



Department
of Energy &
Climate Change

Industrial CCS & CCU View from the UK

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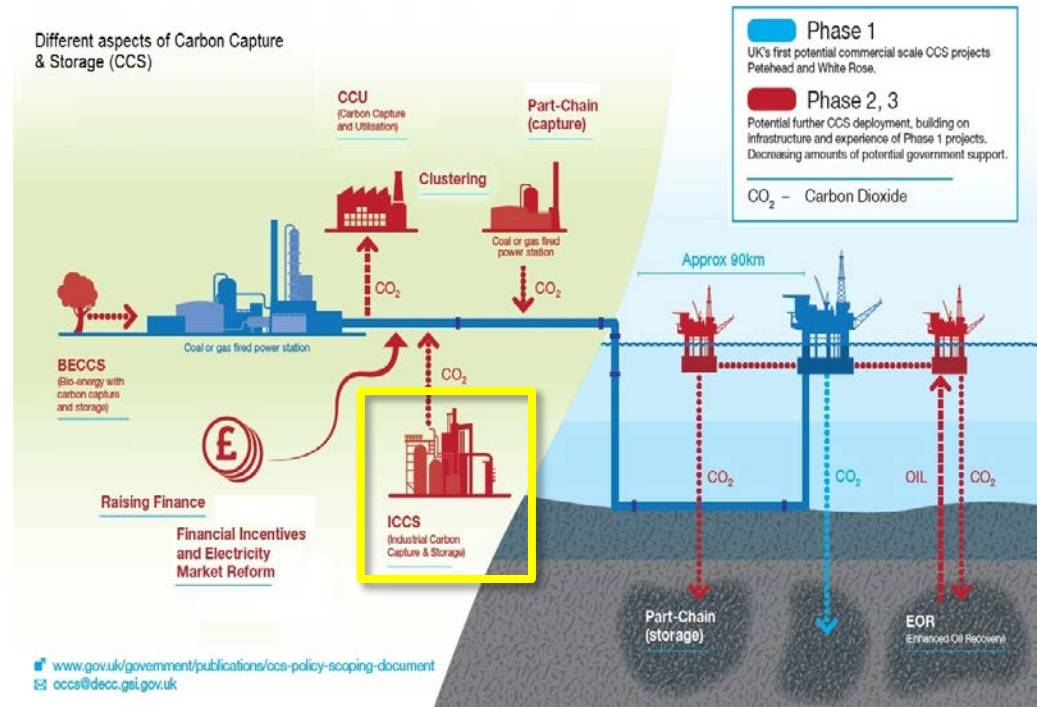
Outline

- Industrial CCS vs Power CCS
- Power CCS in the UK
- ICCS Techno-Economic Study Results
- Tees Valley ICCS
- Next Steps



Industrial CCS vs Power CCS

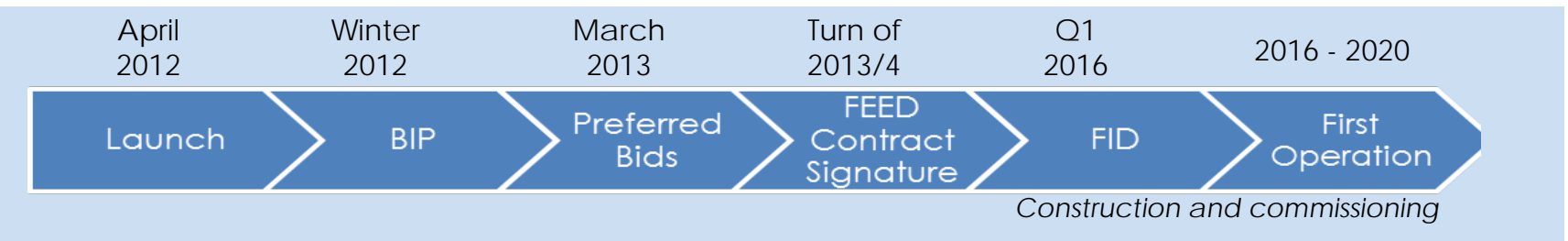
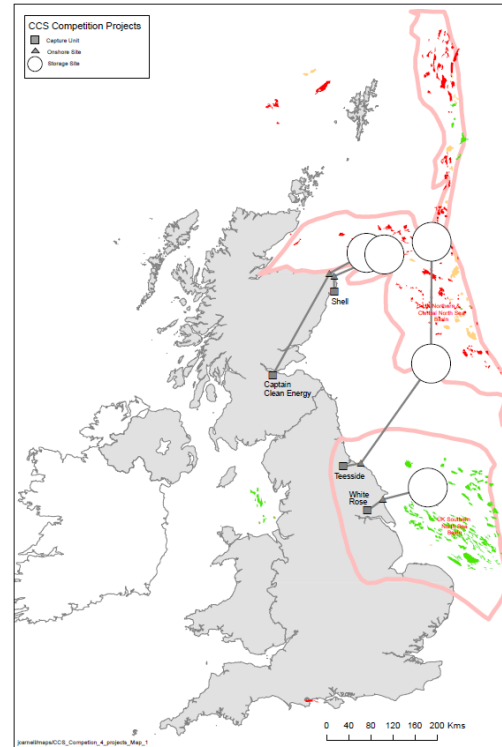
- Process emissions
- Industry produces globally traded products
- Risk of direct carbon leakage
- UK power market is captive (mostly)
- CfD method of funding operation may not work for most UK ICCS applications





Power CCS Commercialisation Programme

- £1bn / \$1.7bn capital funding
- Operational support through CfDs





White Rose



- An oxyfuel capture project at a proposed new 448MW supercritical coal-fired power station on the Drax site in North Yorkshire, England
- Capturing around 90% of all carbon dioxide emissions, ~ 2 million tonnes of CO₂ per year
- Stored in natural porous rock formations under the North Sea

Peterhead

- A 340MW post-combustion capture retrofitted to part of an existing CCGT at Peterhead, Scotland
- Capturing around 85% of the carbon dioxide emissions, ~ 1 million tonnes of CO₂ per year
- Stored in a depleted gas field under the North Sea





Techno-Economic Study - Key Questions

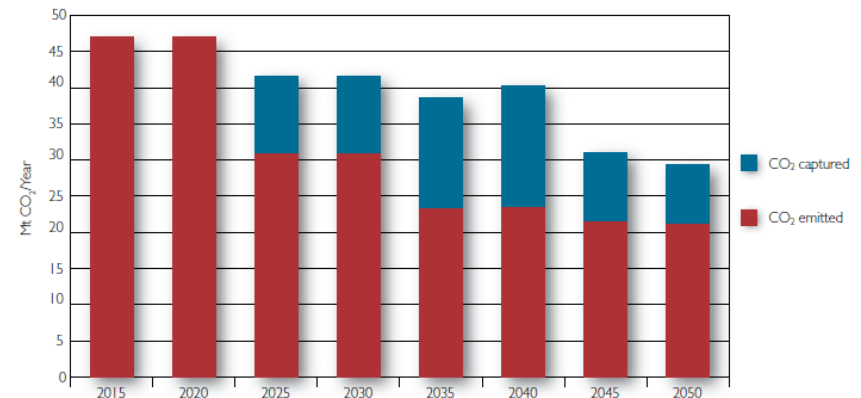
1. What are the **most relevant technologies for industrial CCS** in the UK chemical, iron and steel, refining and cement sectors, which can be implemented by ca. 2025? What do they **cost**? What **technology development**, especially piloting, is required to deliver these?
2. **How could CO₂ utilisation be employed** to facilitate capture from industry, for example by making capture possible for sites e.g. where conventional ICCS is not feasible (difficult to access storage), or by improving the economics of capture?



ICCS Analysis Background

- Technologies that can be retrofitted as “bolt on” solutions by ca. 2025 to existing UK cement, chemicals, oil refining, iron and steel plants.
- Larger industrial CO₂ sources, on an “80/20” basis.
- Emissions from “process” CO₂ (rather than industrial CO₂ sources providing heat or power).

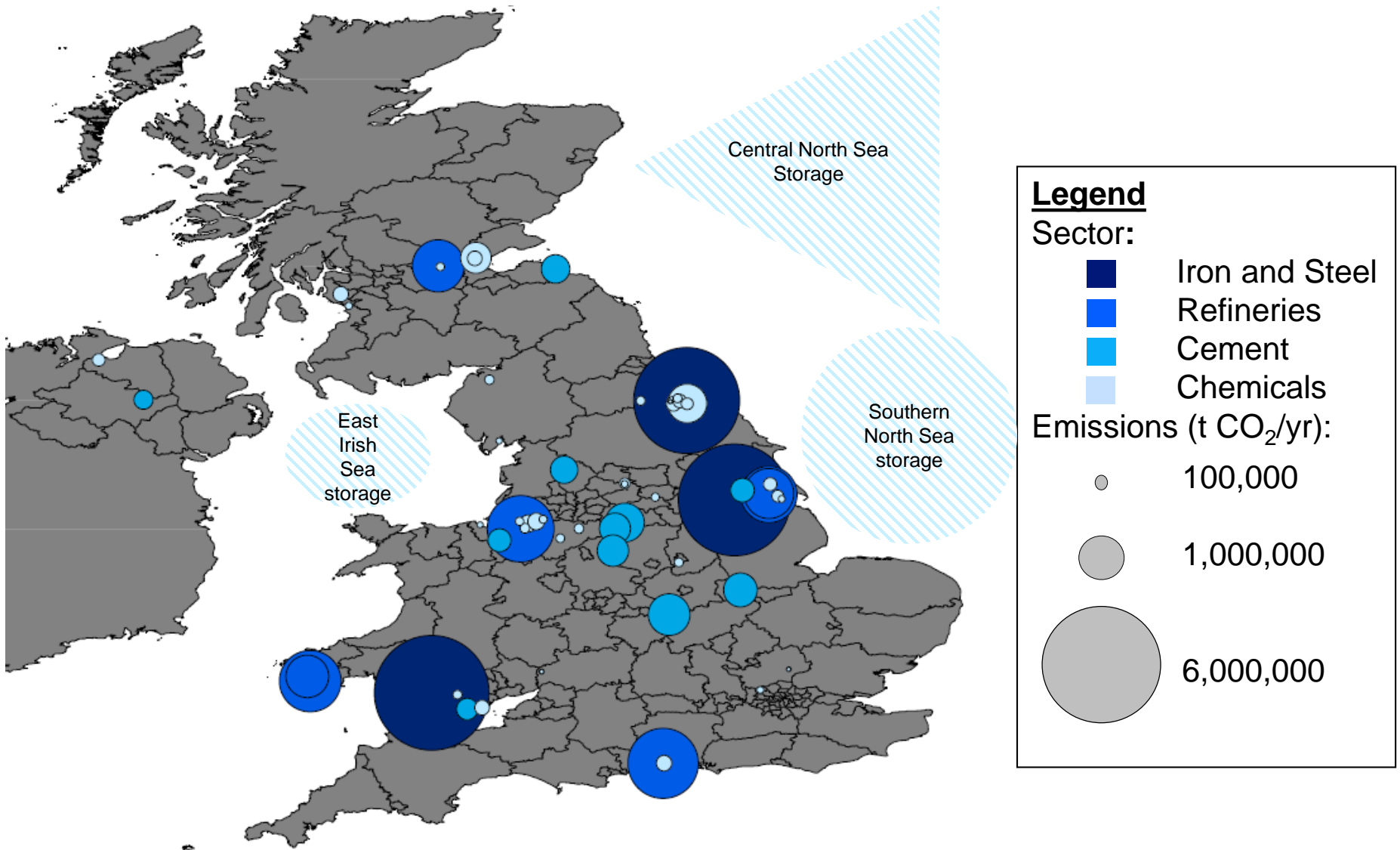
Chart 10: Projection of industry decarbonisation including contribution of industrial CCS



Source: DECC modelling – ESME core run³⁰

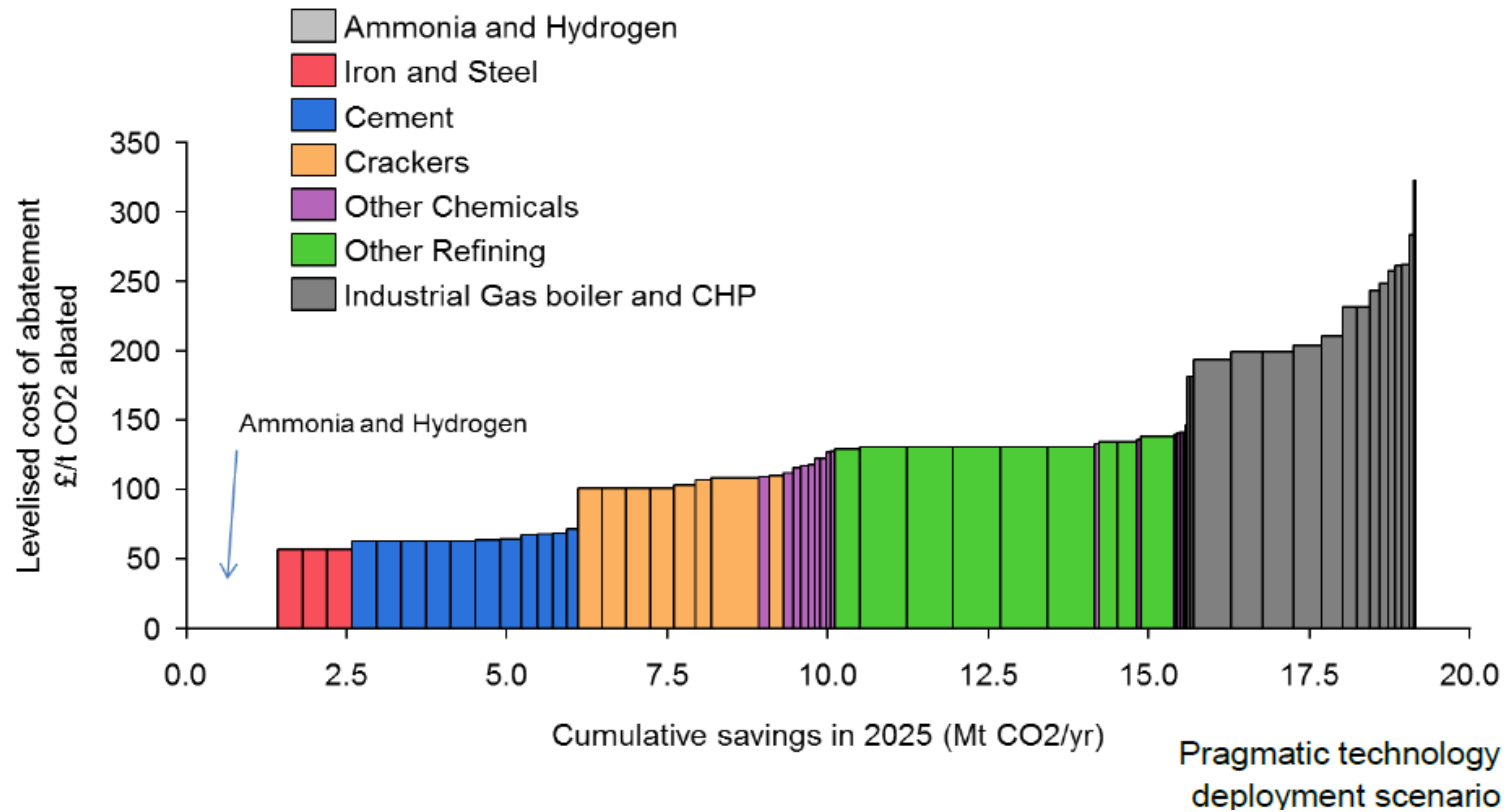
- CO₂ transport, storage, enhanced hydrocarbon recovery, or financing of industrial capture were out of scope.

52 Industrial CO₂ sources





MACC curve of capture technologies





Barriers to deployment

Commercial requirements

Knowledge gaps

Site integration

Operational risks

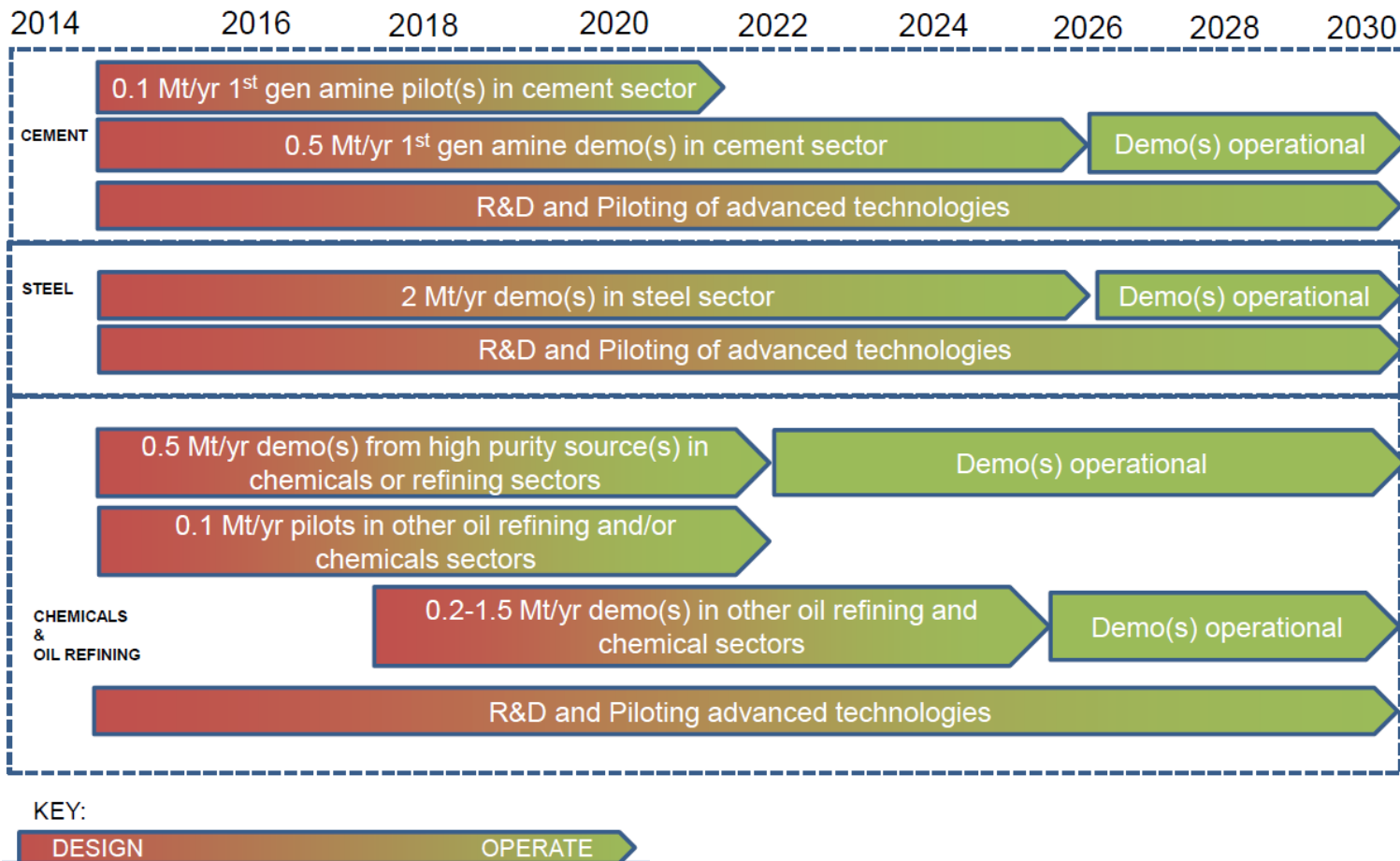
Policy, regulatory and long term investment certainty

Infrastructure availability (transport and storage)

Energy costs



Routes to capture technology deployment





CCU - Results

Only EOR thought to be commercial by 2025 apart from very limited circumstances where CO₂ already used, such as in use of CO₂ in existing chemicals applications.

Remaining technologies at low TRL, high energy cost, or limited market size.



TES Conclusions

Only 1st generation amines likely at scale by 2025 and only if pilots very quickly;

2nd generation bolt-on technologies could be ready at scale by 2030s;

Piloting/demonstration needed by 2020s in all cases;

CCU very unlikely to be commercial by mid 2020s;

Hurdles not just technology and cost;

Costs are comparable to power CCS (except high purity sources).

Key

- Existing Pipe Corridors
- Existing Tunnels
- Existing CO2 Exports
- Future CO2 Exports
- Existing Heat pipeline
- Future Heat pipeline

Ports

- 1** New Energy & Technology Park (Enterprise Zone)
- 2** South Bank Wharf (Enterprise Zone)
- 3** Wilton (Enterprise Zone)

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Seal Sands / North Tees Chemical Sites





Next Steps

- TVU will publish pre-FEED, investment mechanism and business case work
- Welcome EC's proposal for industrial low carbon innovation within NER400 – DECC is talking to stakeholders
- TES and TVU industry collaboration was highly valuable, we will continue to work with industry as next steps are developed
- Questions
 - How much will FEED studies cost?
 - What 2nd generation technology innovation projects may come forward?
 - Who are the key UK players for partnering in innovation and 1st of a kind projects?



Questions?

<https://www.gov.uk/government/publications/co2-capture-in-the-uk-cement-chemicals-iron-steel-and-oil-refining-sectors>