Webinar 4 - Climate change commitments at the corporate level: motivation and effectiveness

UK commitments and market measures to motivate corporate engagement

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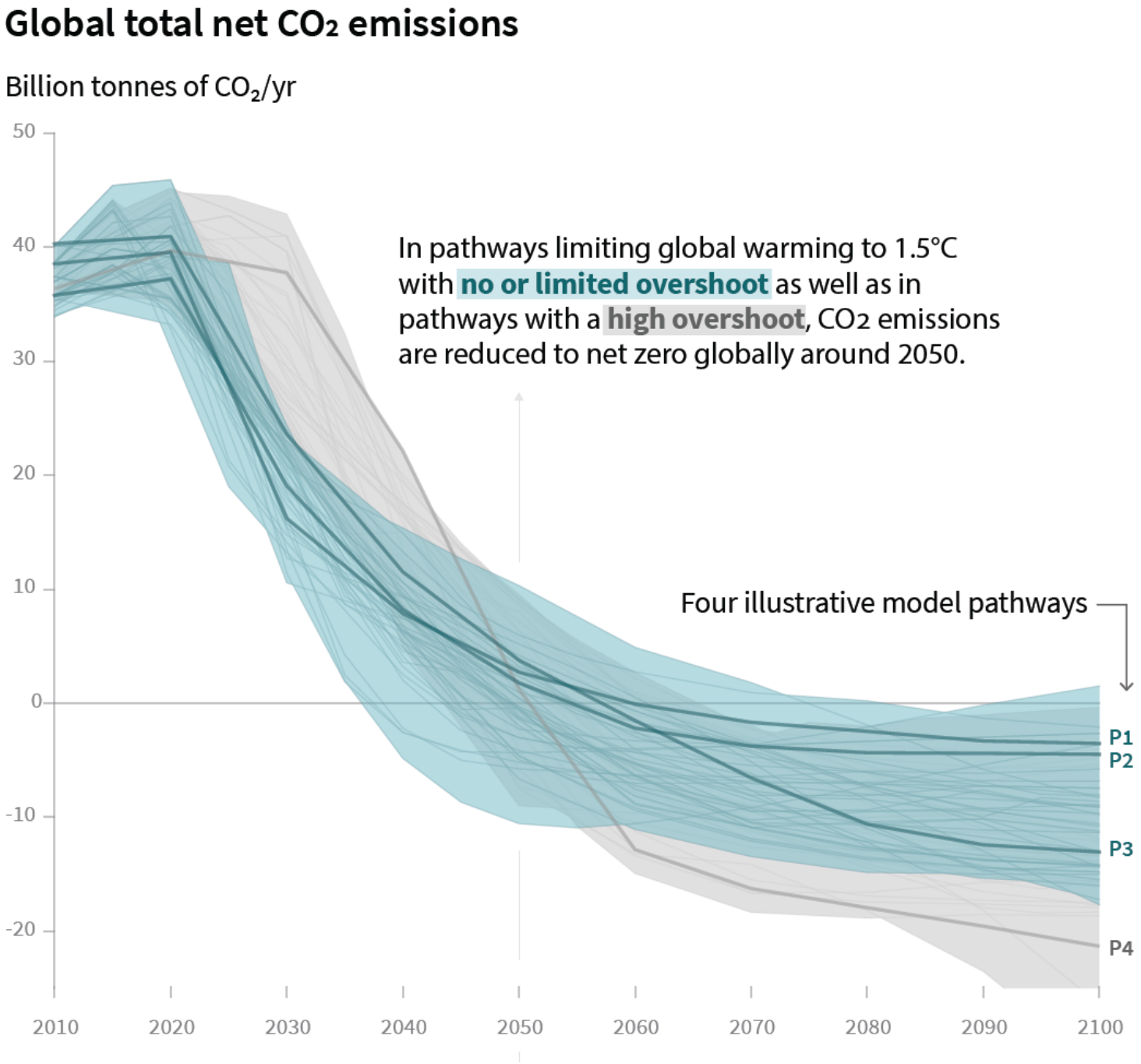
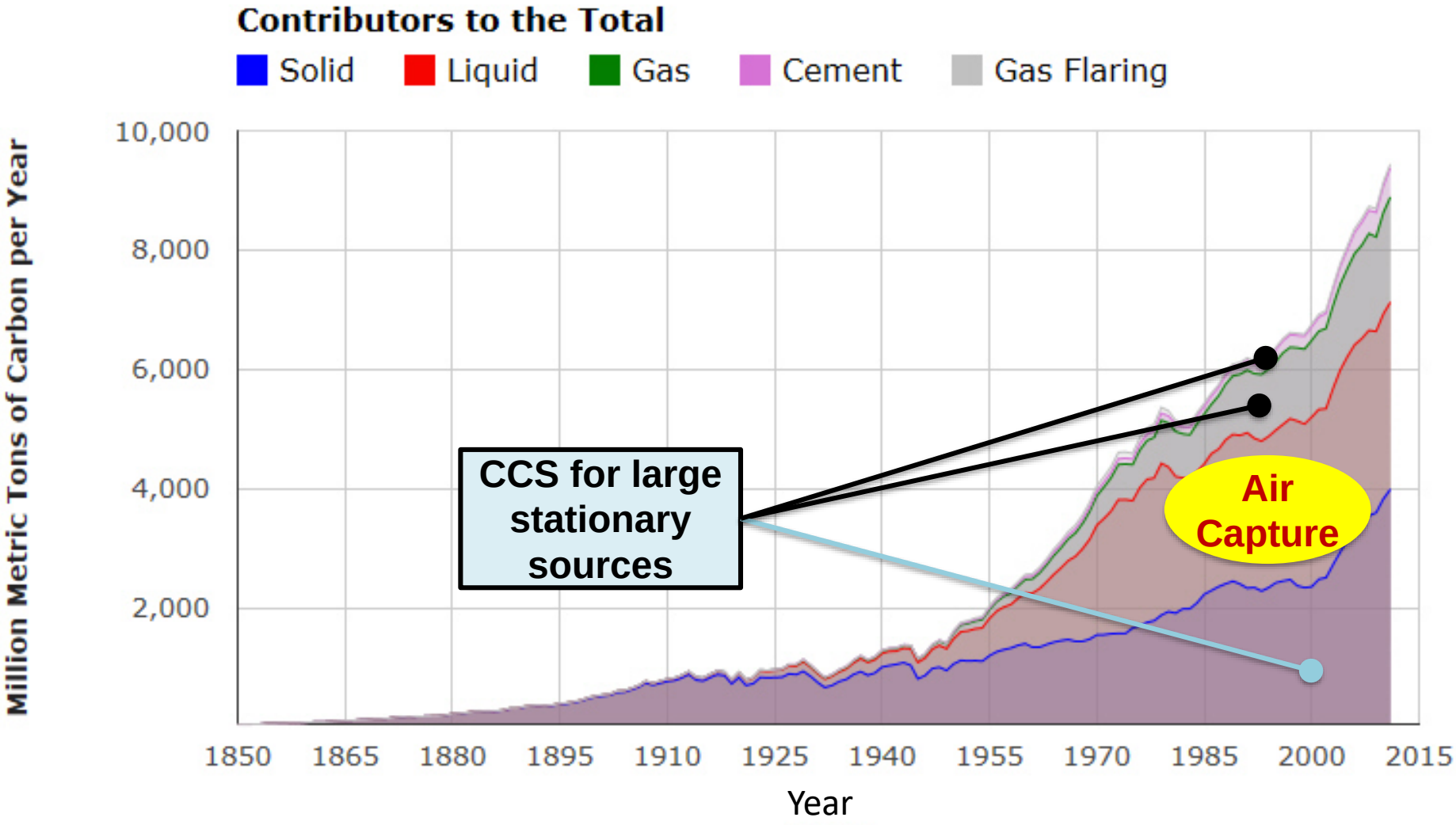
IPCC special report on global warming of 1.5°C, October 2018

CCS and GGR technologies required to achieve even net zero emissions, as well as net negative CO_2 emissions



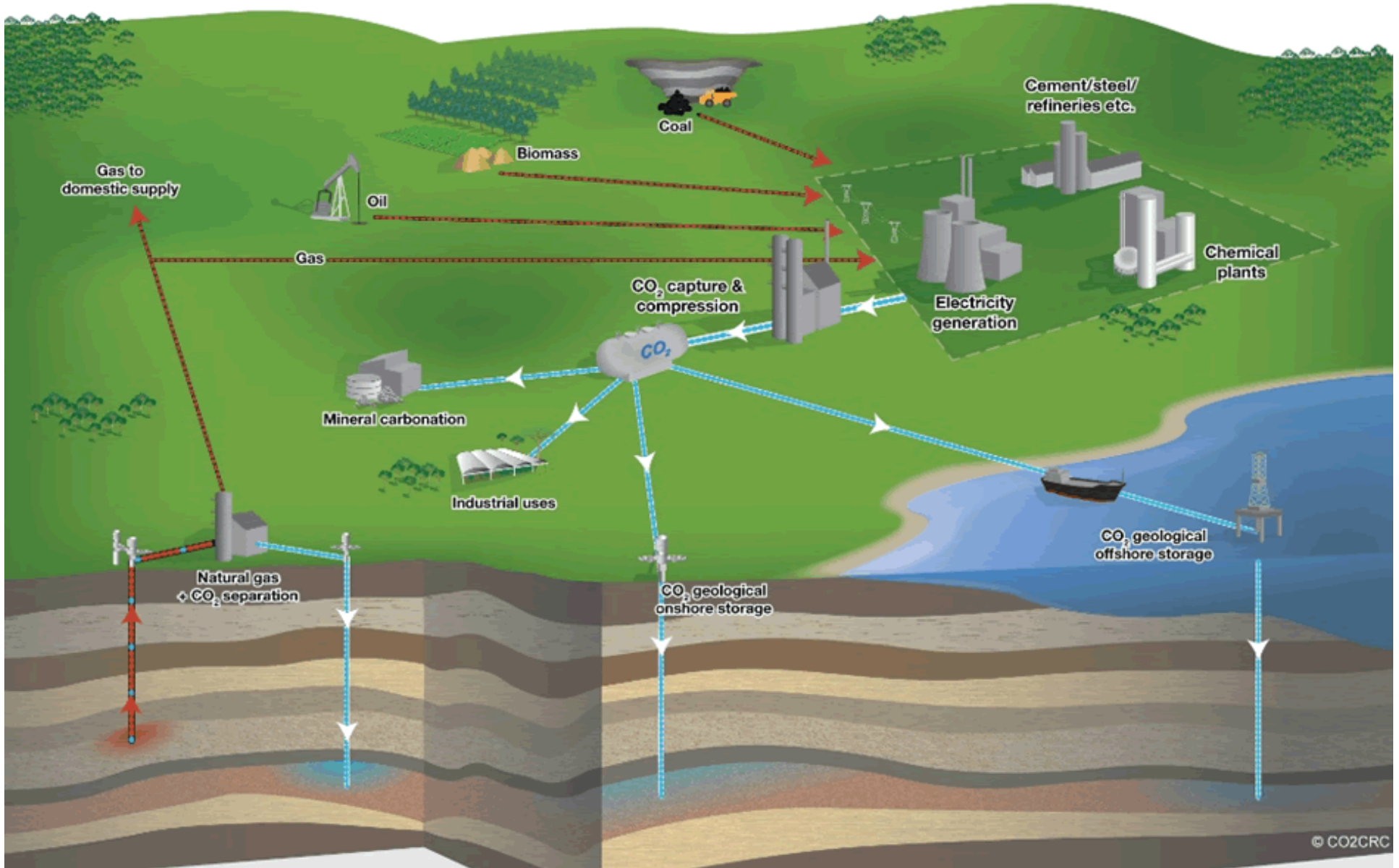
Significant fraction of fossil fuel use requires air capture

http://cdiac.ess-dive.lbl.gov/trends/emis/glo_2014.html



Source: Boden, T.A., G. Marland, and R. J. Andres. 2015. Global, Regional, and National Fossil-Fuel CO_2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi: 10.3334/CDIAC/00001_V2015.

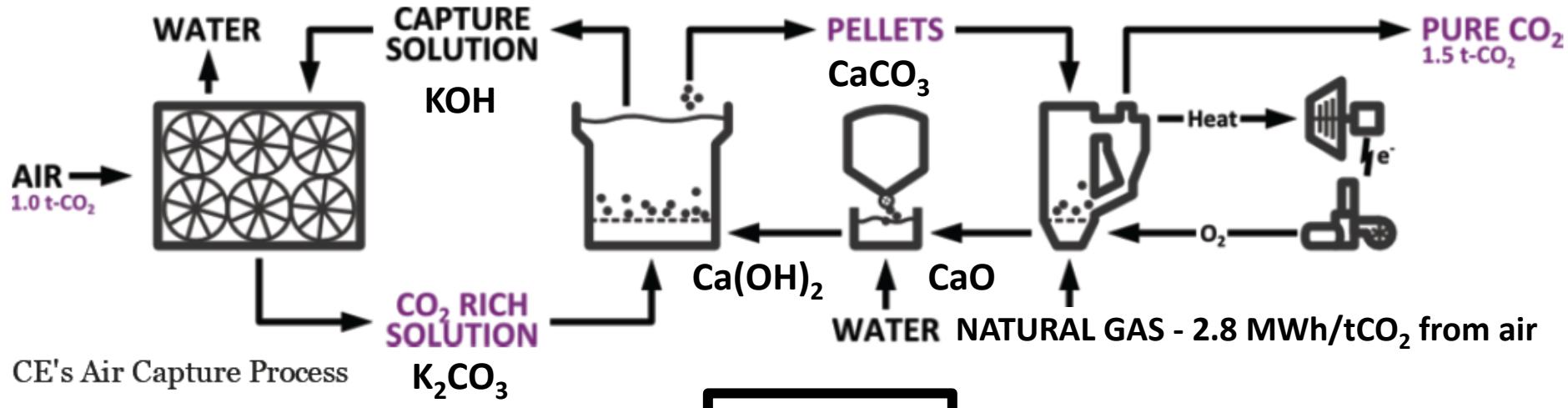
Overview of Carbon Capture and Storage (CCS) from point sources



Example DAC: Carbon Engineering air capture process

Carbon Engineering

http://carbonengineering.com/



Squamish demo plant site construction

Running 2015, ~500 tCO_2/yr scale

Design for 'slab' air contactor

100,000tCO_2/yr scale image, now 1MtCO_2/yr project

Occidental CEO Vicki Hollub on the Company's Future as a "Carbon Management Company; " Its Strategy in Direct Air Capture of CO_2; Expectations for More Industry Consolidation and Why It Will Be Hard for U.S. Oil Output to Return to pre-Pandemic Highs

December 02, 2020

https://news.ihsmarkit.com/prviewer/release_only/slug/bizwire-2020-12-2-occidental-ceo-vicki-hollub-on-the-companys-future-as-a-carbon-management-company-its-strategy-in-direct-air-capture-of-co2-expectations-for-more-industry-consolidation-and-why-it-will-be-hard-for-us-oil-output-to-return-to-pre-pandemic-

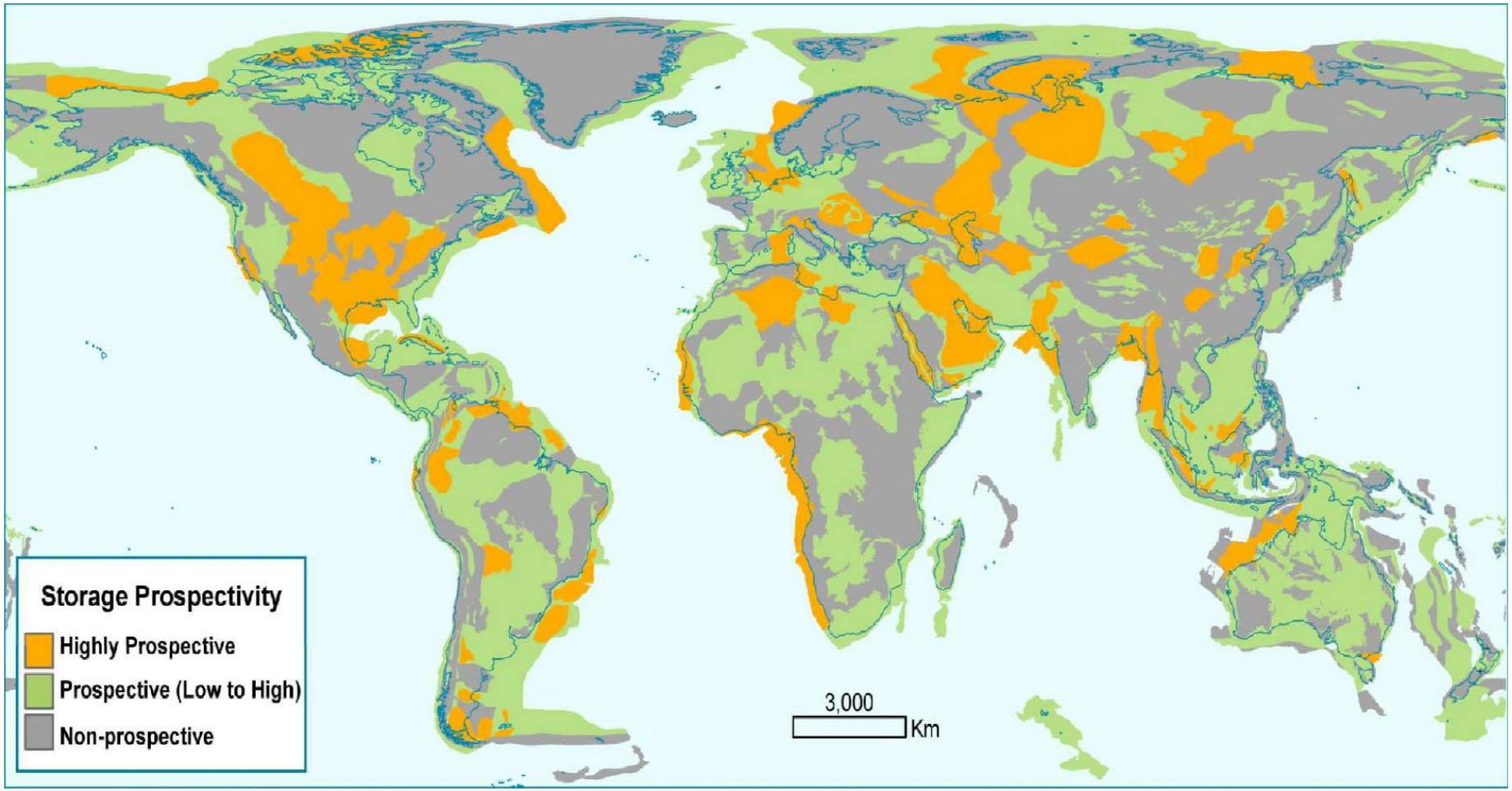
"Ultimately, I don't know how many years from now, Occidental becomes a carbon management company and our oil and gas would be a support business unit for the management of that carbon.

We would be not only using [CO_2] in oil reservoirs [but] capturing it for sequestration, as well. I expect that in the not too distant future our OxyChem business will also be involved in some way to use CO_2 in products that they make. We'd have three ways to manage the CO_2 with both OxyChem and the oil and gas business being a support for that. I believe this industry is going to be huge."

"We're going to build what would now be the largest direct air capture facility in the Permian Basin. We expect to start on that in late 2022 or early 2023. Direct air capture is a process that just pulls CO_2 out of the atmosphere.

[This would be funded by a combination of 45Q and the California Low-Carbon Fuel Standard.]

CO_2 Storage Prospectivity



Source: Bradshaw, J. and Dance, T. (2004): *"Mapping geological storage prospectivity of CO2 for the world's sedimentary basins and regional source to sink matching,"* in (E.S. Rubin, D.W. Keith and C.F. Gilboy eds.), GHGT-7, Proc. Seventh International Conference on Greenhouse Gas Control Technologies, Vancouver, B.C., Canada, September 5-9, 2004.

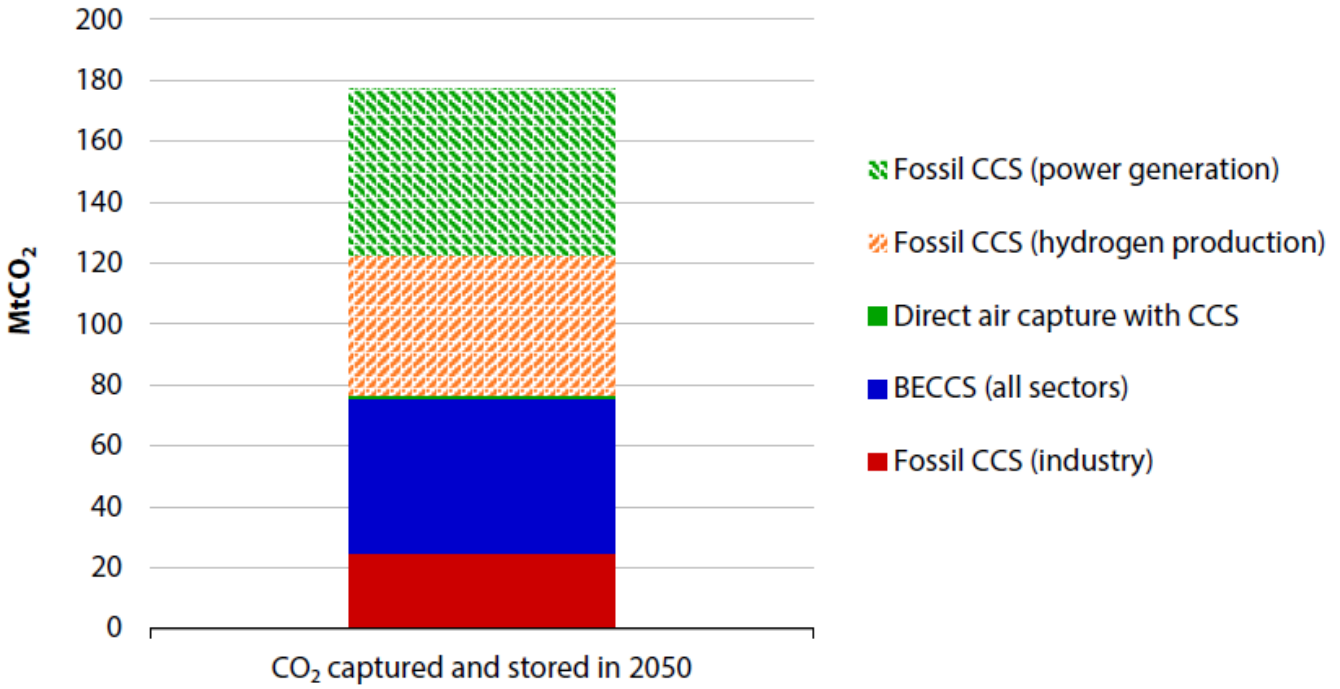
Committee on Climate Change Net Zero report, May 2019

https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

UKCCS RESEARCH CENTRE

The University Of Sheffield.

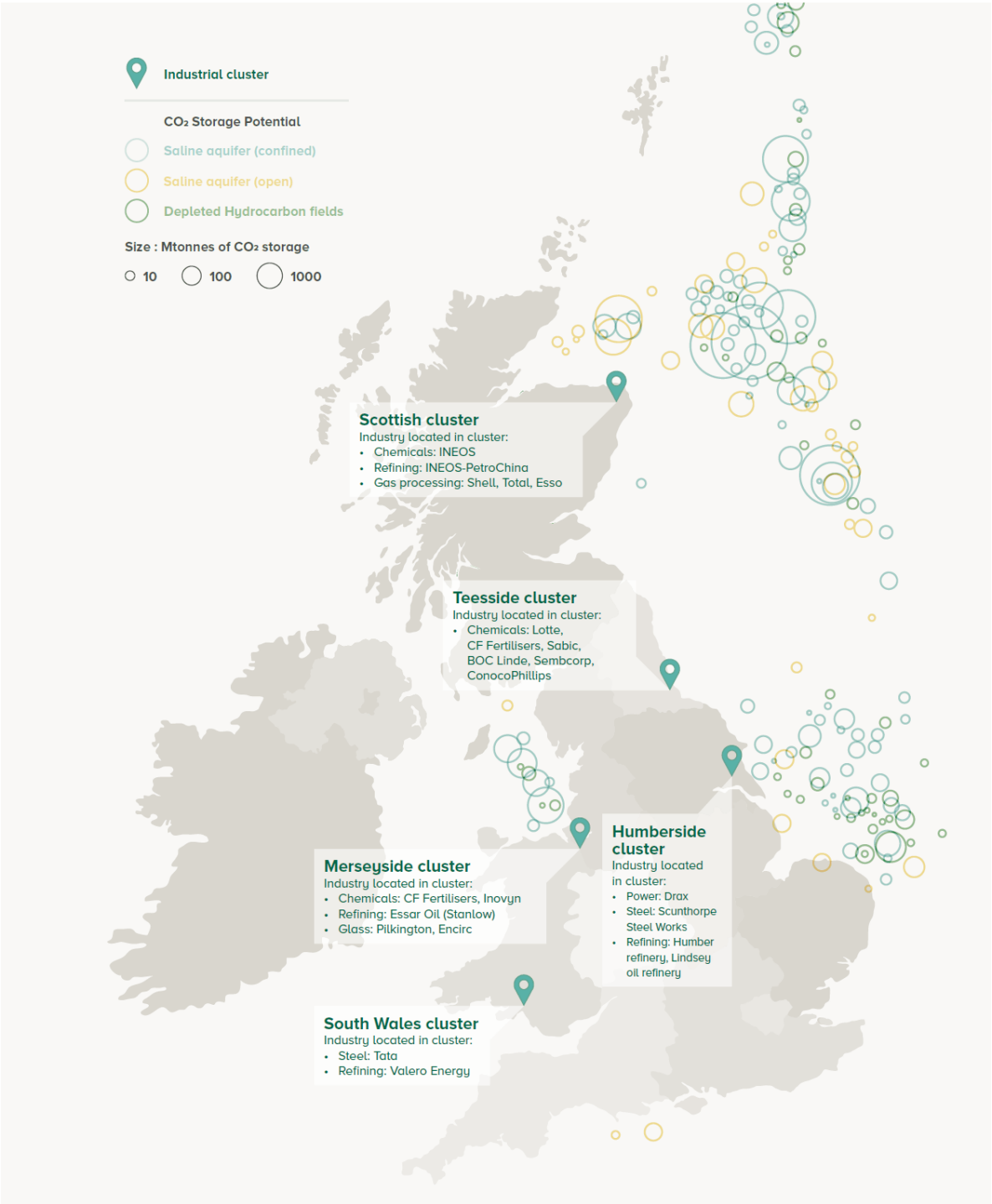
Carbon capture and storage (CCS) in industry, with bioenergy (for GHG removal from the atmosphere), and very likely for hydrogen and electricity production. **CCS is a necessity not an option.** The scenarios involve aggregate annual capture and storage of 75-175 $MtCO_2$ in 2050, which would require a major CO_2 transport and storage infrastructure servicing at least five clusters and with some CO_2 transported by ships or heavy goods vehicles.



https://www.gov.uk/government/publications/delivering-clean-growth-ccus-cost-challenge-taskforce-report

UK's potential CCUS clusters: CO_2 sources share transport and storage infrastructure

- Industries
- Power – from gas and biomass
- Greenhouse Gas Removal Technologies – biomass and direct air capture
- Hydrogen



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Latest UK commitments on CCS

Spending Review, 25 November 2020

CCS will be essential to meeting net zero globally, and the UK has an unrivalled asset – the North Sea – that can be used to store captured carbon under the seabed.

To capitalise on this global opportunity, SR20 provides £1 billion for a Carbon Capture and Storage Infrastructure Fund and will help establish four CCS clusters by 2030, capturing up to 10 megatonnes of carbon dioxide a year by 2030.

These clusters will bring jobs and investment to industrial heartlands in areas of North East and North West England, the Humber, Scotland and Wales.

PM's speech, 1 July 2020

Up to £100m of new funding for research and develop a brand new clean technology, Direct Air Capture (DAC), which captures CO_2 emissions directly from the air around us.

If successful, DAC technology could be deployed across the country to remove carbon from the air, helping sectors where it's tough to decarbonise such as aviation.

To help bring forward this technology, the government is exploring options around carbon pricing and incentives, where the government may pay a price per tonne of CO_2 captured.

Principles for market measures to support CCS deployment

- Accept higher initial costs for the early CCS power plants, but encourage knowledge sharing for cost reduction
- Facilitate the implementation of shared CO_2 transport and storage infrastructure, to give cost reductions from increased scale – **Regulated Asset Base (RAB) model** expected
- Provide a **two part Contracts for Difference (CfD)** payment for CCS electricity, that covers the price differential between market price and CCS generation costs – in theory will go to zero when carbon price high enough:
  - a fixed payment, based on plant availability, to cover fixed costs;
  - a variable payment, linked to electricity output, to cover operating costs
- For biomass plants, provide an **additional payment for negative emissions**, possibly with a CfD linked to market carbon prices, based on CO_2 captured and securely stored less lifecycle CO_2 emissions for the biomass (similar for DACCS)
- Require these subsidised CCS power plants to be designed for flexible operation to secure electricity supplies in systems with growing amounts of intermittent renewables
- CCS power plants should be operated as specified below to provide the maximum benefits:
  - CCS power plant operation to support effective grid operation or system security takes precedence
  - BECCS power plants operate behind zero marginal cost generation plants
  - Fossil power plants with CCS ahead of fossil power plants without CCS
- Industry – cannot accept higher CO_2 costs without a border carbon tariff – **CfD on market carbon price** suggested, plus capital grants
- Hydrogen produced with CCS - use the above mechanisms where possible to avoid market distortion, **CfD on alternative fuels** for other applications (e.g. heating in buildings, road fuels)
- Provide long-term contracts with a reliable counterparty to reduce financing costs

Katowice Airport, COP24, December 2018