Capture project will capture CO<sub>2</sub> from the processing plant, significantly reducing process emissions.

“NSMP is committed to supporting initiatives that will drive the UK towards a sustainable future. Decarbonising operations at our St Fergus site is central to our emissions reduction strategy. The Scottish Cluster, and the broader economic benefits from this program, bring us closer to a sustainable transition towards decarbonising the UK.”

Sayma Cox  
Chief Executive, NSMP



## EPR Westfield Biomass Station

### Bioenergy with carbon capture

EPR Westfield Biomass Power Station (9.8MW) owned and operated by Melton Renewables. Operational since 2003 the site takes up to 85% of Scotland's poultry litter, supporting farmers across the country and protecting the environment from agricultural residues. The retrofitting of CCS will allow the site to continue to operate and produce nearly 150ktpa of negative emissions from sustainable, hard to manage fuels, capturing the biogenic CO<sub>2</sub> produced in its process.

“MRE are fully supportive of the Scottish Cluster. We welcome government clarity as soon as possible to maintain investor certainty, allowing us to progress our innovative project to support the country's pathway to net zero.”

Eddie Wilkinson  
Chief Executive, Melton Renewables



## SEGAL Capture

### Industrial carbon capture

Shell UK operates SEGAL, a fully integrated system which processes and delivers gas to the National Grid via the St Fergus terminal. St Fergus is at the foundation of the Acorn Carbon Capture and Storage (CCS) system and achieving capture of St Fergus's scope 1 emissions is central to Shell UK's upstream decarbonisation plan.

“Shell's target is to be a net zero emissions business by 2050 and we are working hard to decarbonise our upstream operations in the UK. Achieving capture of St Fergus's scope 1 emissions is part of that plan and could also be an enabling project to unlock CCS for other projects within the Scottish Cluster.”

Bethan Vasey  
General Manager, SEGAL



## Earls Gate Energy Centre

### Energy from waste with carbon capture

The Earls Gate Energy Centre is an Energy from Waste plant located in Grangemouth, which utilizes state of the art technology to produce electricity and heat from 274,000 tonnes of residual waste annually. The joint venture between Brockwell Energy Ltd and Encyclis started up in 2024. We are working with Acorn to future-proof the installation by capturing and storing 95% of our CO<sub>2</sub> emissions.

“I am enthusiastic about our commitment to CCS at Earls Gate. We are working with Acorn to create local growth and a cleaner, greener environment in Grangemouth and make a contribution to the UK's transition to Net Zero emissions.”

Andrew Dean  
General Manager, EGEC

## Non-Pipeline Transportation (Shipping) Customers



## Grain Carbon Capture

### Dispatchable power with carbon capture

Uniper's Grain Carbon Capture project is a proposal to retrofit post combustion carbon capture technology on potentially all three units of the existing 1326MW Combined Cycle Gas Turbine plant at Grain power station located in the South East of England, on the Isle of Grain. The carbon captured would be shipped to be stored securely and permanently under the seabed.

“Retrofitting carbon capture technology at Grain will enable continued efficient and flexible power generation, contributing to supply security in a key location. It is critical to progress NPT projects to decarbonise industry right across the UK.”

Mike Lockett  
Country Chair, Uniper UK



## Milford Haven CO<sub>2</sub> Project

### Dispatchable power with carbon capture

The Milford Haven CO<sub>2</sub> project combines carbon capture at RWE's Pembroke power station with a CO<sub>2</sub> export facility incorporated into the Dragon LNG terminal. This joint project will capture & transfer gaseous CO<sub>2</sub> for liquefaction, storage and loading onto CO<sub>2</sub> transport ships, routed to Acorn as a Track II CCS project for permanent storage under the North Sea.

“The MHC<sub>2</sub> project will allow the Milford Haven industries transition into a net zero future, whilst maintaining energy security for the UK and making a significant contribution towards Wales' legally binding target for decarbonisation.”

Richard Little, Director, PNZC RWE  
Simon Ames, Managing Director, Dragon  
Ben Burggraaf, CEO, Net Zero Industry Wales



## 7CO<sub>2</sub> at Avonmouth

### The Severnside Carbon Capture and Shipping Hub

The 7CO<sub>2</sub> hub supports industrial decarbonisation across the South West and South Wales, including local pipelines, railhead, CO<sub>2</sub> storage and ship loading facilities, enabling regional emitters of over 8MTPA to introduce CCS to transport to 7CO<sub>2</sub> for onward shipping to the Scottish Cluster and other CO<sub>2</sub> stores.

“With clear government support and NPT bid timetable, 7CO<sub>2</sub> and regional emitters are ready to develop CCS. The Scottish Cluster is a key collaborative partner and we encourage Government support to develop an import terminal.”

Paul Davies  
Director, 7CO<sub>2</sub>

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THE ACORN DEVELOPMENT AGREEMENT PARTICIPANTS:

**STOREGDA**

 Harbour  
Energy



**NSMP**  
NORTH SEA PROGRAMME PARTNERS

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