CO_2 storage conditions in Czechia

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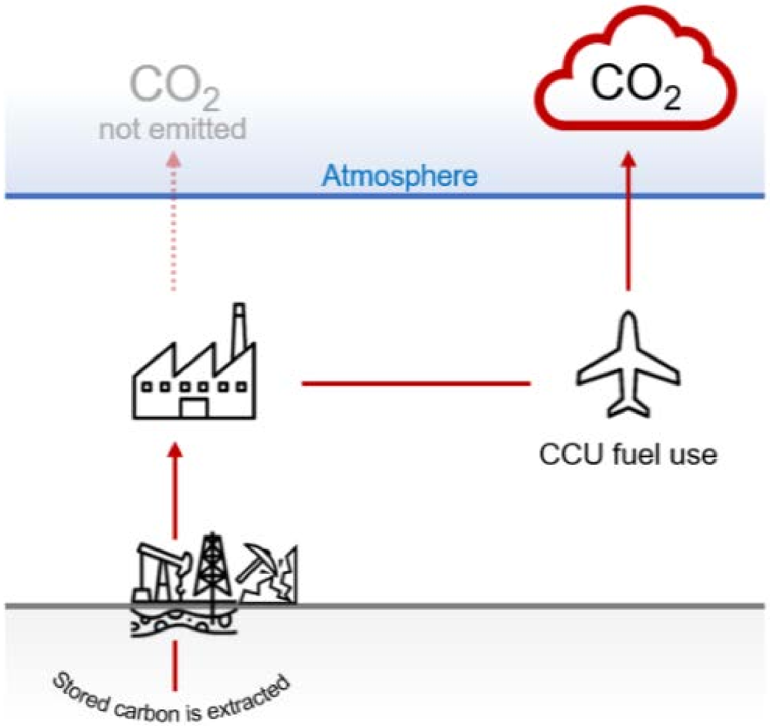
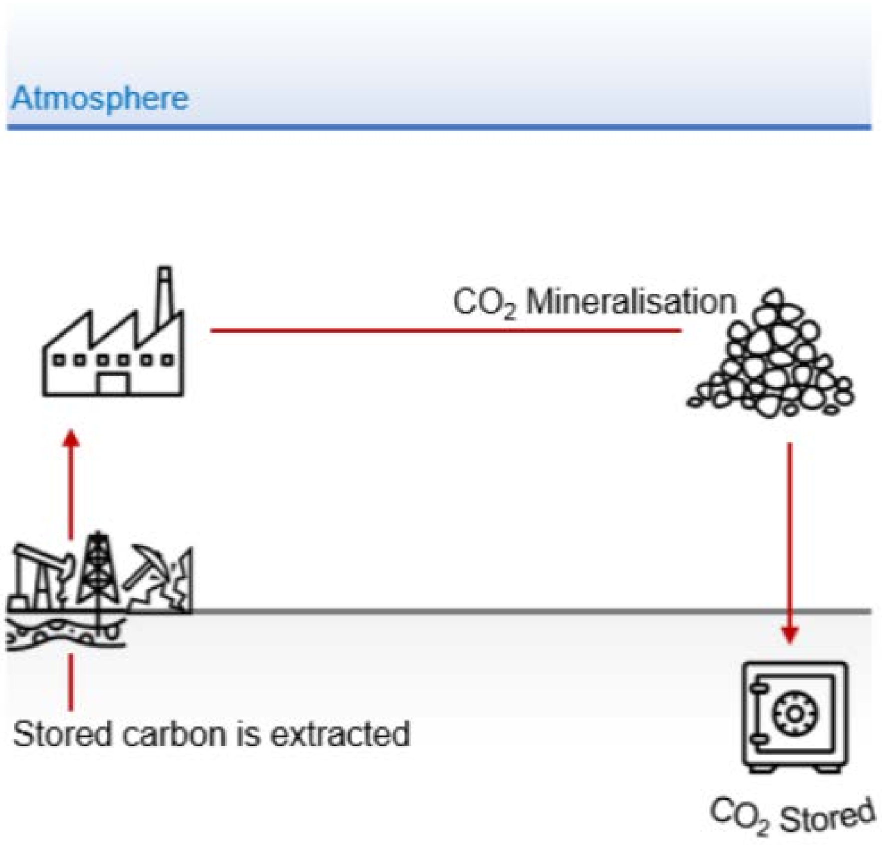
Norway grants   Programme Kappa   TA ČR

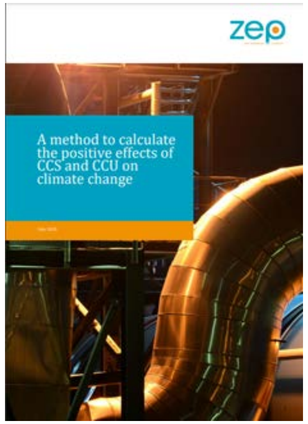
What to do with the captured CO_2?

- Utilisation → CCU
  overall carbon balance to be considered
- Geological storage → CCS
- Combination of the two → CCUS
  e.g. CO_2-EOR with subsequent storage

CCU – what is the climate change mitigation effect?

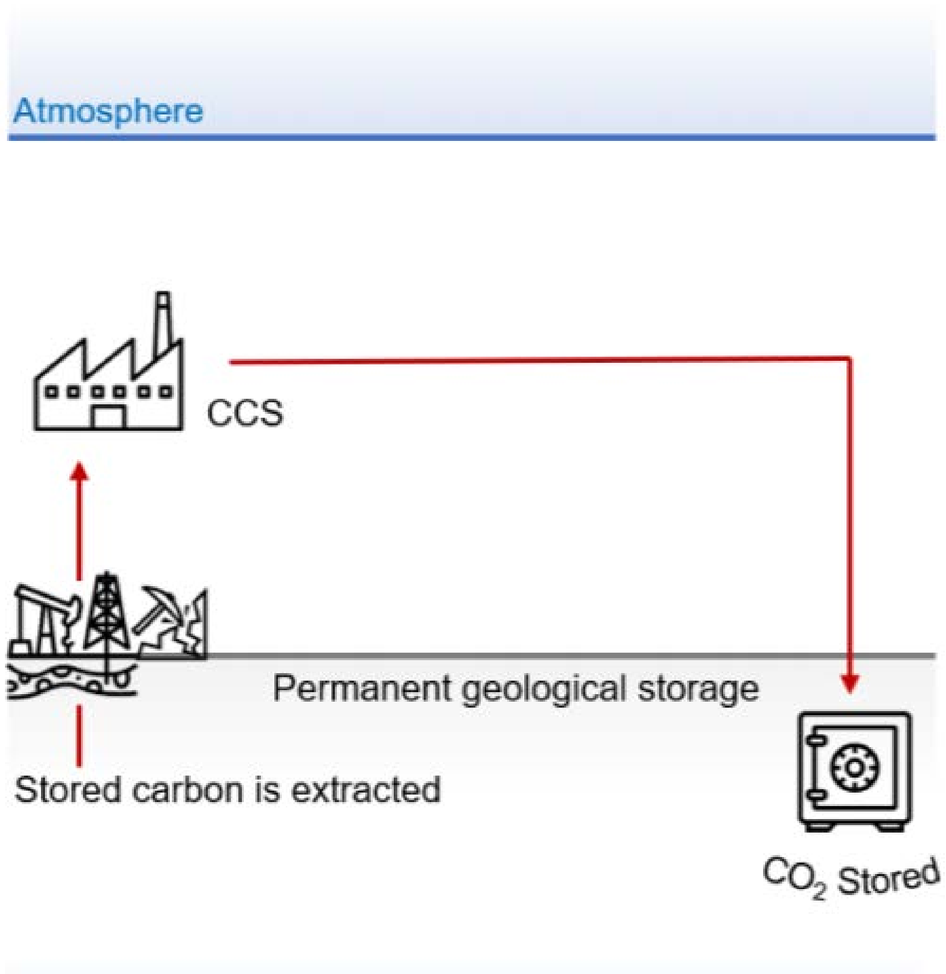


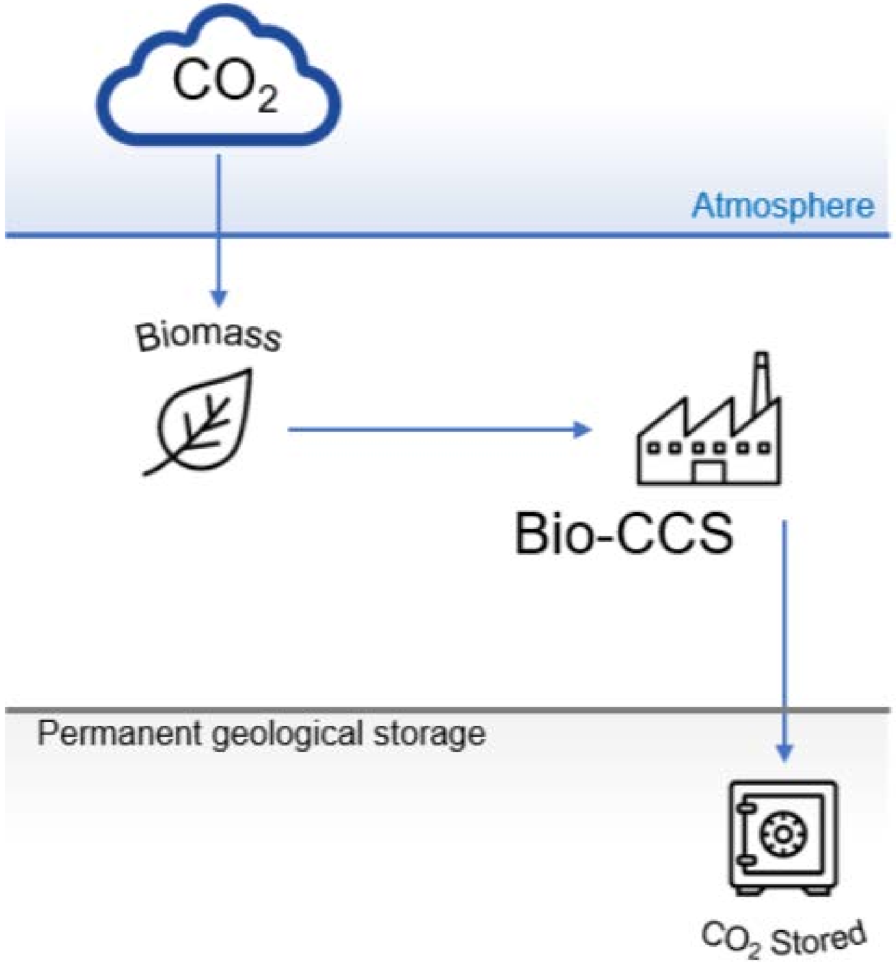


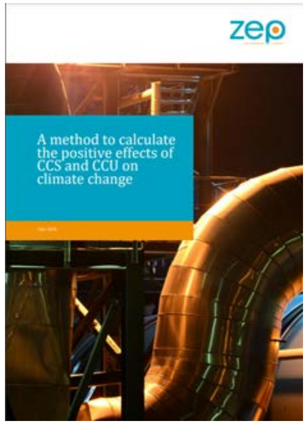


A method to calculate the positive effects of CCS and CCU on climate change (ZEP 2020)

Comparison with CCS

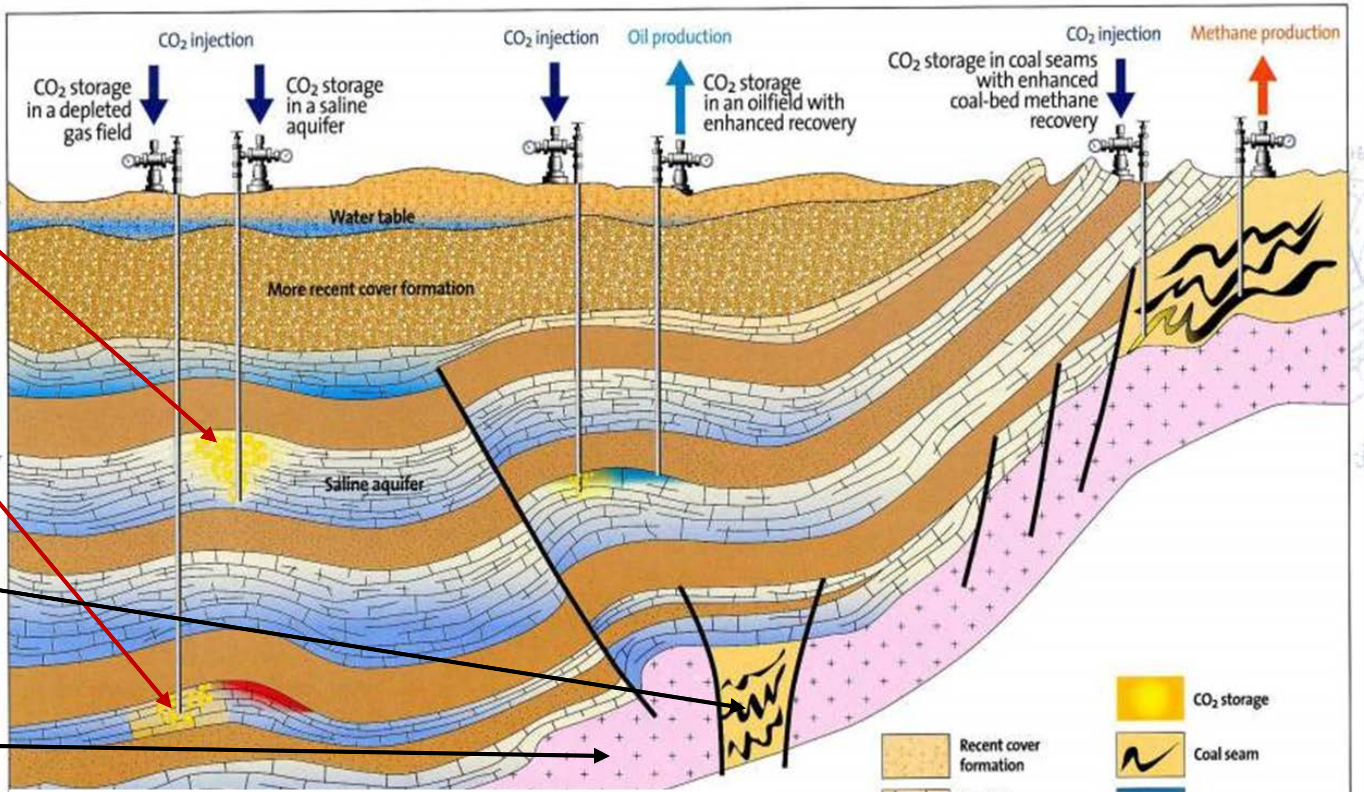






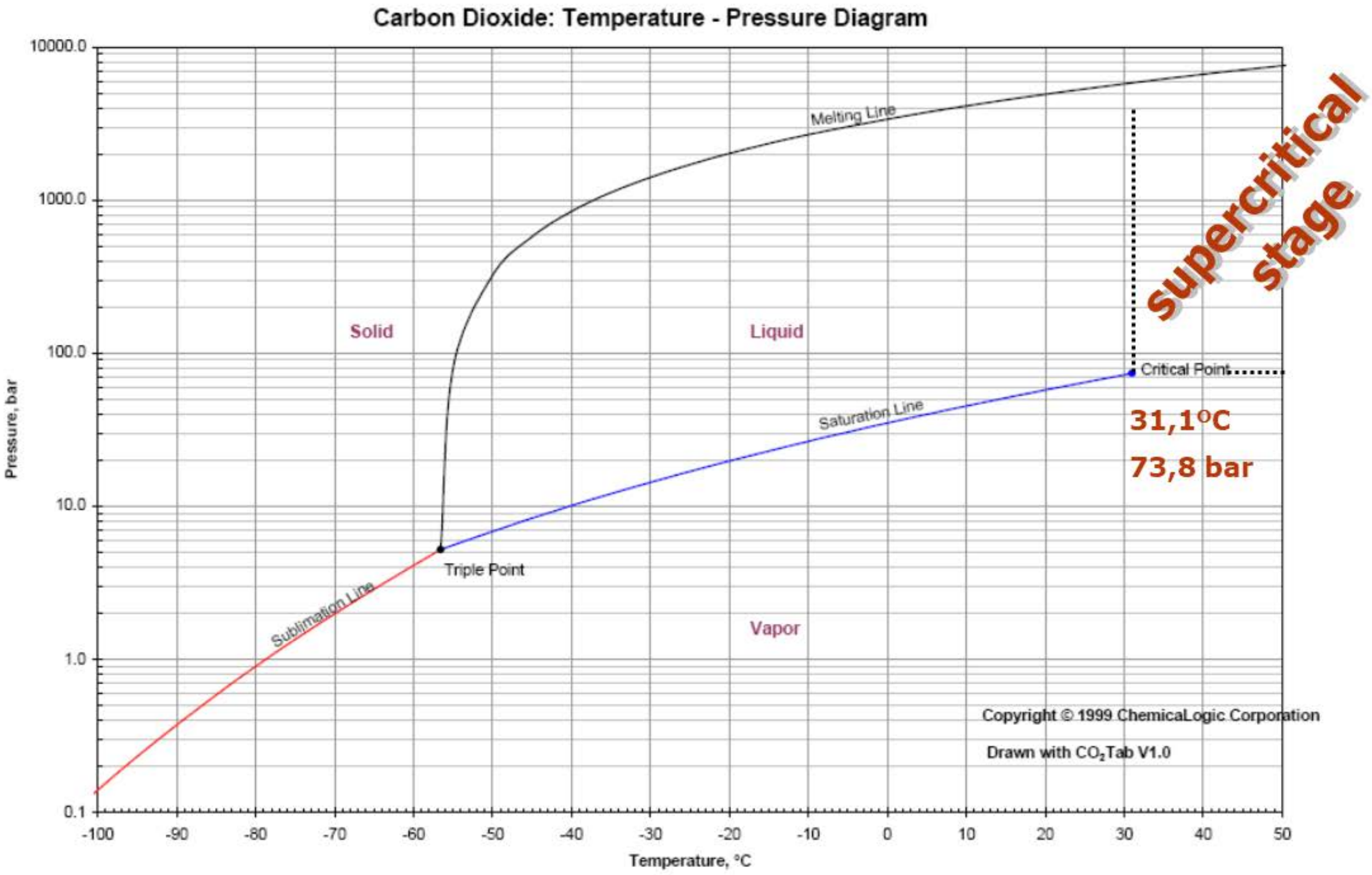
CO_2 geological storage options

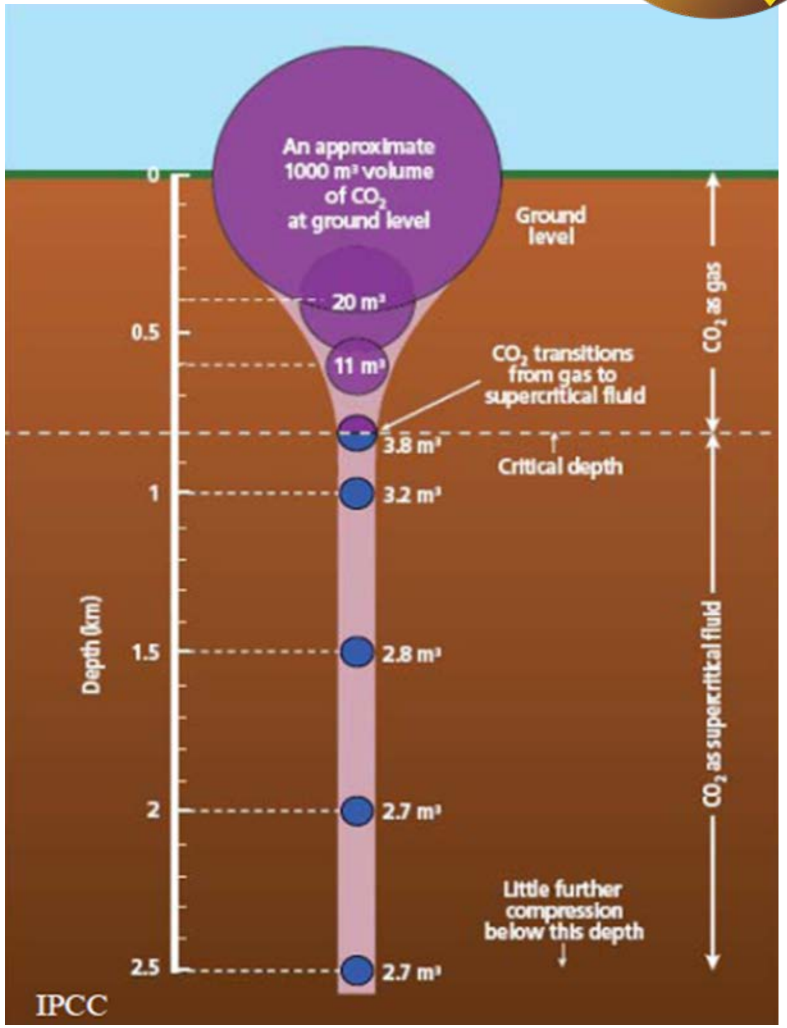
- Deep saline aquifers
- Depleted oil and gas fields
- Unmineable coal seams
- Basalts & ultramafic rocks



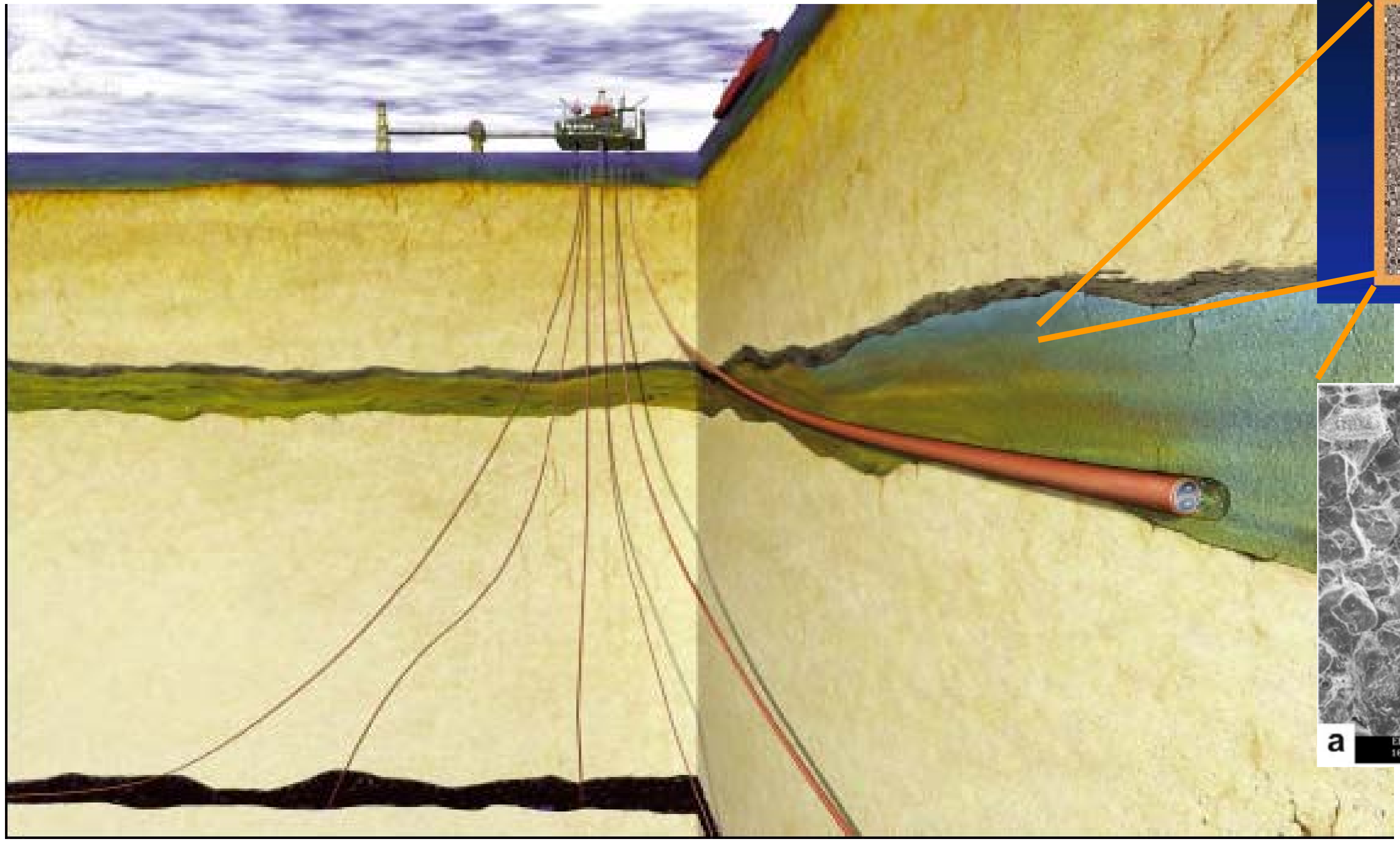
Global storage capacity: at least 2000 Gt CO_2 (IPCC 2005)

Phase behaviour of CO_2

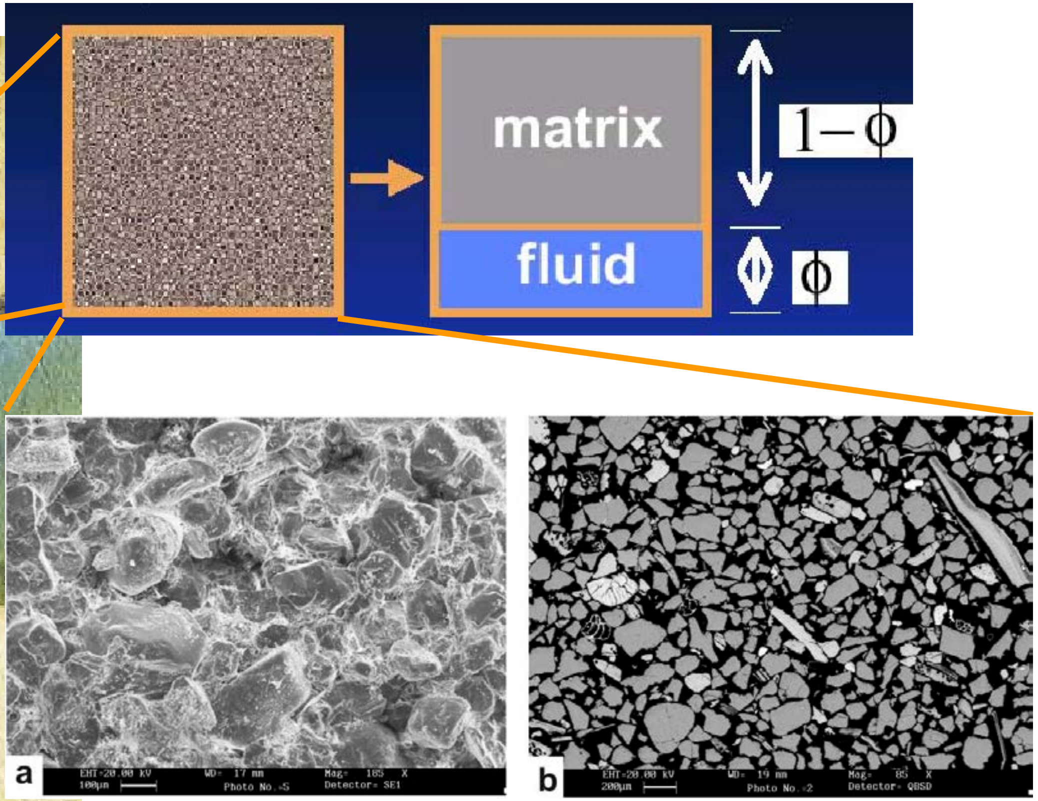




Principle of CO2 storage in porous rocks

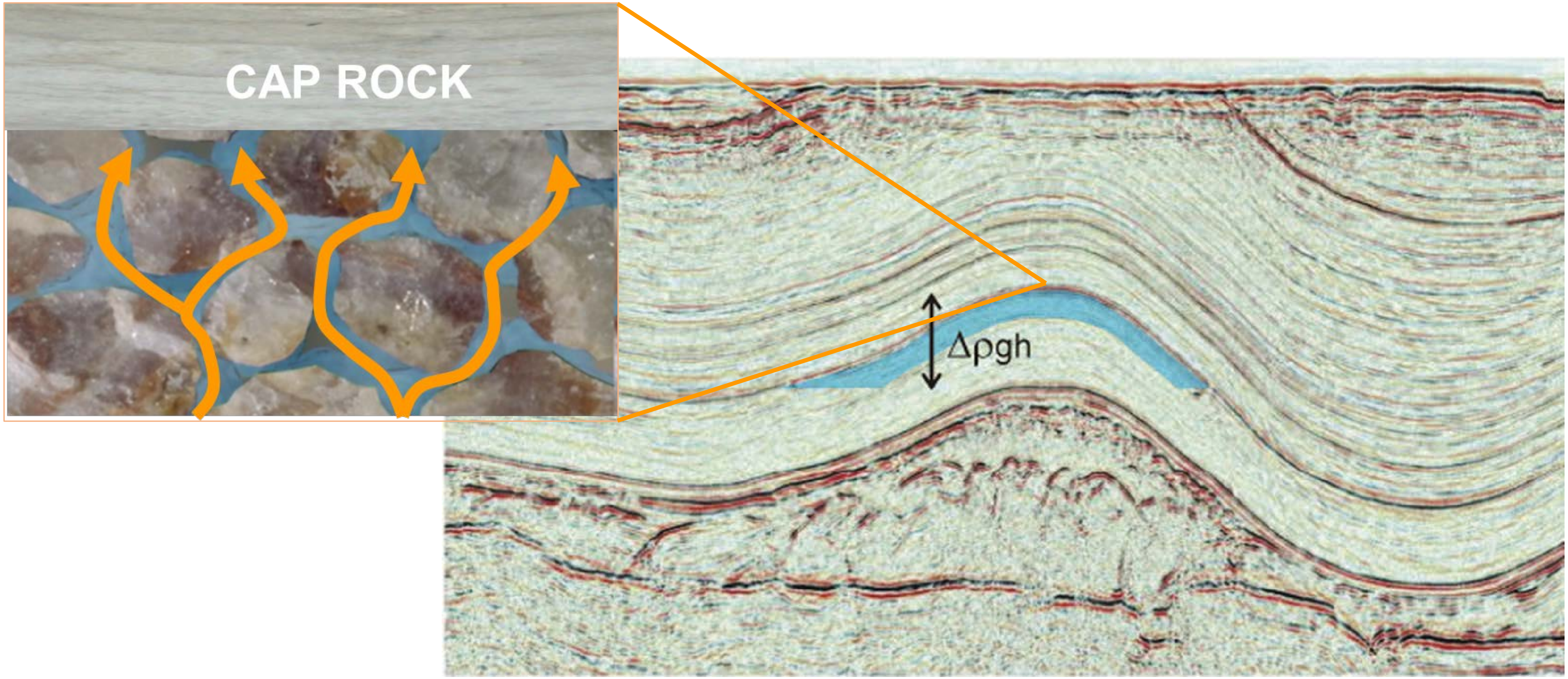


Courtesy CO2STORE

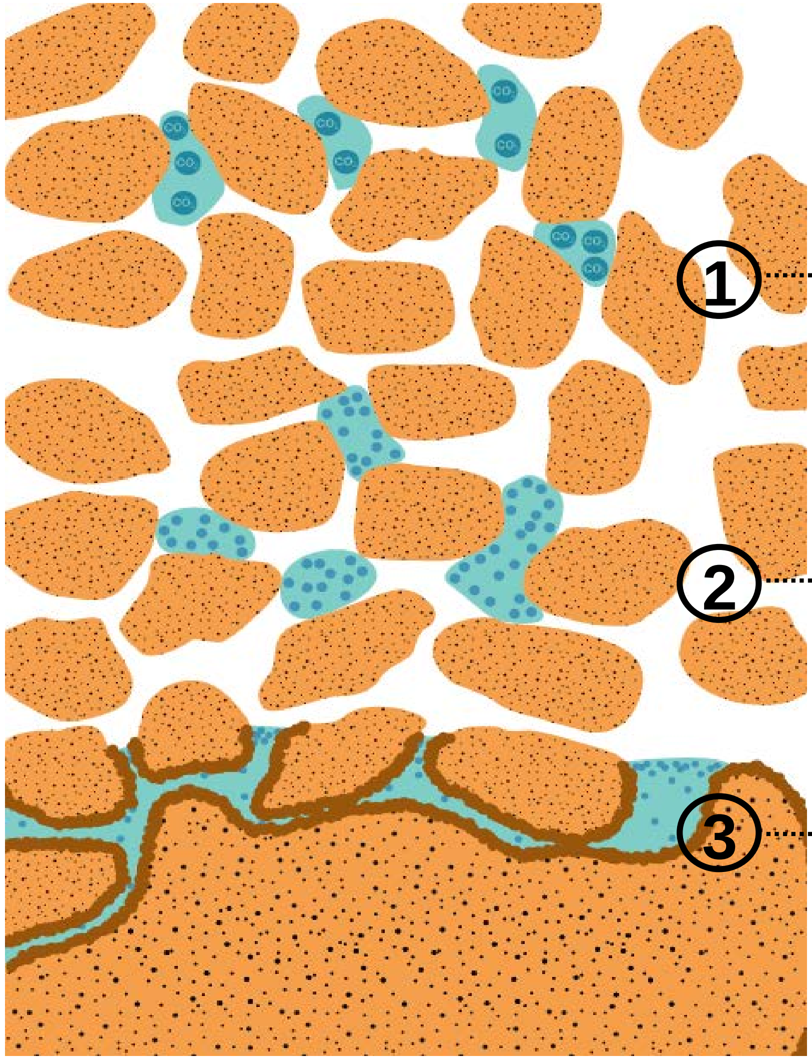


SEM images of the Utsira Sand
a) Reflected light
b) Transmitted light (pore-spaces are black)

Structural trapping of CO_2



Additional trapping mechanisms



Safety of CO2 storage increases with time thanks to three mechanisms:

Residual trapping

CO_2 is irreversibly caught in micropores and cannot move any more

Dissolution

CO_2 is dissolved in the surrounding brine, which becomes heavier and sinks to the bottom of the reservoir

Mineral trapping

CO_2 geochemically reacts with minerals and creates chemical bonds

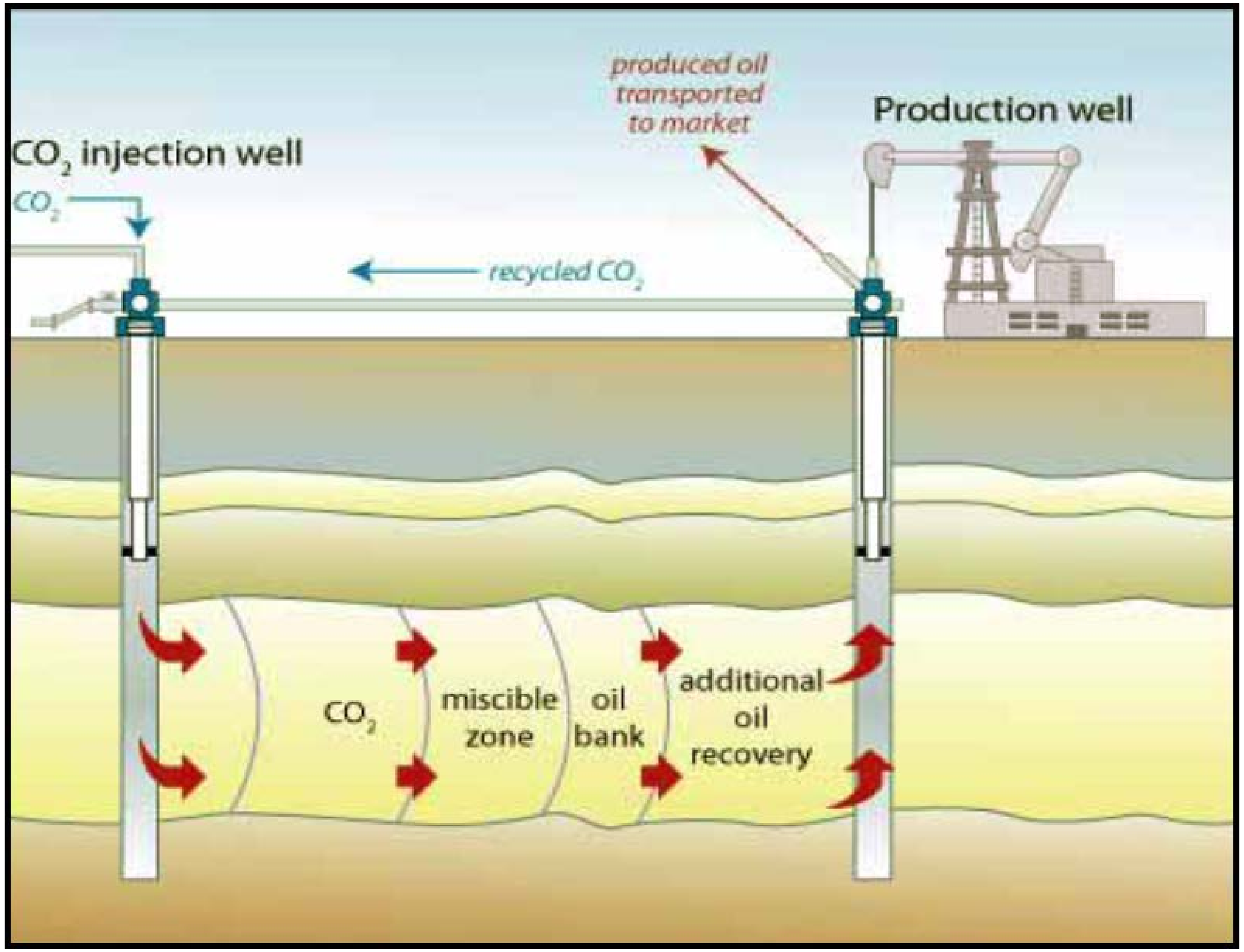
Required characteristics of a storage site

- Geological
  - Capacity, to store the intended CO_2 volume (pore volume, p-T conditions)
  - Injectivity, to receive the CO_2 at the supply rate (permeability, flow barriers)
  - Containment, to avoid or minimise CO_2 leakage (impermeable caprock, caprock integrity)

Required characteristics of a storage site (2)

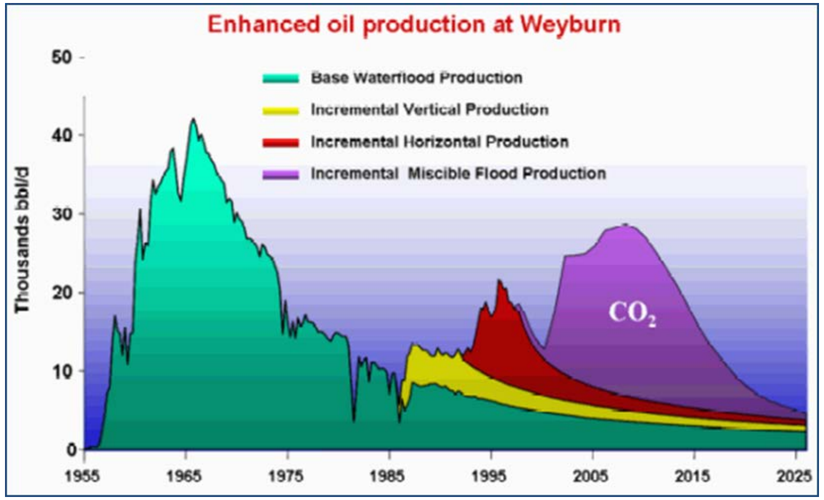
- Economic
  - Distance from the source
  - Existing infrastructure
  - Data availability
- Other
  - Conflicts of interests
  - Public acceptance

CO_2-EOR – example of CCUS

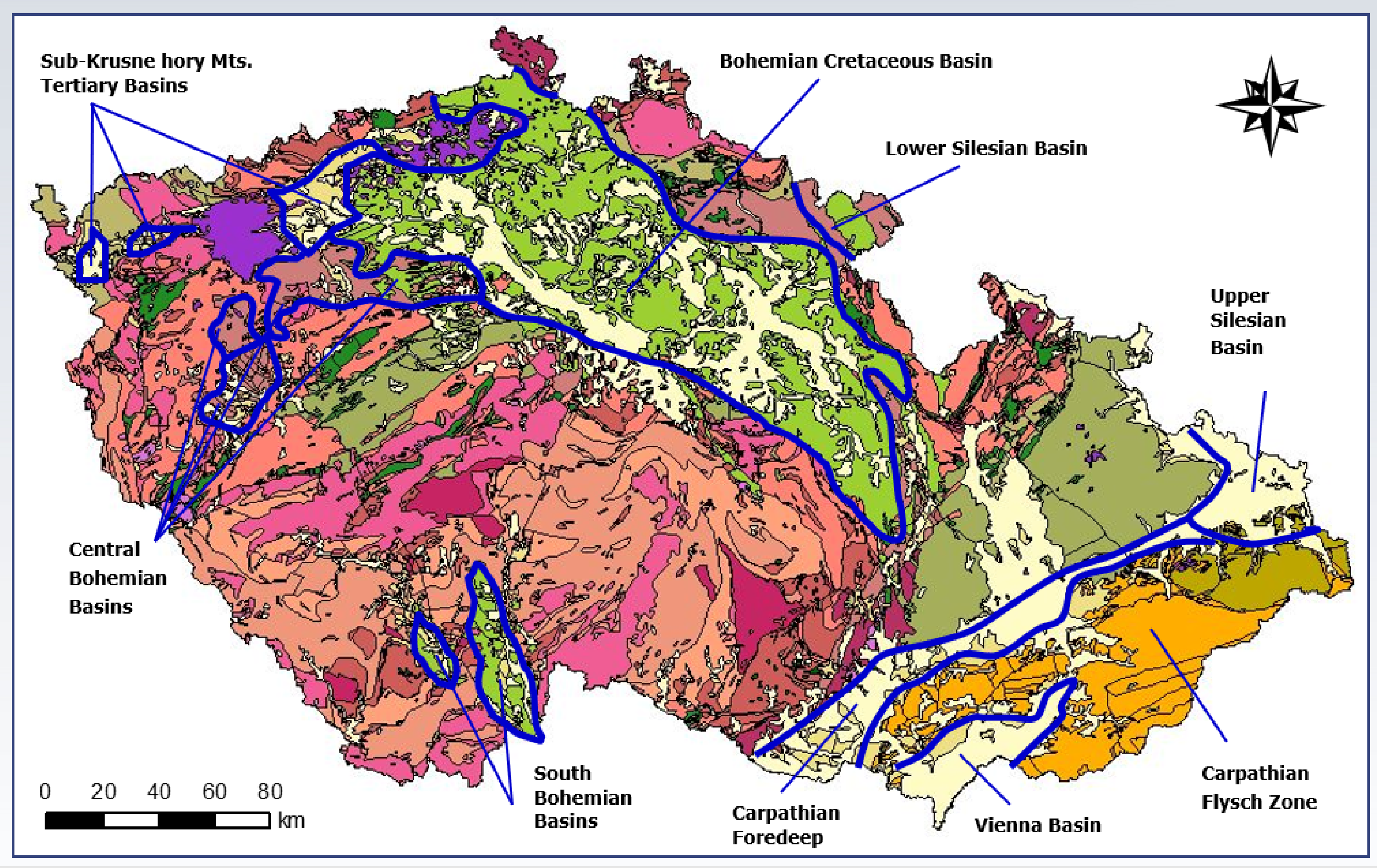


CO_2 is able to push part of residual oil from the reservoir.

CO_2-EOR is always combined with CO_2 storage and can be optimised for maximising of the CO_2 amount stored.



Sedimentary basins in Czechia

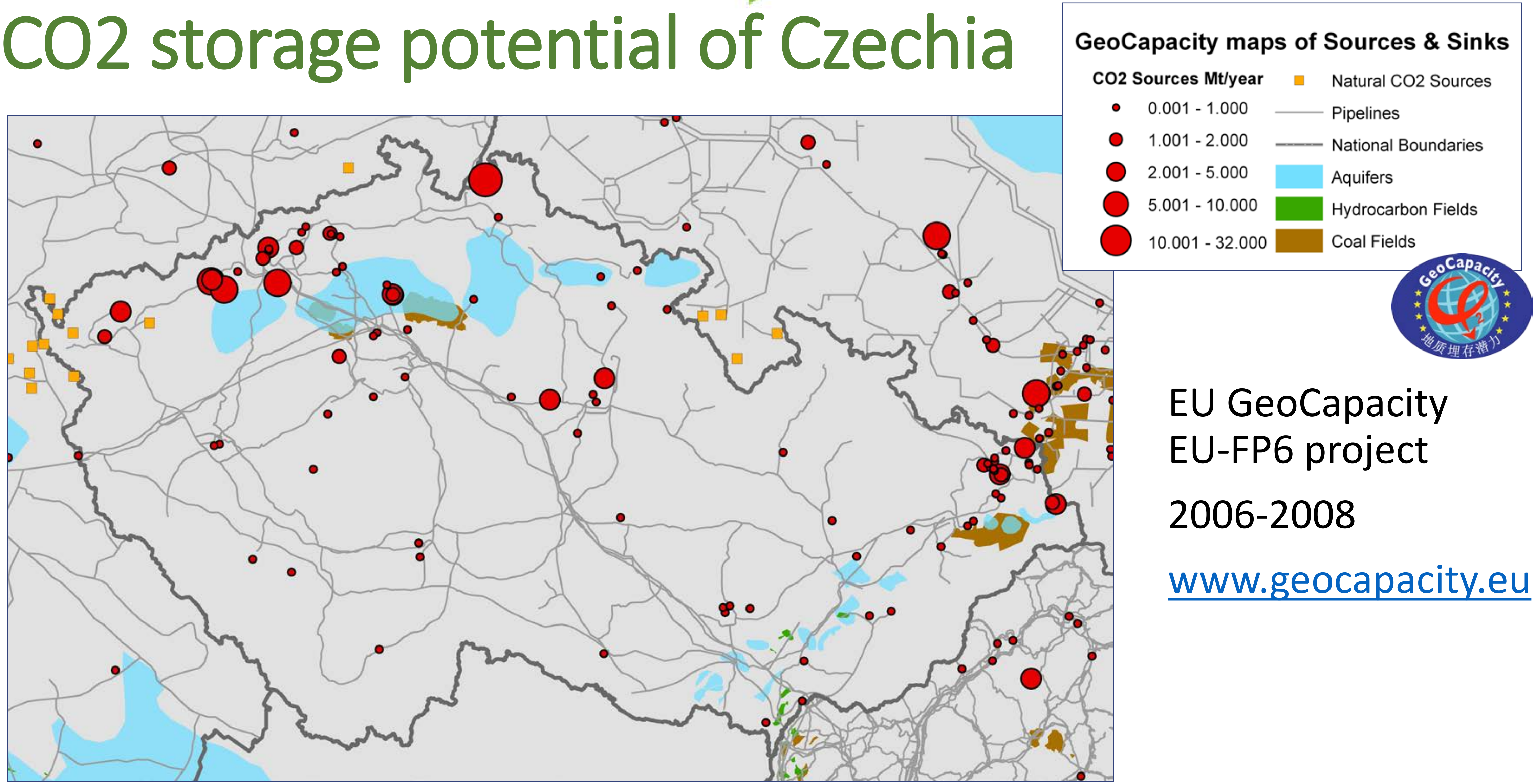


Basis: geological map of the Czech Republic

Most sedimentary basins are too shallow for CO_2 storage, except:

- Central Bohemian Permian-Carboniferous basins
- Carpathian Foredeep
- Vienna Basin

CO2 storage potential of Czechia



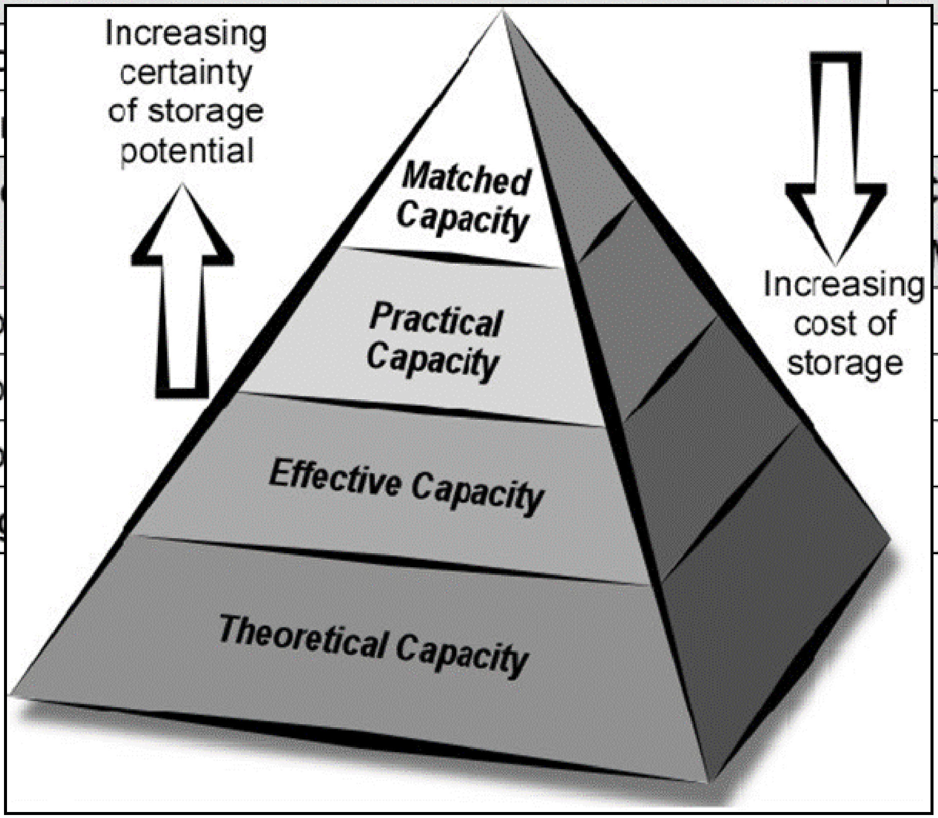
EU GeoCapacity
EU-FP6 project

2006-2008

www.geocapacity.eu

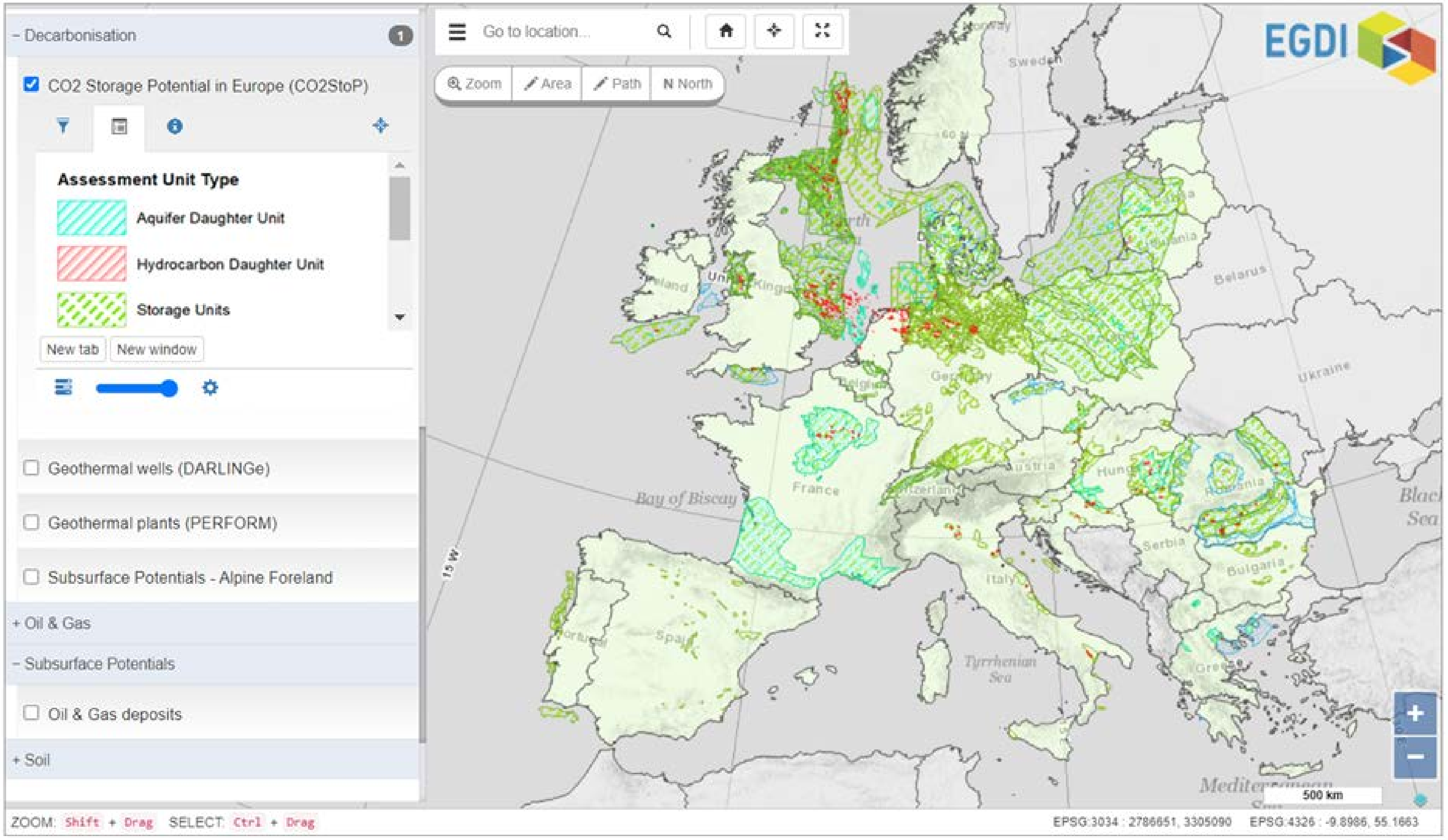
EU GeoCapacity results

CO_2 emissions	Year(s)	Average CO_2 emissions (Mt)
CO_2 emissic	2005	78
Total CO_2 e	2006	128
CO_2 storag	**onservative estimate Mt)**	**Estimate in database (Mt)**
Storage cap	766	2863
Storage cap	33	33
Storage cap	54	54
Total storag	**853**	**2950**



Large uncertainty about the capacity in saline aquifers caused by lack of data

CO2StoP – minor updates



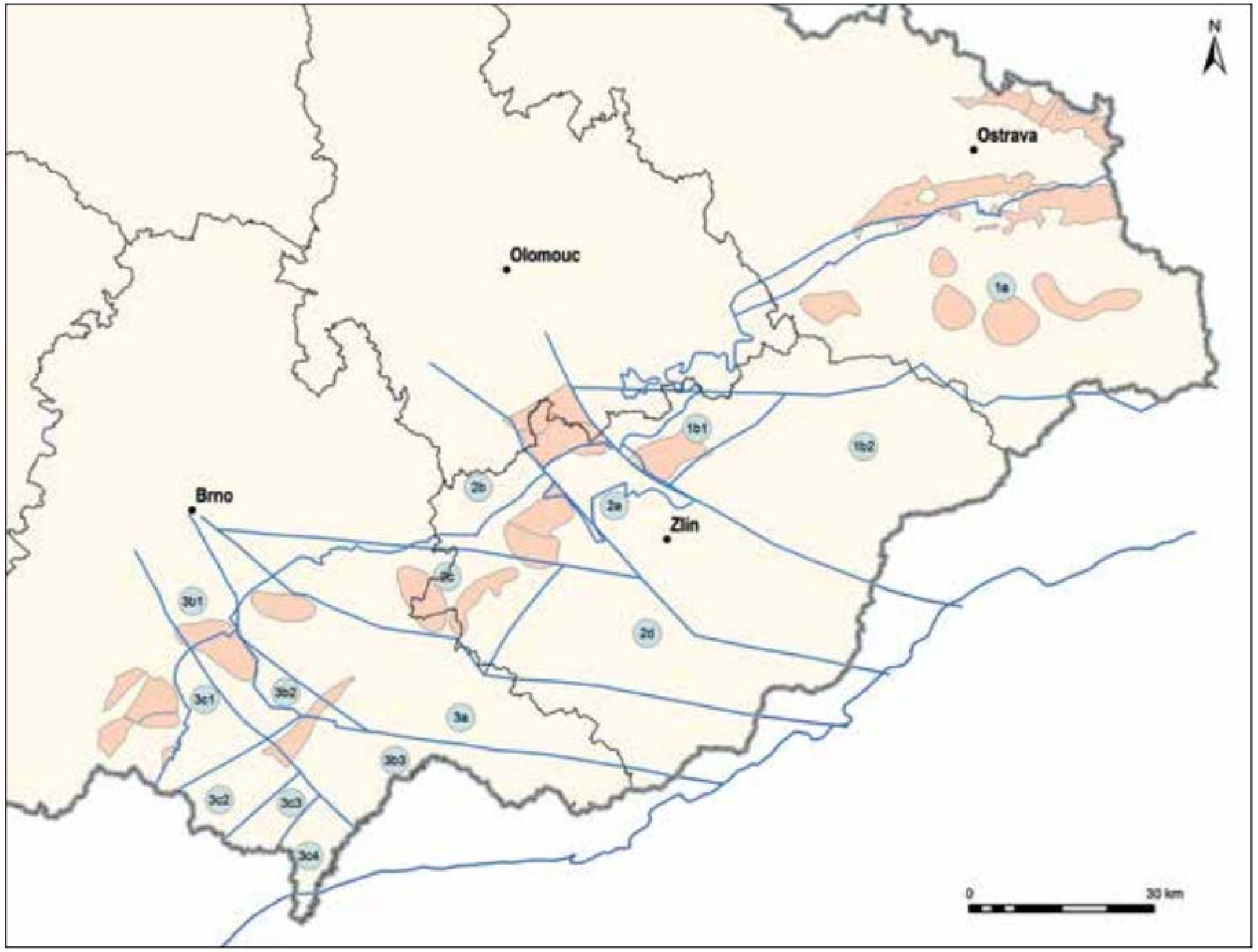
CO2StoP project funded from EU-FP7

2013-2014

Pan-European database available at the EGDI portal

http://www.europe-geology.eu/map-viewer/

REPP-CO2 – update of Carpathian part



REPP-CO2 project funded from Norway Grants

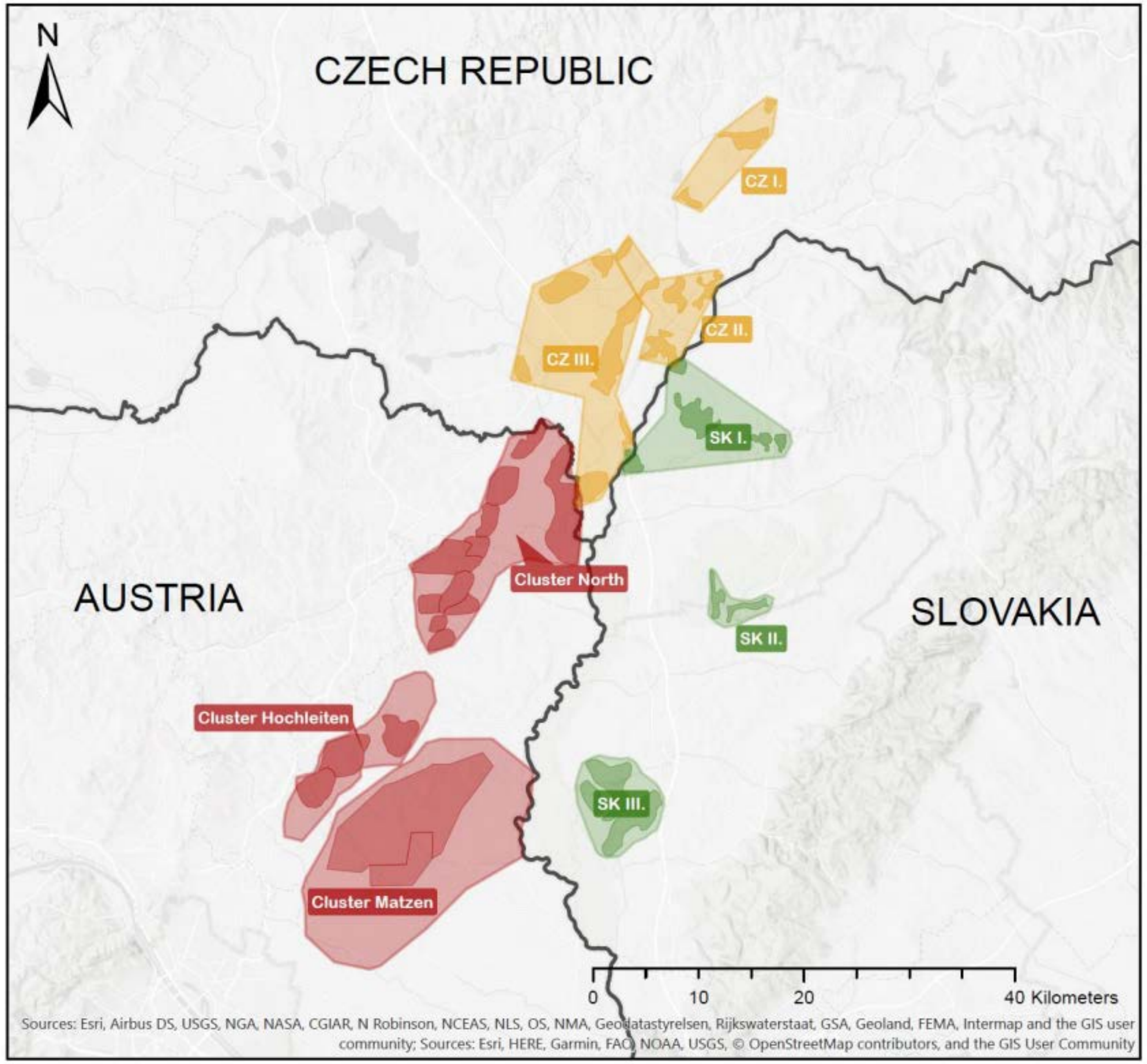
2015-2016

Re-assessment of storage capacities, no new structures revealed

Theoretical storage capacity assessed at ca. 670 mil. t CO_2

www.geology.cz/repp-co2

ENOS – study on CO2-EOR in Vienna Basin



ENOS project funded by EU-Horizon 2020 programme

2016-2019

Roadmap for CO2-EOR development in 3 countries, cluster-based assessment

http://www.enos-project.eu/

Regulatory framework

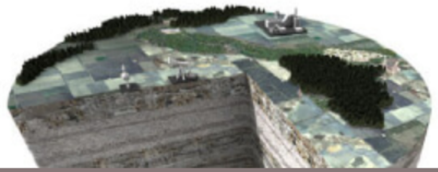
- Basic legislation in place – the **EU CCS Directive** (Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide) transposed to the Czech law by **Act No 85/2012** (on storage of carbon dioxide into natural rock structures and on changes of some acts)
- Limitation of amount to be stored in one storage site per annum – 1 mil. tonnes of CO_2
- Implementing regulations still incomplete

Conclusions

- The geology of the Czech Republic provides CO_2 storage capacity enabling storage of emissions from hard-to-abate sectors (and more)
- Main capacity is in saline aquifers, followed by hydrocarbon fields. The storage potential of aquifers needs further research and investigation to be verified and made more accurate.
- Unmineable coal seams and basalts / ultramafic rocks represent an opportunity that needs further research to be confirmed.
- Basic regulatory framework is in place but implementing regulations are still incomplete.

http://geology.cz/ccs

Informační portál
pro technologie zachytávání a ukládání CO_2



- **Úvodní stránka**
- Novinky
- Kalendář
  - Dřívější akce
- Slovníček pojmů
- Technologie CCS
  - Vliv CO2 na změnu klimatu
  - Zachytávání CO2
  - Přeprava CO2
  - Ukládání CO2
  - CCS v praxi
- Ke stažení
- Zajímavé odkazy

Zachytávání a ukládání CO_2 (CCS)

Vítejte na českém národním informačním portálu pro technologie zachytávání a ukládání CO_2.

Zachytávání a ukládání CO_2 (CO_2 capture and storage, někdy také carbon capture and storage / CCS) je jednou z perspektivních možností, jak omezit emise skleníkových plynů do atmosféry a dosáhnout tak zmírnění změny klimatu. Více informací o technologii CCS můžete najít zde.

Cílem tohoto portálu je mj. poskytovat zájemcům aktuální informace z oboru, z domova i ze zahraničí. Tyto informace najdete v sekci Novinky. Informace o připravovaných událostech najdete v sekci Kalendář. Sekce Odkazy obsahuje obsáhlou databázi internetových adres, kde najdete velké množství dalších informací z oboru. V sekci Ke stažení je k dispozici řada užitečných dokumentů týkajících se CCS.

Tento portál byl zřízen Českou geologickou službou v roce 2006 v rámci projektu CO2NET EAST a dále rozvíjen v rámci projektu CCS Europe (2010-2013). V letech 2015

Aktuality

Informační letáky projektu CO2-SPICER ke stažení
25. března 2021

BeePartner pořádá online konferenci o CCUS pro české průmyslové firmy
10. března 2021

Česko-norská konference o zachytávání a ukládání CO_2 se uskutečnila on-line
9. března 2021

Česko-norská konference o zachytávání a ukládání

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