TEESSIDECOLLECTIVE

A NEW INDUSTRIAL FUTURE FOR THE UK

A Blueprint for an industrial CCS network in the Tees Valley

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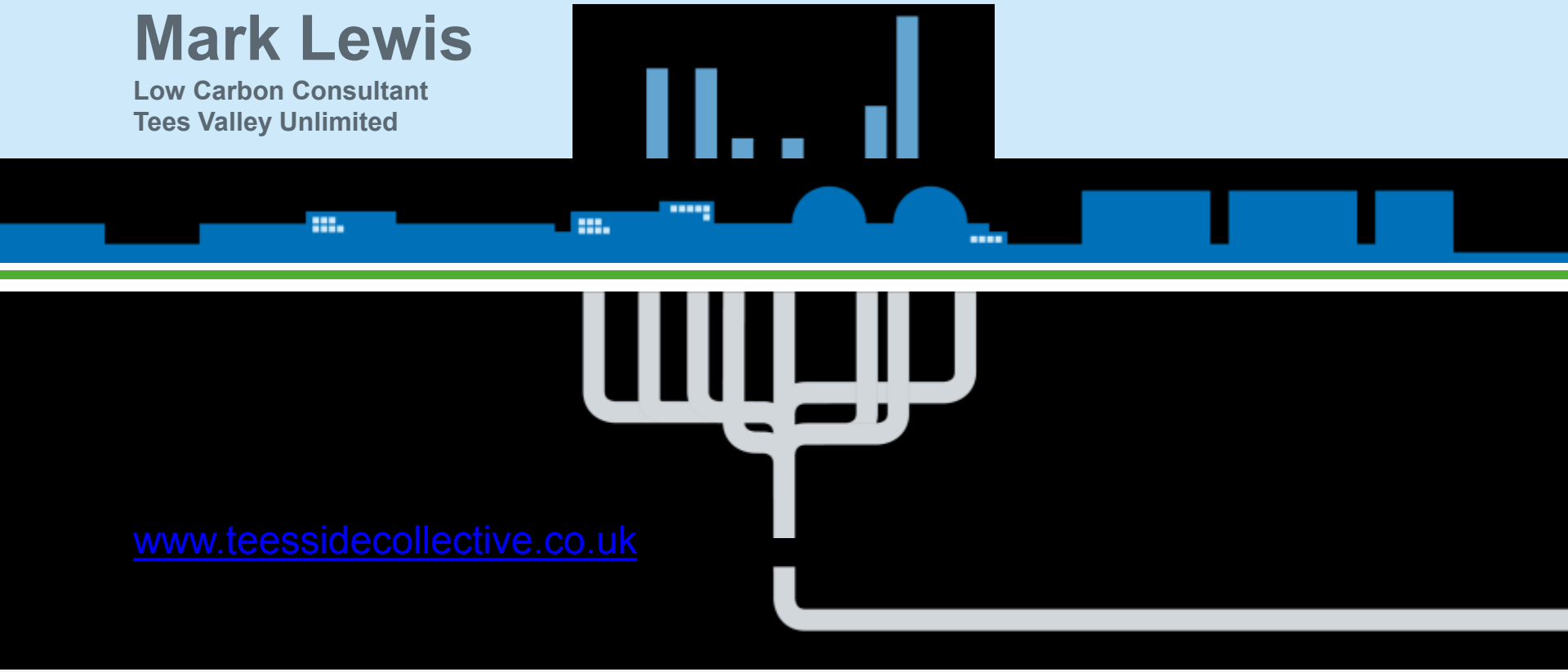

www.teessidecollective.co.uk

Why ICCS and Why Teesside?

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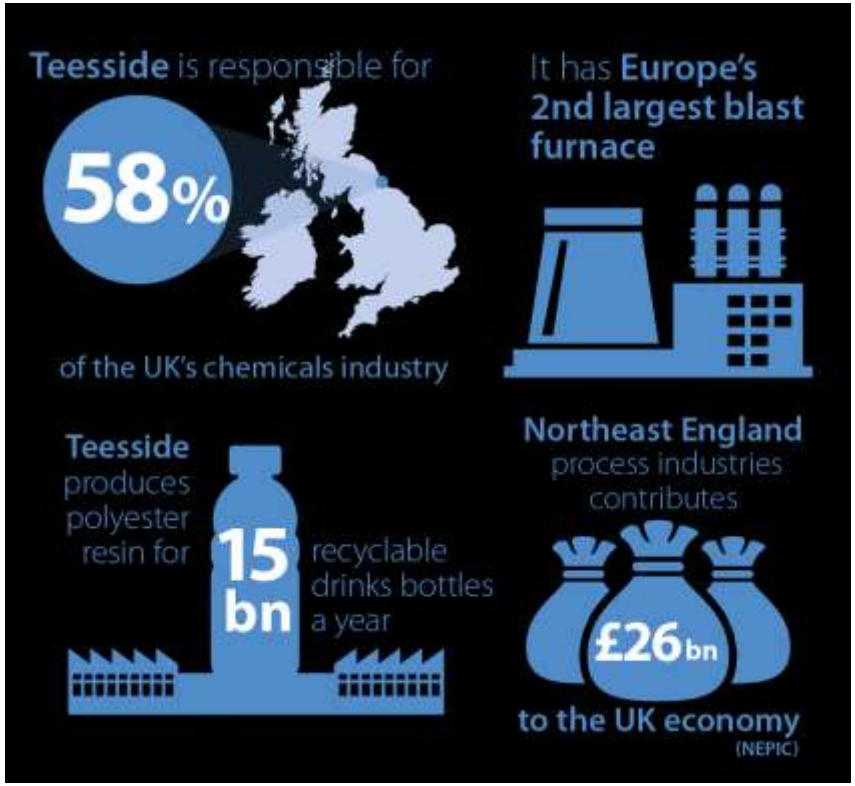
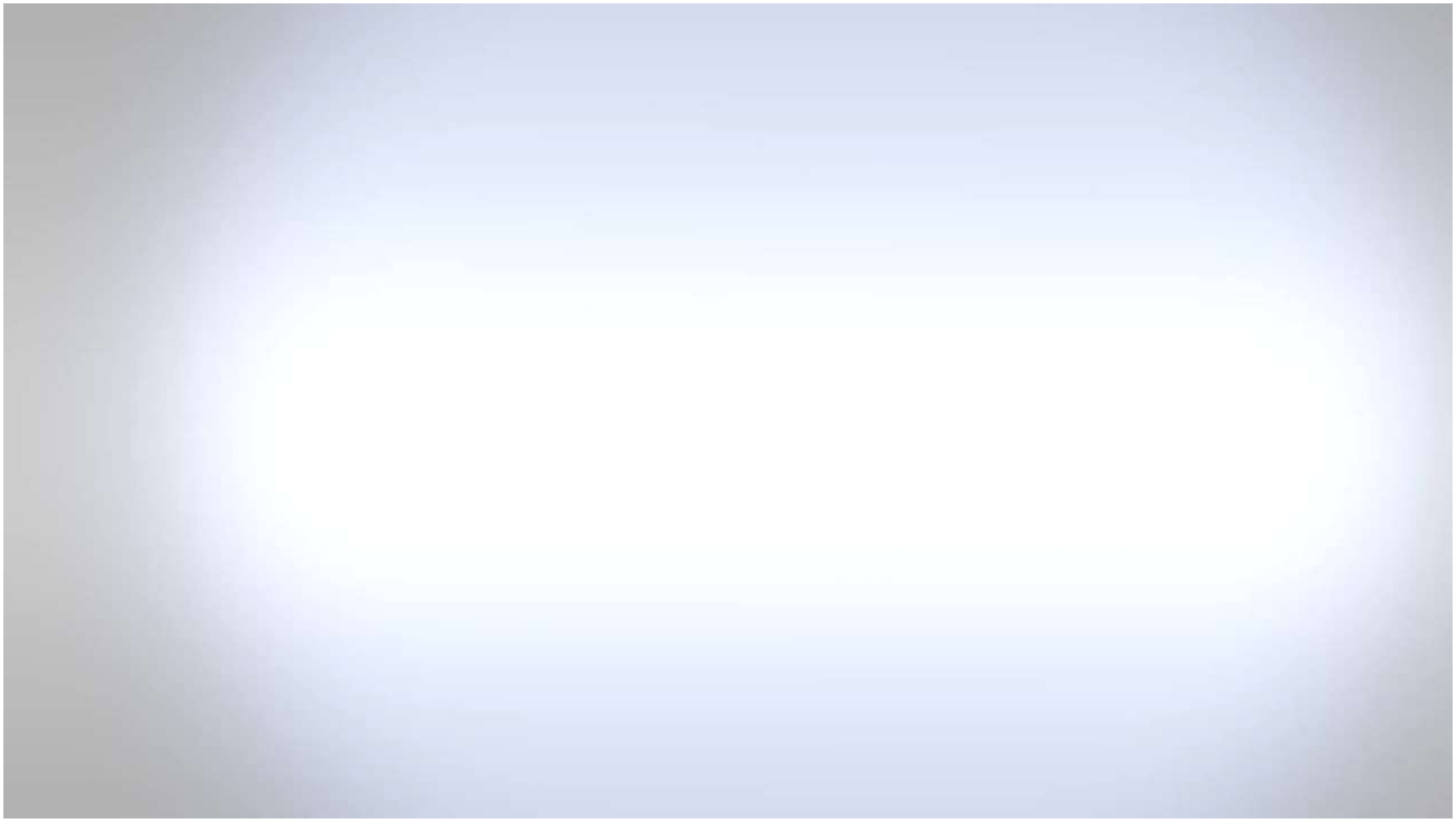


Teesside 2030 Vision



Tees Valley Integrated Complex

Tees Valley Unlimited

Over £3bn investment over last 5 years

Company	Capex
SSI	£1.9 billion
Air Products	£600 million
Sembcorp and SITA	£200 million
SNF Oil & Gas	£150 million
BOC Linde	£100 million
Huntsman Tioxide	£65 million
Lotte Chemicals	£60 million

Who are Teesside Collective?

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Multinational companies based in Teesside with an interest developing a CCS network on Teesside

BOC	Largest steam methane reformer in UK
Growhow	Largest UK ammonia fertiliser producer
SSI	Europe's second largest blast furnace
Lotte	produces PET for15bn drinks bottles per year
National Grid	Store developer
TVU	Local Government
NEPIC	Cluster representative

"CCS on industrial plants is going to be a critical part of the global effort to prevent serious climate change. Teesside is in the right place, at the right time, to get ahead of the curve."
Sir David King, UK's Special Representative for Climate Change

"A CCS network in Teesside is a critical step, giving a shot in the arm to British industry's long-term future."
Dianne Sharp, North East Director, CBI

SSI - Europe's second largest Blast Furnace

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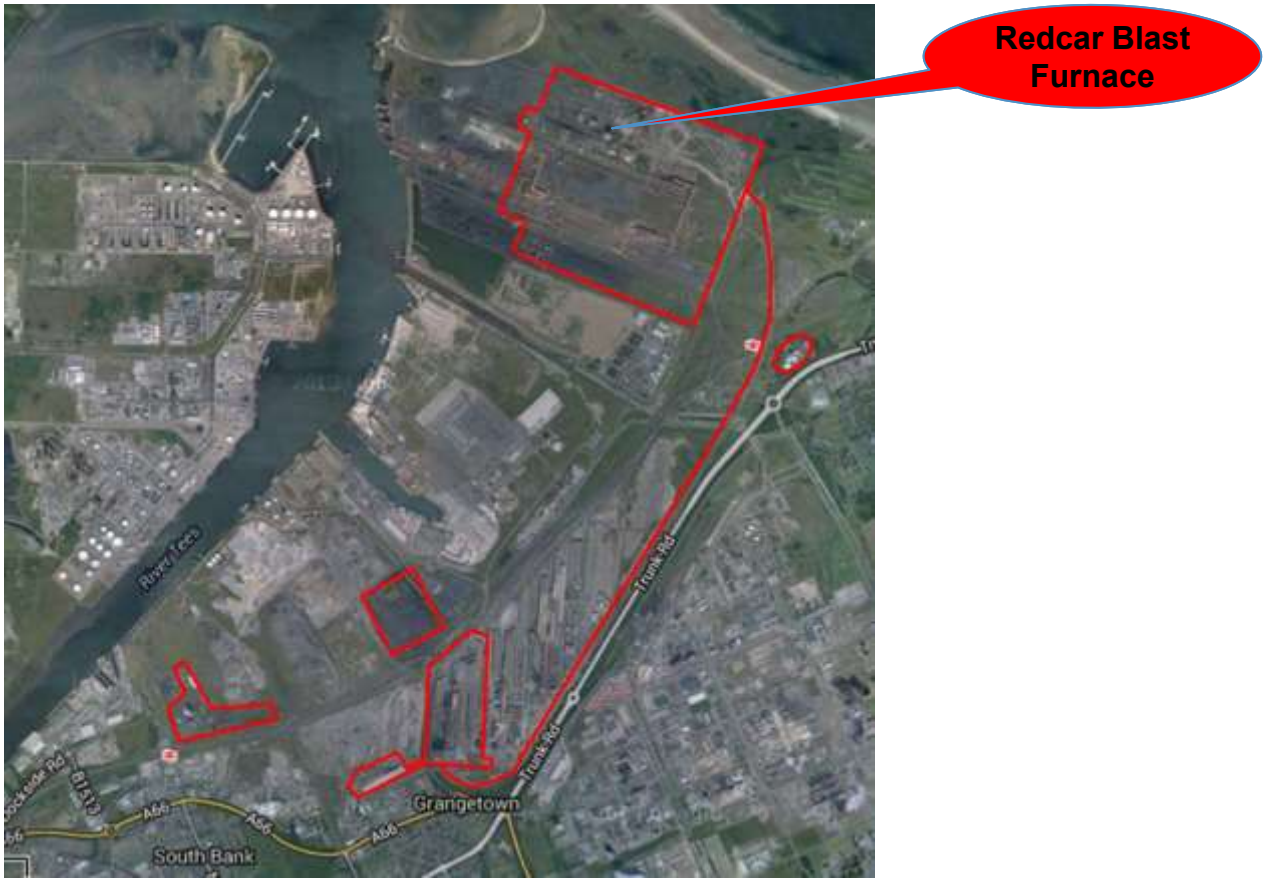

SSI - Europe's second largest Blast Furnace

- Total site emits 7.1million tonnes of CO2 per year
- After optioneering 3 concepts studied in detail:
  1. Post combustion capture on the flue gas from new power station fueled by blast furnace gas – 1.6million tonnes captured
  2. Pre-combustion capture from entire blast furnace gas – 2.1million tonnes captured
  3. Pre-combustion capture from excess blast furnace gas and BOS gas – carbon converted to H2 and CO2 in shift reaction – 2.2million tonnes captured

Growhow – 35% of UK's fertilisers

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- Produces CO2 as part of process, sells to Greenhouses and Drinks industry
- Average of 375,000 tonnes of CO2 per year
- New 100barg compression plant required (2 x 50tonne/hr compressors)
- Proven technology from existing suppliers
- No operation or integration issues identified

Tees Valley Unlimited
Department of Energy & Climate Change
BOC
A Member of The Linde Group
SSI UK
GrowHow
LOTTE CHEMICAL UK
nationalgrid
The power of action
repic

BOC Linde - UK's largest Steam Methane Reformer

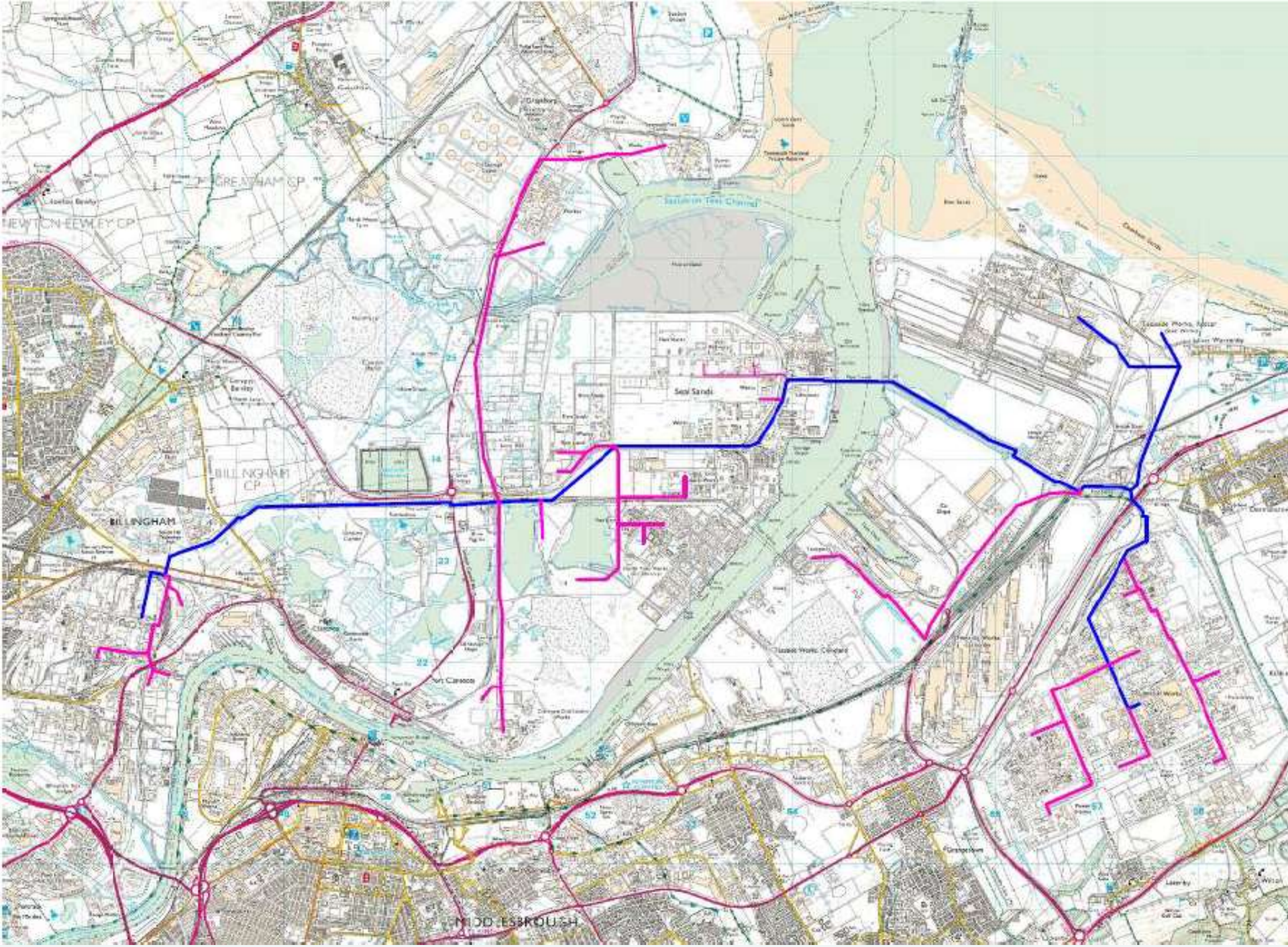
- 305,000 tonnes of CO2 captured
- Conventional Amine Process on flue gas from SMR
- No significant impact on the hydrogen plant
- Significant power consumption – 5.9MW

Lotte - Produces enough PET for 15billion drinks bottles every year

- 50,000 tonnes of CO2 captured
- Amine capture solution selected
- Pre-designed amine units available – American – no European pricing available
- 90% CO2 captured

Onshore network

- 5 and 15 million tonnes per year capacity pipe studied
- 100 barg from capture units with specified CO2, transport at dense phase
- Constraints identified to generate route:
  - Environmental
  - NG NTS Feeder
  - Populations
  - Access to suitable shore landing
  - Rail and road crossings


BILLINGHAM
MIDDLESBROUGH
Seal Sands

Offshore network

- Two possible destinations:
- National Grid's 5/42 / Bunter
  - 154km
  - 3 pipeline crossings, 3 communication crossings, 3 electrical transmission cable crossings, submarine exercise area.
  - 5mt/yr = 18in. 15mt/yr = 24in
- Captain
  - 433km
  - 4 pipeline crossings
  - 5mt/yr = 20in. 15mt/yr = 30in

Investment mechanism

- Without an investment mechanism, such as the power sector has, Industrial CCS will not happen
- Trade exposed sectors - Costs cannot be passed on to consumers
- EU ETS certificates are not bankable
- Industrial companies can close – long term financing unavailable
- Clustering important to minimise individual credit risk and decrease infrastructure costs

What has Teesside Collective done?

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- Used the £1million received from DECC to:
  - Engineer and cost capturing CO2 from 4 industrial plants, an onshore & offshore network and developing a new store (Amec Foster Wheeler)
  - Develop the Business Case for an industrial CCS network (Pale Blue Dot)
  - Propose a solution to 'how can Industrial CCS be funded?' (Societe Generale)
- We have:
  - Shown we can cut industrial CO2 emissions by 2.8million te/yr for at least 20 years
  - Shown it supports retaining 5,900 local jobs
  - Shown it can be done by 2025 for less than £95/te CO2 stored at current prices.
  - Readily expand by a factor of 3 for less than 10% cost increase
- We are
  - Developing the project proposal and plans for FEED towards a FID
  - Identifying additional partnerships

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Thank You

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Research needs summary

- The technical needs include:
  - *Opportunities to improve efficiency & operational costs*
  - *Small scale capture is very expensive*
  - *Best approach for integrated steelworks*
  - *Operation of network – management, control & measurement*
  - *Reliability & Asset management*
  - *Large scale use possibility*
  - *Challenge of integration of other processes*
  - *Retrofitting of existing assets*
    - *New processes*
- Storage options need development
  - *How to reduce costs and risks further - monitoring*