

Funding Industrial CCS

Although the technologies involved are proven, public funding will be needed to make CCS a realistic option for industries operating in an intensely competitive global marketplace.

As with CCS in the power sector, an incentive mechanism will be needed to bring about the capital and operational investment needed while also ensuring value for money for the taxpayer. Options for incentive mechanism design have been examined by Societe Generale:

- ✓ An emitter Contract for Difference model would adapt the existing mechanism in the power sector, using the EU-ETS certificate price as the market reference price.
- ✓ A storage driven model would channel funding through the transportation and storage provider in the form of capacity and usage fees.
- ✓ A hybrid model would be more complex, but could resolve issues around risk and bankability present in pure emitter and storage models.
- ✓ A hub model with integration of a power project, which would further reduce risks but might also extend project timescales.



Blueprint for Industrial Carbon Capture and Storage in the UK

July 2015

Teesside Collective is a cluster of leading industries with a shared vision: to establish Teesside, in Tees Valley, as the go-to location for future clean industrial development by creating Europe's first Carbon Capture and Storage (CCS) equipped industrial zone.

CCS is a proven technology that can capture, transport and permanently store up to 90% of the CO₂ emissions produced by industrial facilities, preventing them from entering the atmosphere.

With support from the Department of Energy and Climate Change (DECC) and the Department for Business, Innovation and Skills (BIS), and advice from leading engineering and financial consultants, **Teesside Collective** has produced a blueprint for industrial CCS in the UK.

Key documents are...

The Teesside Collective CCS Business Case (led by Pale Blue Dot with input from Amec Foster Wheeler) presents the technical and commercial basis for establishing an industrial CCS network in Teesside.

Incentive Mechanism Design (led by Societe Generale) examines a range of models of support that could be put in place to bring on the necessary infrastructure investment.

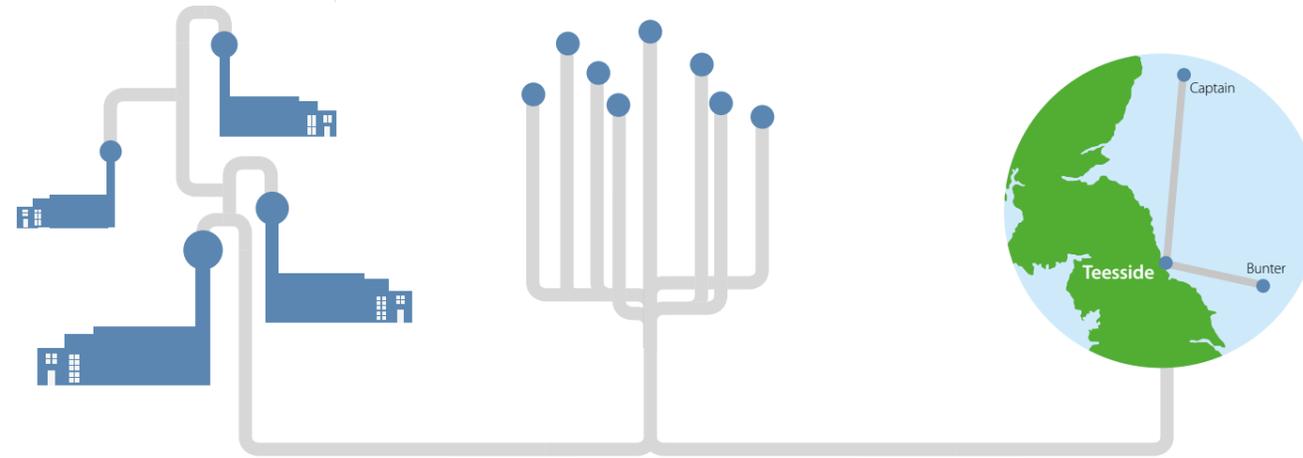
The Economic Impact of Developing Teesside Collective (led by Cambridge Econometrics) sets out the likely impact on jobs and economic activity of progressing Teesside Collective.

Teesside Collective Summary Report (led by Pale Blue Dot) summarises the technical aspects of the project as well as examines the next steps for its development and the commercial structures which might evolve.

A pioneering infrastructure project

Teesside Collective has a technically viable, end-to-end plan. It encompasses the capture of CO₂ from four energy-intensive anchor companies, as well as its transportation and permanent storage under the North Sea. It is envisaged that other industries already in Teesside would later be able to plug in to the network, as would new plants attracted to the area by the infrastructure.

A reference scenario is the basis of the **Teesside Collective** Business Case. This is a conservative scenario that could be up-scaled or varied to maximise environmental and industrial benefits.



Capture

The reference scenario envisages a network built around an anchor group of four emitters – SSI UK (iron & steel), GrowHow (ammonia), BOC (hydrogen) and Lotte Chemical UK (polyester resin).

Using a number of established technologies, an initial total of 2.8 million tonnes of CO₂ a year would be captured from these four industrial processes.

Transportation

Teesside, in Tees Valley, is the UK's most concentrated energy intensive cluster, making a shared CCS network a viable proposition. The reference scenario envisages a pipeline carrying some 5 million tonnes a year of CO₂, allowing for some expansion of the network.

A modest additional investment at the outset would treble the size of the pipeline, improving the economics of the project, and would provide capacity in anticipation of greater inward investment.

Storage

The project would leverage the UK's wider investment in CCS by using an extension to one of the sub-sea stores being considered by CCS projects in the power sector. While the Captain aquifer in the northern North Sea is better understood, the Bunter aquifer in the central North Sea is significantly closer to Teesside and is therefore taken as the basis for the reference scenario. National Grid, operator of the Bunter aquifer, brings its expertise in gas transportation and storage to the **Teesside Collective** steering group.

Environmental and industrial benefits

The reference scenario is conservative but would...

- Cut CO₂ emissions from the four anchor companies by **2.8 million** tonnes a year - a quarter of Teesside's emissions.
- Provide **60%** of the Committee on Climate Change's suggested deployment capacity for industrial CCS by 2030.
- **Cut a third** of emissions from the SSI iron and steel plant.
- Allow for expansion, with scope to feed in a further **2.2 million** tonnes of CO₂ a year.
- Support **1,200 jobs** during construction and help retain **5,900 jobs** in the anchor companies and their supply chains.
- Require investment of **£1.5 billion** in present value terms, discounted at 7% (actual cost is £5.4 billion).
- Cost **£95** per tonne of CO₂ stored, based on **56.5 million tonnes being stored over 20 years**.

A more ambitious scheme could...

- Treble the pipeline capacity to **15 million** tonnes of CO₂ a year, with only **8%** additional support required.
- Provide nearly **50%** of the Committee on Climate Change's suggested deployment capacity for industrial CCS in 2050.
- Provide a platform for new low carbon investment - supporting in excess of **2,600** permanent jobs in new plants in Tees Valley, **£2 billion** in additional annual economic activity and **£1.2 billion** in additional exports annually by the 2030s.
- **Further reduce** the cost per tonne of CO₂ stored by a substantial amount.

Next steps for Teesside collective

With the right level of support, **Teesside Collective** could be up and running in time to deliver on the Committee on Climate Change's recommendation of industrial CCS being deployed in the UK from the mid-2020s. It could be an expanding network, with new clean industrial production attracted to the area to plug in to the infrastructure.

Teesside Collective timeline

- **2015-2018**
Front end engineering and design
- **2015-2016**
Development of incentive mechanism
- **2018-2020**
Planning, development, permitting, project structuring, design work
- **2020-2023**
Construction of CCS network, transportation and infrastructure based around four anchor companies
- **2024 – Project operational**
- **2025-2029**
Expansion - other existing Teesside chemical plants plug into network
- **2025-2035**
Expansion - new CCS-equipped industrial and power plants plug into network