



CO₂ EOR and storage: A key enabler for CCS in the UK

J A Lorsong

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EOR candidates are accessible from proposed CCS projects



UK Applicants for NER300 Funding

Peterhead, SSE
400 MW, 1.5 Mtpa

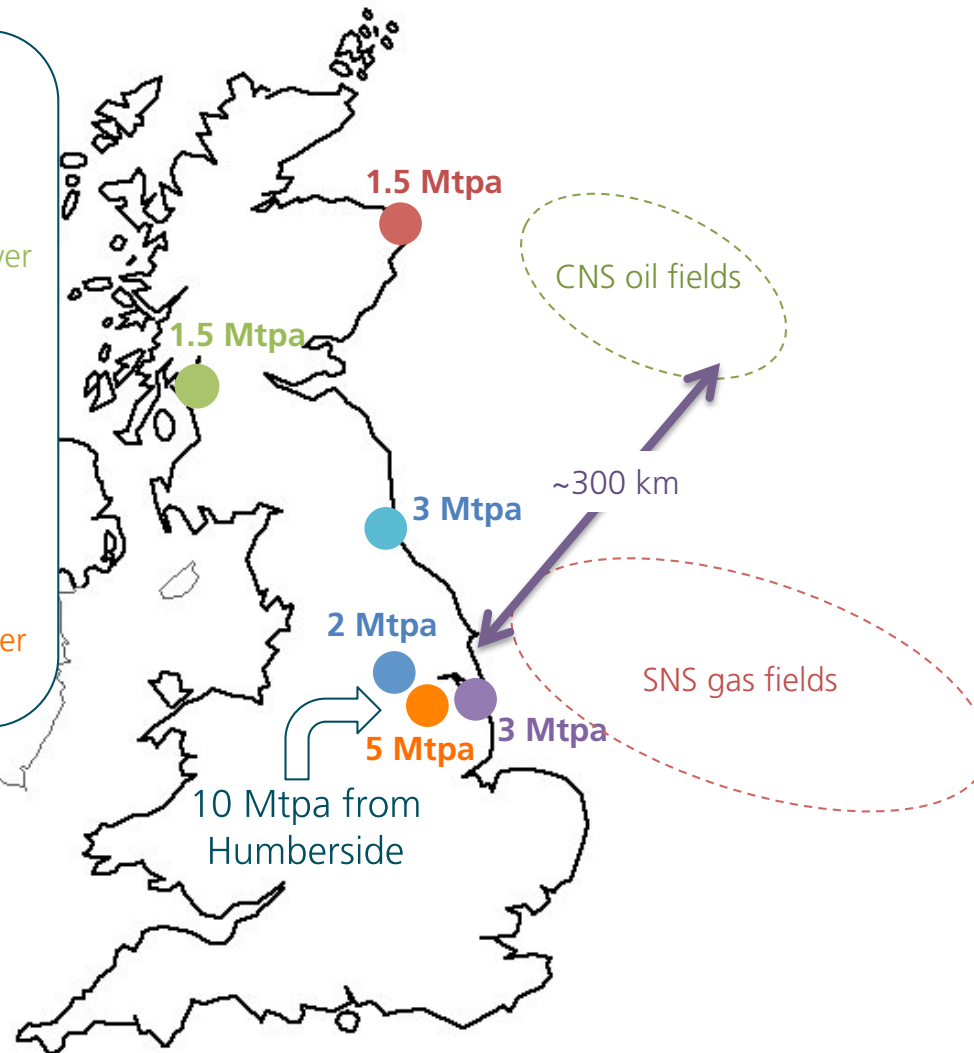
Hunterston, Peel Power
300 MW, 1.5 Mtpa

Teesside, Progressive
450 MW, 3 Mtpa

Selby, Drax
300 MW, 2 Mtpa

Immingham, C-Gen
450 MW, 3 Mtpa

Don Valley, 2Co Power
650 MW, 5 Mtpa



Many oil fields in the Central North Sea are suitable for CO₂ EOR

Transporting CO₂ by pipeline from Humberside is technically feasible

Potential CO₂ supply 5 – 11 Mtpa by 2020

Generic North Sea development for CO₂ EOR and storage



Project size

- Assume ultimate recovery of 1.5 - 3 stb/t of imported CO₂ and 8 - 15% of STOIP (cf 3 stb/t and 12% onshore*)
- 80 Mt CO₂ (4 Mtpa for 20 years) yields 120 - 240 mmstb
- Field size needed: 800 – 1,500 mmstb STOIP
- 25 – 60 wells for 25 - 30 mmstb/well



New facilities capex £500 - £1,000 m

- CO₂ import & injection – riser, metering, manifolds, vent, (pumps)
- Produced gas recycling >300 mmscfd – compression and power
- New steel jacket and platform (bridge-linked to existing)
- Platform life extension
- Installation, hook-up & commissioning

Generic North Sea development for CO₂ EOR and storage (cont'd)



Well capex £150 - £700 m

- Workovers to equip for CO₂ service
- New drilling for improved well placement and spacing
- Abandonments for CO₂ storage integrity

Opex £70 – 90 m/yr

- Operations, maintenance, inspection and corrosion control
- CO₂ storage monitoring, CO₂ Storage Permit and CO₂ Storage Lease

Illustrative costs & revenues (£ billion)

Capex	0.7	1.7
Opex	1.4	1.8
CO ₂ transport (purchase)	0.8	2.5
CO ₂ storage fees	0	1.5
Oil revenue (\$75/bbl)	6	12
Production Taxes	3	9

N Sea EOR is potentially economic with conservative assumptions on oil recovery and price, over a range of scenarios

Many potentially economic scenarios may not achieve commercial returns commensurate with risks

CO₂ EOR and storage enablers



- Regulatory framework that facilitates concurrent CO₂ EOR and storage
 - in place, but as yet untested on a development
 - practical provisions for post-injection handover and financial security
- Taxation of CO₂ EOR projects that supports commercial returns, such as
 - reduced rates of Petroleum Revenue Tax
 - field allowances (tax credits to offset capital cost)

Benefits of CO₂ EOR and storage

Cost-effective, secure CO₂ storage creating demand for captured carbon

New revenue for government, potentially offsetting low-carbon incentives

Deferred decommissioning

Enhancement of exportable skills and employment



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