



Issues facing offshore EOR

newenergy

# EOR or CCS – a chicken or egg question

Ian Phillips – Director, CO2 Infrastructure



- CO<sub>2</sub>DeepStore is a UK company
  - founded in 2007 and based in Aberdeen
  - focussed entirely on creating, developing and operating CO<sub>2</sub> transportation and storage projects as Operator and / or investment partners
  - acquired 100% by Petrofac Limited in April 2010
- Petrofac
  - A Co-Investing Energy Services Business
  - Designs / Builds / Operates onshore and offshore facilities
- Company profile (2010 Annual Report)
  - Revenues US\$4.4 billion
  - Net cash \$1.1 billion
  - FTSE 100 – Market cap US\$7.4 billion (March 2011)
  - 15,000+ employees
  - 5 major operating centres
    - 19 further offices worldwide

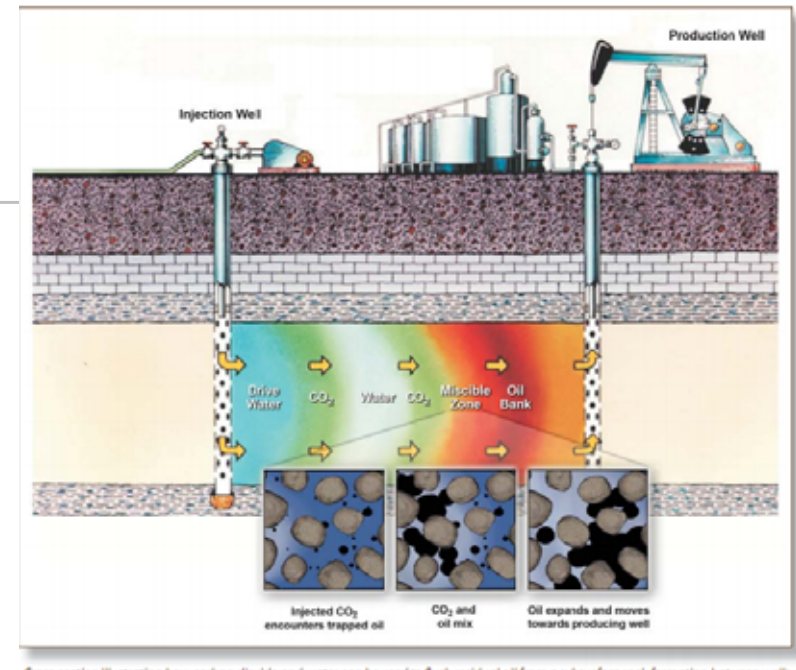


- Attractive proposition
  - Very common in USA
  - Involves large oil company balance sheets
  - Engages large oil company technical know-how
  - Minimises “transition” challenges
    - Petroleum-licence-to-CCS-use of pore space
- Result
  - Globally governments / academics / industry watchers expect this to happen widely – to lead CCS investment
    - In the USA this is what is happening

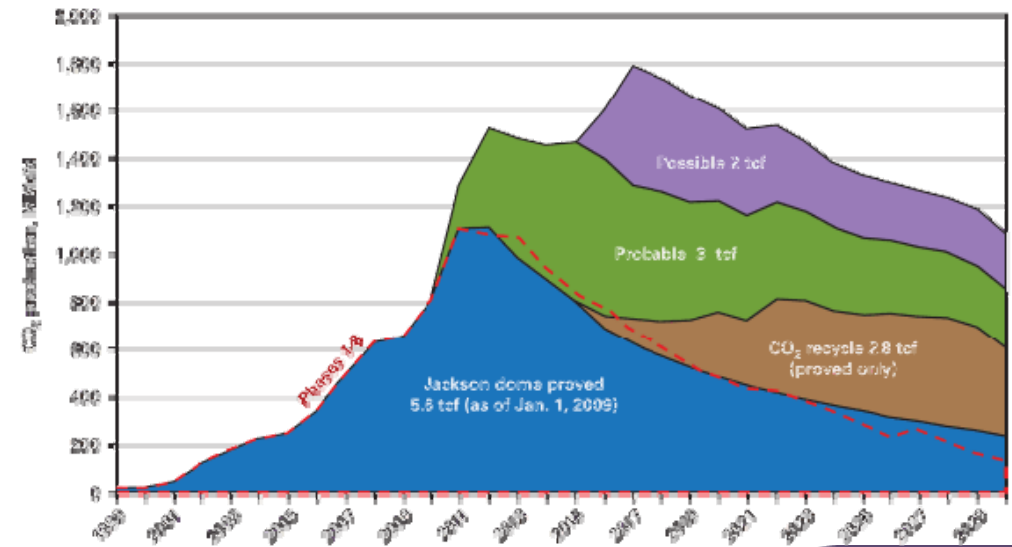


# CO<sub>2</sub> DeepStore EOR works

- EOR is
  - Well established
  - Works well
- Predominantly in the USA
  - ~50 million tonnes per annum CO<sub>2</sub> injected
  - ~350-400,000 bbls/day
    - 5% of US production
  - Estimated 240 billion barrels potential reserves
- EOR needs a lot of CO<sub>2</sub>
  - ~1/3 tonne new CO<sub>2</sub> per bbl



POTENTIAL JACKSON DOME CO<sub>2</sub> SUPPLY

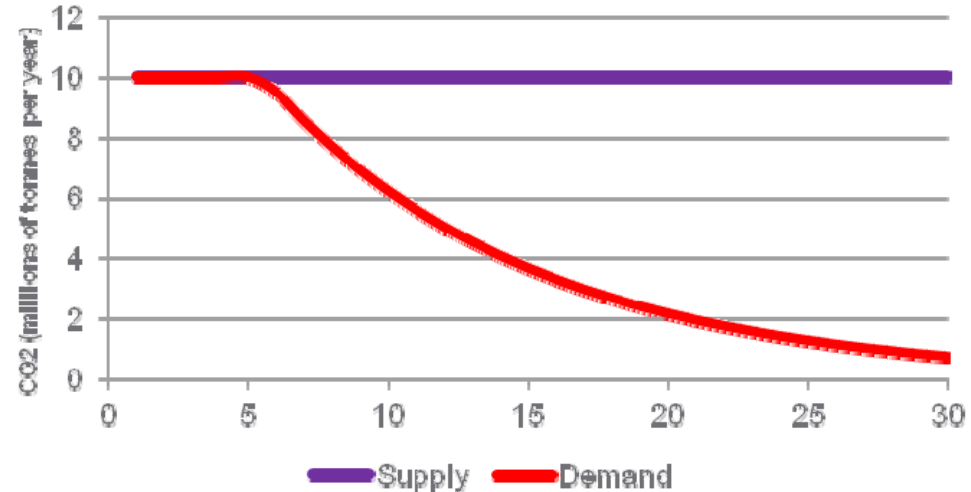


Source: Enbridge Resources Inc.

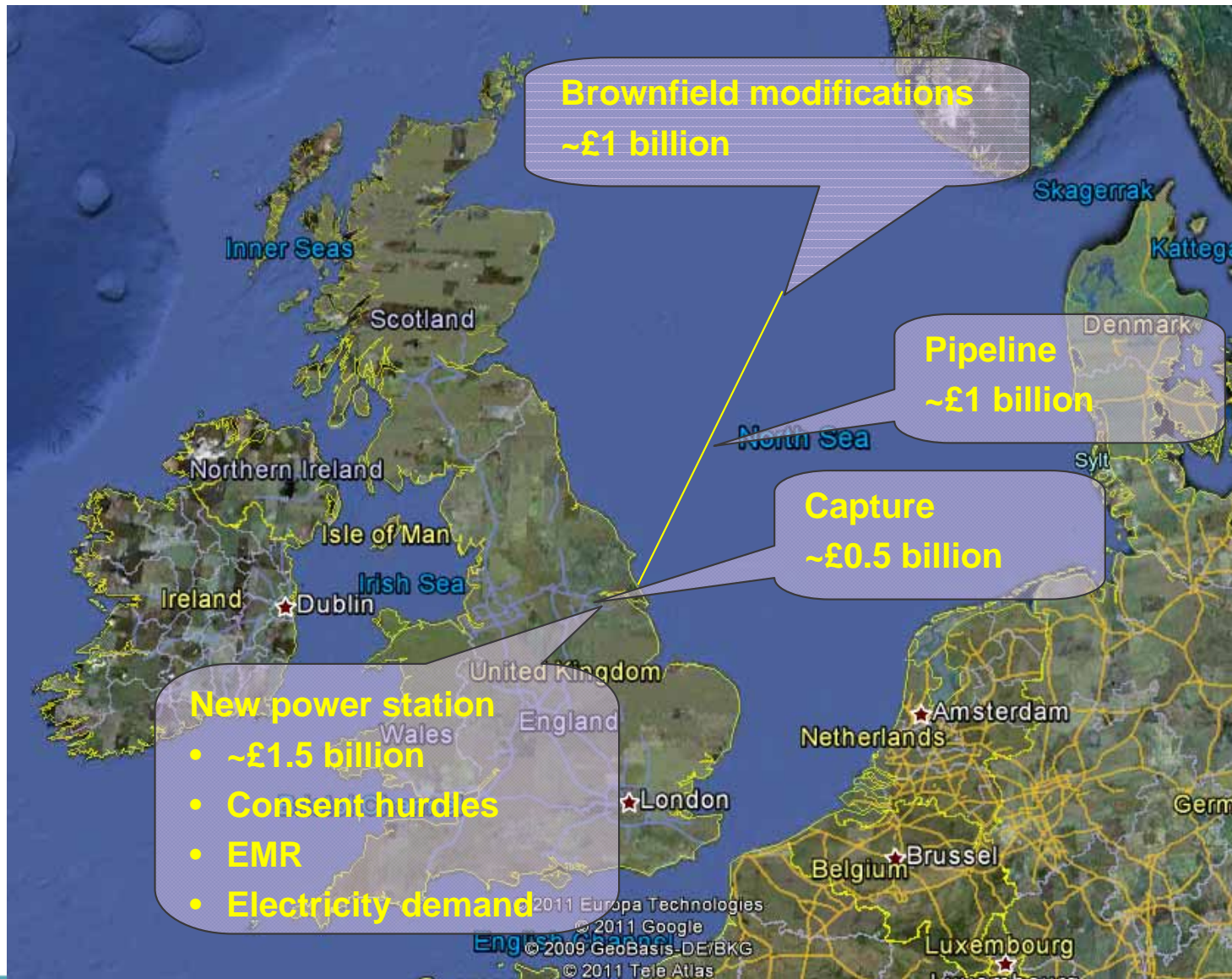


# CO<sub>2</sub> DeepStore Issues facing offshore EOR

- CO<sub>2</sub> Supply
  - Need significant volumes (millions of tonnes per annum)
    - not currently available in NW Europe
    - Uncertain until injection happening
  - Most likely CO<sub>2</sub> source is large point-source
    - Power station / industrial process
  - Take profile doesn't match supply profiles
    - Demand declines as CO<sub>2</sub> cycled
    - Supply essential flat and long term









CO<sub>2</sub> DeepStore

# Synchronous investment unlikely

- Power station
  - Major generator investment decision
- Capture and transportation
  - Major capital programmes – may not be same company's
- Platform and wells
  - Large oil company investment decision
  - Significant reservoir uncertainty
- Major planetary alignment required for this to happen







# CO<sub>2</sub> DeepStore Conclusion

- CCS to storage will lead
  - Simpler (but large) projects – fewer investors, less complexity
- EOR will follow
  - Supply proven – major risk removed







Issues facing offshore EOR

newenergy

# EOR or CCS – a chicken or egg question

Ian Phillips – Director, CO2 Infrastructure

- There are challenges to the supply of CO<sub>2</sub> for EOR in the N Sea
- EOR is proven technology
- The viability of EOR in the N Sea is all about economics and especially certainty of CO<sub>2</sub> supply
- Early EOR concepts have significant CO<sub>2</sub> supply uncertainty
- CCS project to storage will come first; this will enable subsequent EOR
- Synchronous investment decisions in 2 major projects (CCS and EOR) is not feasible