ERP Plenary

July 2015
CO₂ Enhanced Oil Recovery

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July 2015
Outline

• Technical challenges
  – CO$_2$-EOR is not easy, and expensive

• Synchronisation issue
  – Timing of CO$_2$ supply

• Geographical disconnect
  – CO2-EOR is in the North and emissions in South
CO$_2$-EOR

Additional equipment
Energy Research Partnership

Successful in USA

Weyburn oil field production profile

US Oil Yields ~6% of total production >300,000 barrels/day

Injecting CO₂ >70 Mt/yr – mainly from natural sources
Benefits of CO$_2$-EOR in UK

**Additional oil**
- ~500 million barrels ~10% of remaining reserves
- increase revenue from North Sea
- revenue -> potential return on public investment

**CO$_2$ storage**
- additional storage space
- low cost

**Accelerate CCS**
- Transition to a low carbon energy system
- Transformation of the North Sea
Barriers in the UK

No CO$_2$ – but needed soon

**Offshore challenge**
- higher CAPEX and OPEX
- fewer wells – delay cost recovery
- uncertain oil recovery

**Economics**
- oil price
- tax regime

**Public acceptance**
- Additional hydrocarbons and CO$_2$ emissions
CO$_2$-EOR economic risks

Some risks are inherent – reservoir performance
Others need negotiating – CO$_2$ price
Demand for CO₂

CO₂ demand profile differs from emitter -> back-up storage needed
Energy Research Partnership

Central North Sea only real prospect

Potential additional oil & operational fields by date

- Northern North Sea
- Central North Sea

CO₂ supply unlikely to reach critical mass until 2025
Supply won’t reach Northern North Sea
Energy Research Partnership

Geographical disconnect

Uncertainty about CO₂ from CCS to St Fergus Teesside pipeline would secure CO₂ supply
Timing CCS is critical for CO$_2$-EOR

Multiple capture projects needed. Pipeline from Teesside to CNS could reduce risks.
Critical timeline for CO$_2$-EOR

- Progress three Phase 2 capture
- Storage Phase 2 CCS
- Reliable CO$_2$ supply to CNS >5MtCO$_2$/yr
- Reliable CO$_2$ supply to CNS >9MtCO$_2$/yr
- Next EOR dependent on CO$_2$ supply

2015

- North Sea Oil Gas & CO$_2$ vision.
- CO$_2$EOR ambition

2020

- White Rose approved
- Stores appraised Phase 2 CCS

2025

- Phase 2 CCS plants
- EOR pilot 4-5MtCO$_2$

2030

- CO$_2$ supply options to CNS
  - Multiple capture Teesside
  - SNS -> CNS Pipeline
  - Multiple new capture Scotland

2035

- Next EOR 5MtCO$_2$
- Second EOR 5MtCO$_2$
Mitigating transportation risks

Pipeline Teesside to CNS
- additional cost

‘Market Maker’
- publicly supported CO$_2$
  transport company
- de-risk interdependencies

Humber

Source ETI
Wider economic return on investment

Source: Element Energy
Recommendations

North Sea plan to coordinate oil extraction, CCS and CO₂ network

CCS on its own will not deliver the full benefits of CO₂-EOR
A North Sea CO₂ network could open up a new offshore industry

Early policy decisions on CCS Phase 1 & 2 determine CO₂-EOR outcomes

Both CCS Commercialisation projects should be supported
Govt to create environment to progress Phase 2 CCS by 2017
De-risk storage in depleted oil fields and aquifers

Ensure offshore tax regime supports CO₂-EOR’s high expense and risks
Additional support for early CO₂-EOR project – essential for learning

CO₂ network to reduce risks and cost for emitters, sinks and CO₂ users
A publicly supported ‘Market Maker’ network company would accelerate deployment of CCS and CO₂-EOR