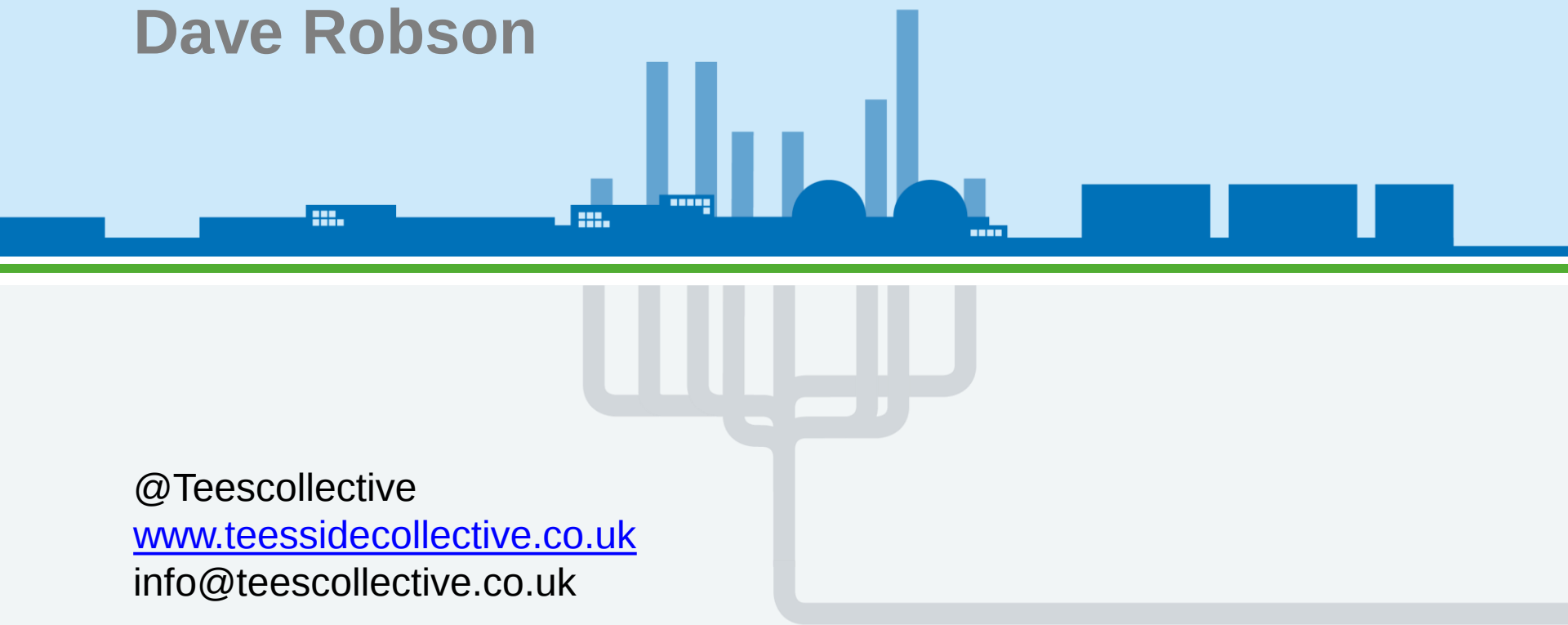




A NEW INDUSTRIAL FUTURE FOR THE UK

# Developing an industrial CCS network in Teesside

Dave Robson



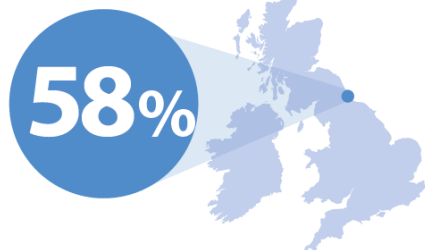
@Teescollective

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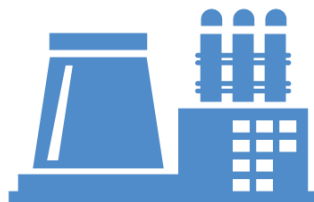
# Why ICCS and Why Teesside?

Teesside is responsible for



of the UK's chemicals industry

It has **Europe's**  
**2nd largest blast**  
**furnace**



Teesside  
produces  
polyester  
resin for



**Northeast England**  
process industries  
contributes



to the UK economy  
(NEPIC)

Teesside industries  
are responsible  
for

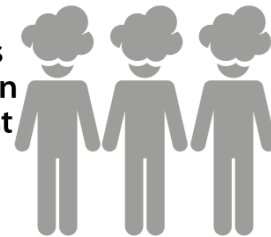


Teesside is home to



Regional  
emissions  
per person  
are almost

**3x**  
the UK average



Costs of CO<sub>2</sub> permits  
are expected to  
**quadruple**  
by 2030





# 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  |



# Current status

- Received £1million from DECC, commissioned Pale Blue Dot, Soc Gen, Madano, and Amec Foster Wheeler
- Engineering now complete with cost estimates
- Business Case now in development
- Soc Gen developing a short list of funding mechanisms
- Commissioning economic impact assessment
- Launch of project in June / July

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- Europe's second largest Blast Furnace
- Total site emits 7.1million tonnes of CO<sub>2</sub> per year
- After optioneering 3 concepts selected for further study:
  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 – 2.1 million tonnes captured
  3. Pre-combustion capture from excess blast furnace gas and BOS gas – carbon converted to H<sub>2</sub> and CO<sub>2</sub> in shift reaction – 2.2million tonnes captured

- Produces CO<sub>2</sub> as part of process, sells to Greenhouses and Drinks industry
- Produces 950,000 tonnes CO<sub>2</sub> per year, average of 375,000 tonnes of CO<sub>2</sub> per year to be considered available for network
- New 100barg compression plant required (2 x 50tonne/hr compressors)
- Proven technology from existing suppliers
- No operation or integration issues identified

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- UK's largest Steam Methane Reformer
- 305,000 tonnes of CO<sub>2</sub> captured
- Conventional Amine Process on flue gas from SMR
- No significant impact on the hydrogen plant
- Significant power consumption – 5.9MW

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- Produces enough PET for 15 billion drinks bottles every year
- 50,000 tonnes of CO<sub>2</sub> captured
- Amine capture solution selected
- Pre-designed amine units available – American – no European pricing available
- 90% CO<sub>2</sub> captured

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# Onshore network

- 5 and 15million tonnes per year capacity pipe studied
- 100 barg from capture units with specified CO<sub>2</sub>, transport at dense phase
- Constraints identified to generate route:
  - Environmental
  - NG NTS Feeder
  - Populations
  - Access to suitable shore landing
  - Rail and road crossings

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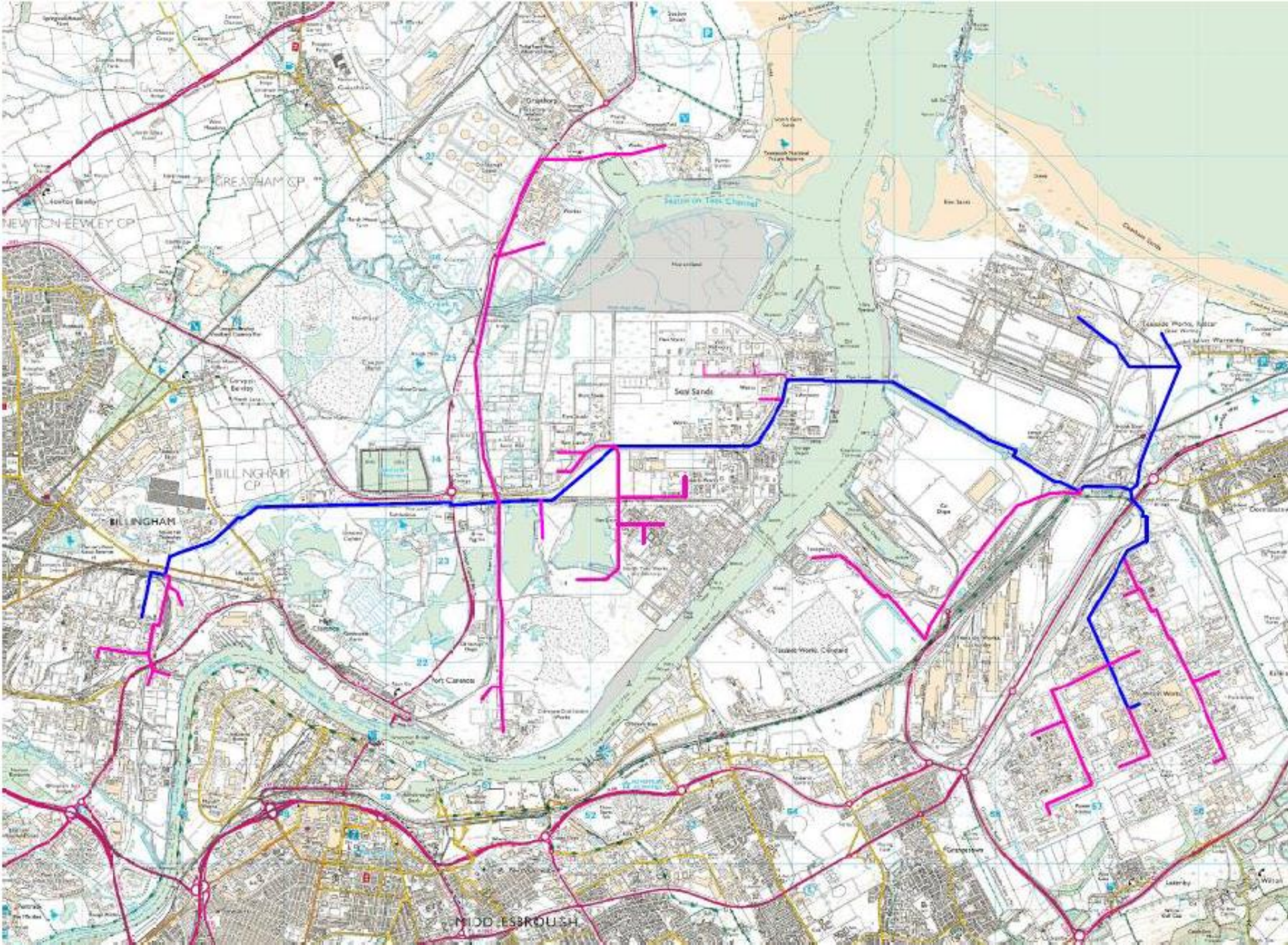
  
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# Offshore network

- Two destinations:
  - National Grid's 5/42 – 154km, 3 pipeline crossings, 3 communication crossings, 3 electrical transmission cable crossings, submarine exercise area. 5mt/yr = 18in. 15mt/yr = 24in
  - Shell's goldeneye – 433km, 4 pipeline crossings. 5mt/yr = 20in. 15mt/yr = 30in
- 5 components:
  - Booster station – PIG receivers, metering, booster pumps and PIG launcher
  - Onshore Horizontal Directional Drill to beach – cross under two natural gas lines to get to beach
  - Shore approach – pre-trench area to float the pipe to beach connection
  - Transport line – concrete coated, trenched and buried under 50m of water then laid on seabed
  - Delivery Termination – subsea isolation valve, riser to platform, PIG receiver, and metering

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# Funding mechanism

- Without a funding mechanism, such as the low carbon power sector has, this project is not viable
- Costs cannot be passed on to consumers
- EU ETS certificates are not bankable
- Industrial companies can close
- Clustering important to minimise individual credit risk and decrease infrastructure costs
- NER400 opportunity, especially for Transport and Storage for clusters
- A funding mechanism is possible and will be presented in June
- Who pays?

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