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The European network of excellence
on the Geological Storage of CO_2

Growing CO_2 storage to meet climate targets

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What is CO_2 capture and storage?

CO_2 captured	transported	Stored deep underground
CO_2 captured commercially since ~1938	Oldest pipelines ~1970s >6500 km of CO_2 pipeline worldwide	First injection of CO_2 in oil fields ~1972. First injection for storage, Sleipner 1996

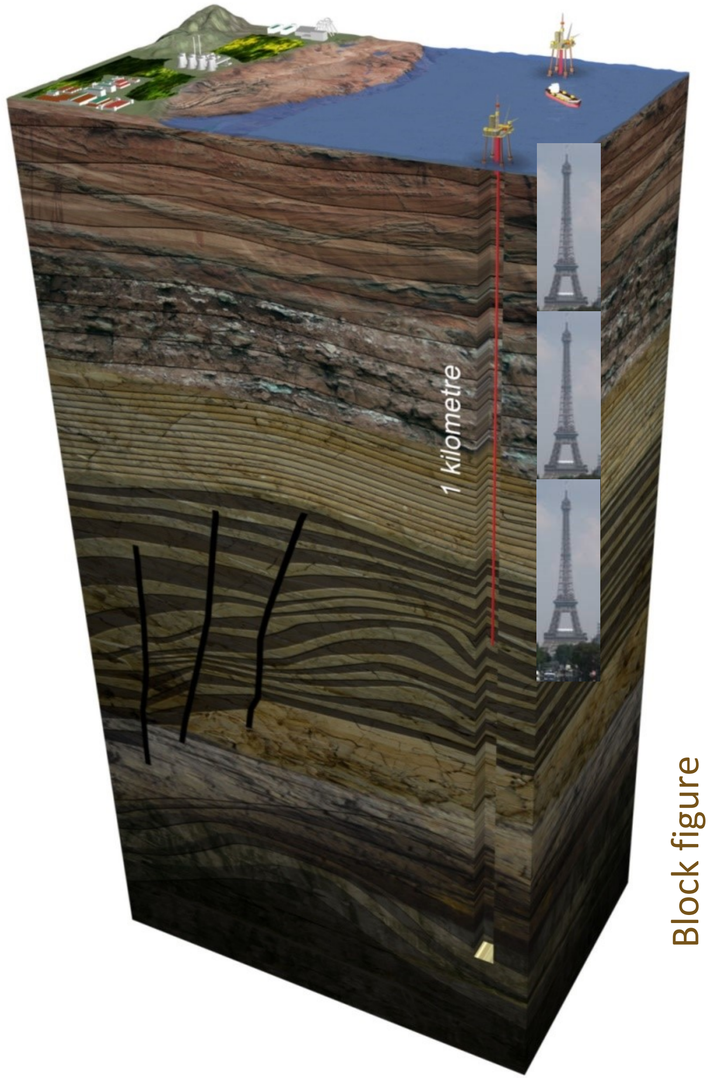
CO_2 Capture and storage uses proven technology and industrial experience

Over 260 million tonnes (Mt) of CO_2 emissions from human activity (anthropogenic sources) has already been captured and stored (Global CCS Institute, 2019. The Global Status of CCS: 2019. Australia)

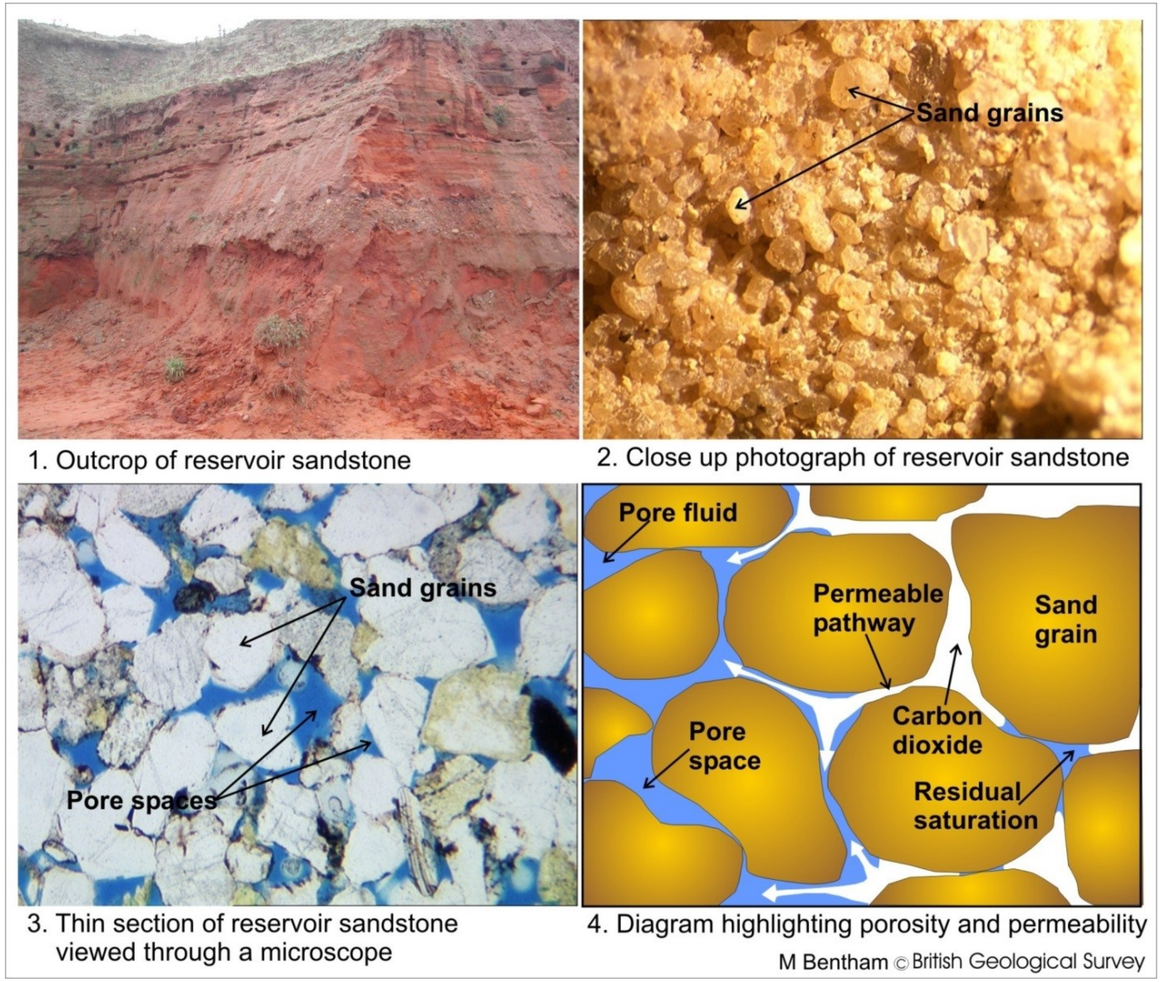
How does CO_2 storage work?

CO_2 is stored in the pore spaces in the storage reservoir rocks deep underground

CO_2 is trapped underneath a thick geological seal



Block figure courtesy GERC



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http://www.co2geonet.com/resources/#1392

How can CCS help meet climate targets?

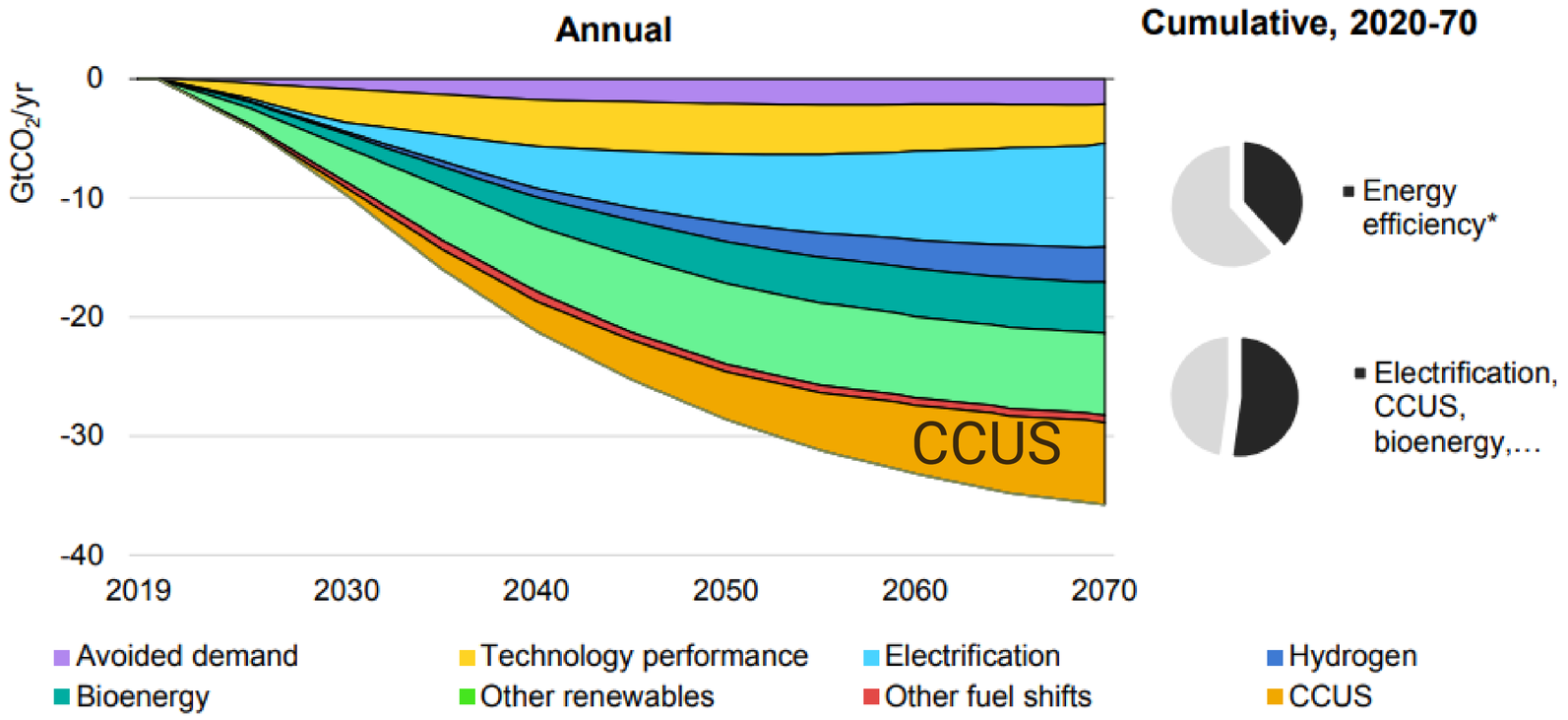
Geological storage of CO_2:

- enables **significant & rapid reduction in emissions** from any large fixed CO_2 source
- Can be used to reduce emissions from **multiple sectors** – power, chemicals, commodities…..
- **Only currently viable mitigation option to decarbonise the production of commodities** such as cement, iron and steel
- Can **help offset hard to abate emissions** to help achieve a net zero future
- Can offer **negative emissions** when coupled with Direct Air Capture or bioenergy using sustainable biomass

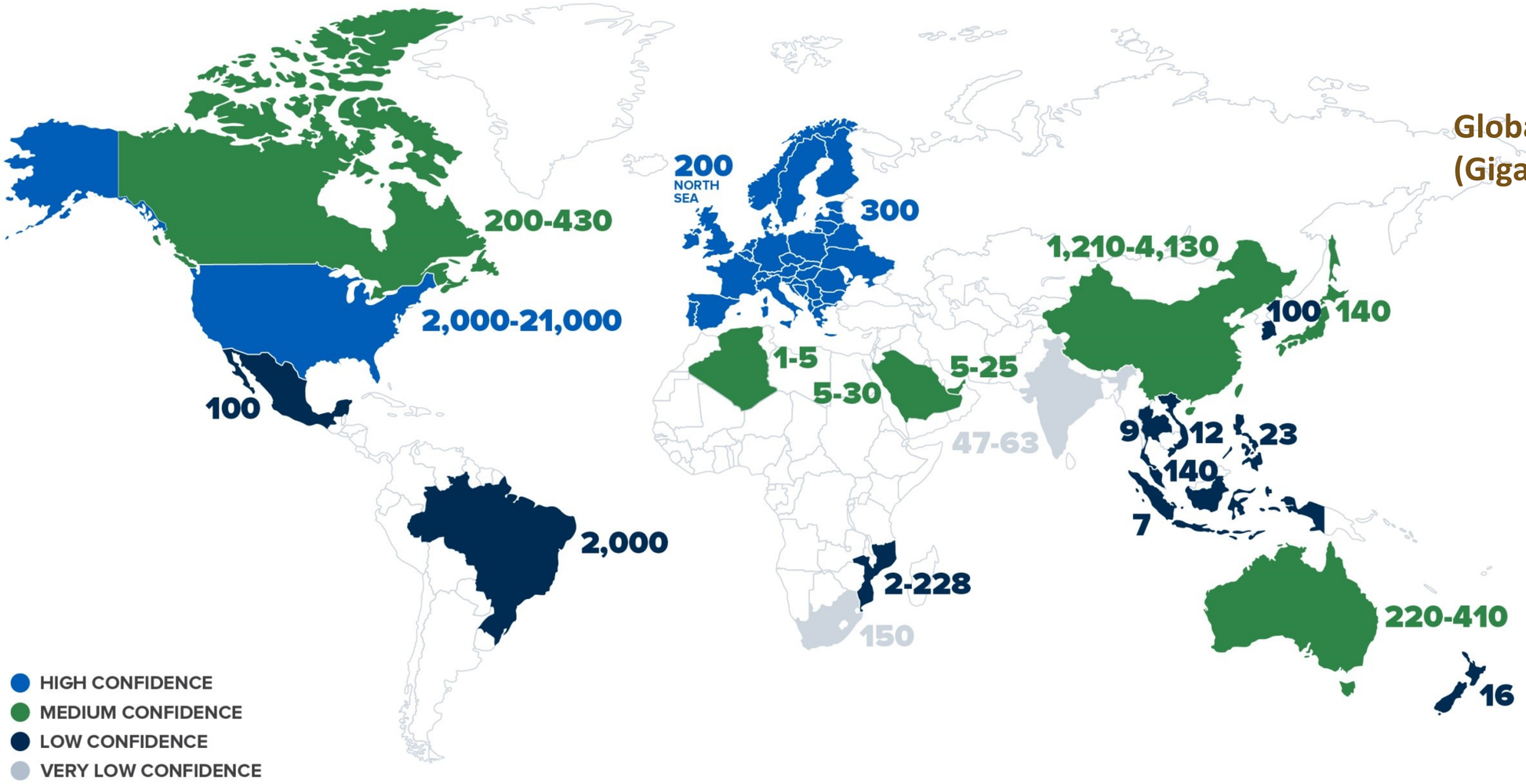
CCS works alongside other measures to achieve climate targets

- IEA 2020: **Achieving net-zero emissions requires a radical transformation in the way we supply, transform and use energy**
- Spreading the use of electricity into more parts of the economy is the single largest contributor to reaching net-zero emissions. Reaching net-zero by 2050 requires rapid deployment of low-carbon power generation. Hydrogen extends electricity's reach
- Carbon capture and bioenergy play multifaceted roles: low carbon fuels, CDR, bioenergy, hydrogen, offset emissions

Global energy sector CO_2 emissions reductions by measure in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2019-2070



Where can we store CO_2?



Global storage resource estimate (Giga tonnes) around the world

Confidence indicates level of assessment carried out

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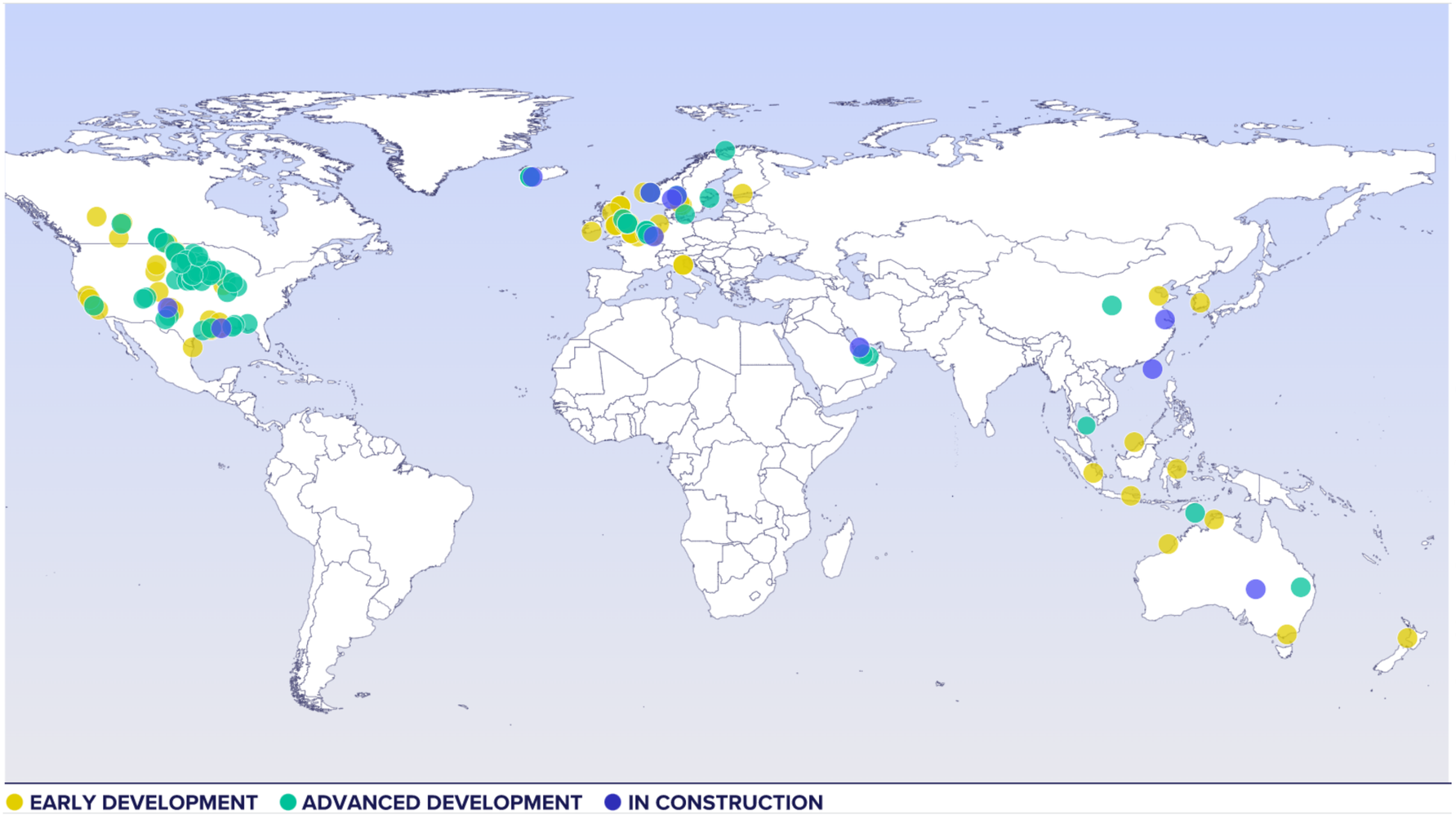
Map from: Global CCS Institute, 2019. The Global Status of CCS: 2019. Australia
https://www.globalccsinstitute.com/resources/global-status-report/previous-reports/

Where are we storing CO_2?



Projects in **operation and construction** have the capacity to capture and permanently store around **50 million tonnes of CO_2 every year**

As of September 2022, there are 196 large-scale CCS facilities (44% growth since GCCSI 2021 report). Of these: 30 are operating; 11 are under construction

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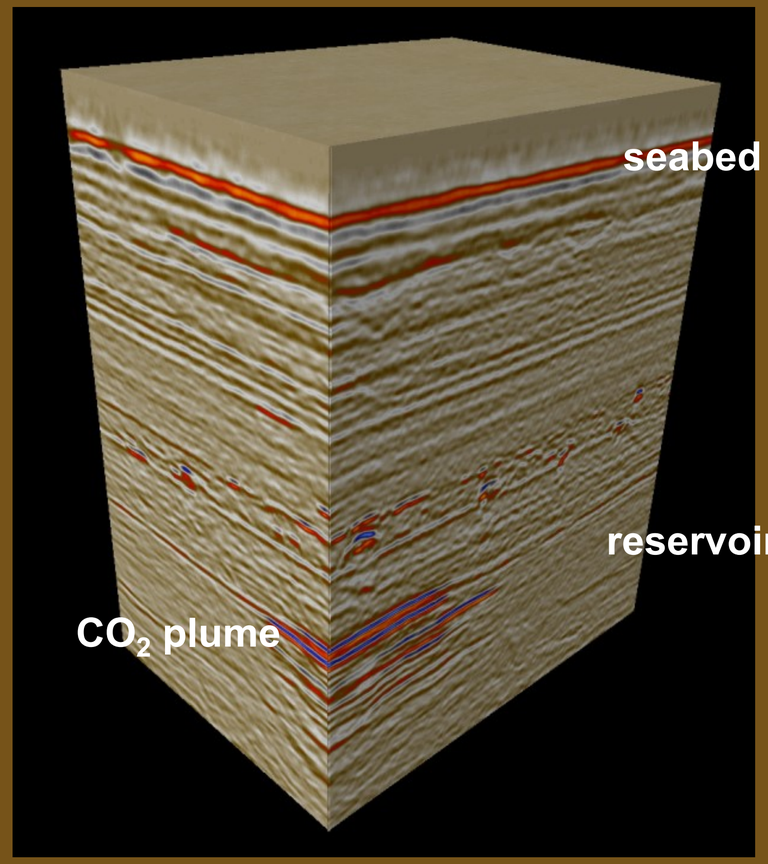
Map & data from: Global CCS Institute, 2022. The Global Status of CCS: 2022. Australia https://status22.globalccsinstitute.com/2022-status-report/global-status-of-ccs/

Case study: Sleipner 19 million tonnes stored over 20 years

The natural gas from the Sleipner field contains around 9.5% CO_2. This is separated from the gas and injected into the Utsira Formation ~ 1 Mt CO_2 per year stored since 1996

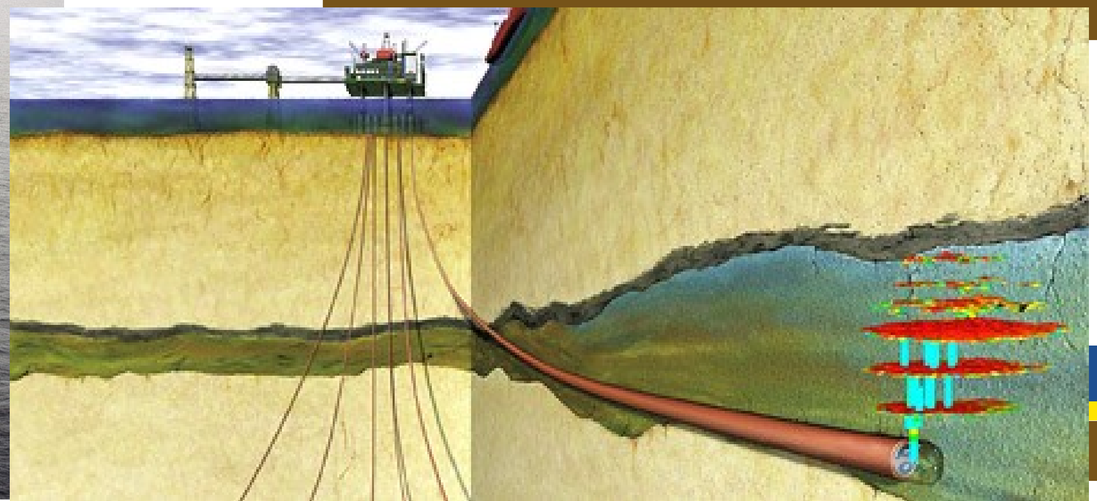
Image courtesy BGS, data courtesy Equinor



CO_2 treatment platform

Gas extraction platform

Images & data courtesy Equinor



GCCSI 2020 Global Status of CCS – CCS is growing, but not fast enough

GCCSI (2020) noted: Currently, some 40 megatonnes of CO_2 are captured and stored annually. **This must increase at least 100-fold by 2050 to meet the scenarios laid out by the IPCC**

Global CCS Institute, 2020. The Global Status of CCS: 2020. Australia

What next for CO_2 capture and storage?

- IEA @ COP21: *Use the Paris Agreement to drive short-term actions consistent with long-term emission goals*
- CCS can play a key part in a just transition to a low-emission future
- CCS is an opportunity for economic growth and job creation

So what do we need to grow CCS?

- **Practical, well-defined governance**: Clear, consistent and long-term policy and regulatory measures are needed to provide a predictable business landscape that will attract investment
- **Financial mechanisms**: A level playing field with other climate-friendly technologies…subsidies and/or incentives and tailored financial mechanisms
- **More real projects**! Anchor projects that can form nodes in CCS networks with capture hubs and storage clusters, plus R&D projects to refine aspects of CCS

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Thank you for your time

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