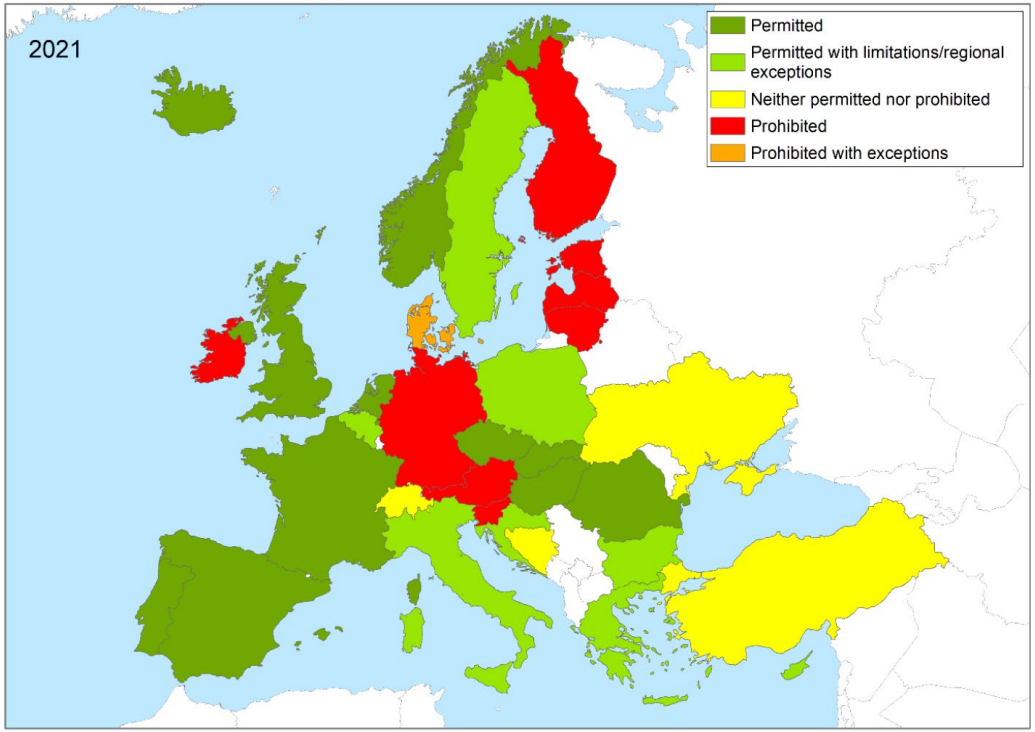
CO_2 Storage in Austria – current developments

Jakob Kulich

17th CO_2 GeoNet Open Forum

28.05.2024

Situation in Austria



development in Austria

Heinemann et al. (2004)

Scharf (2006)

Polak et al. (2009)

Secklehner et al. (2010)

OMV study (2011)

CCS ban (2011)

Welkenhuysen et al. (2016)

Evaluation (2018)

ENOS (2020)

Evaluation (2023)

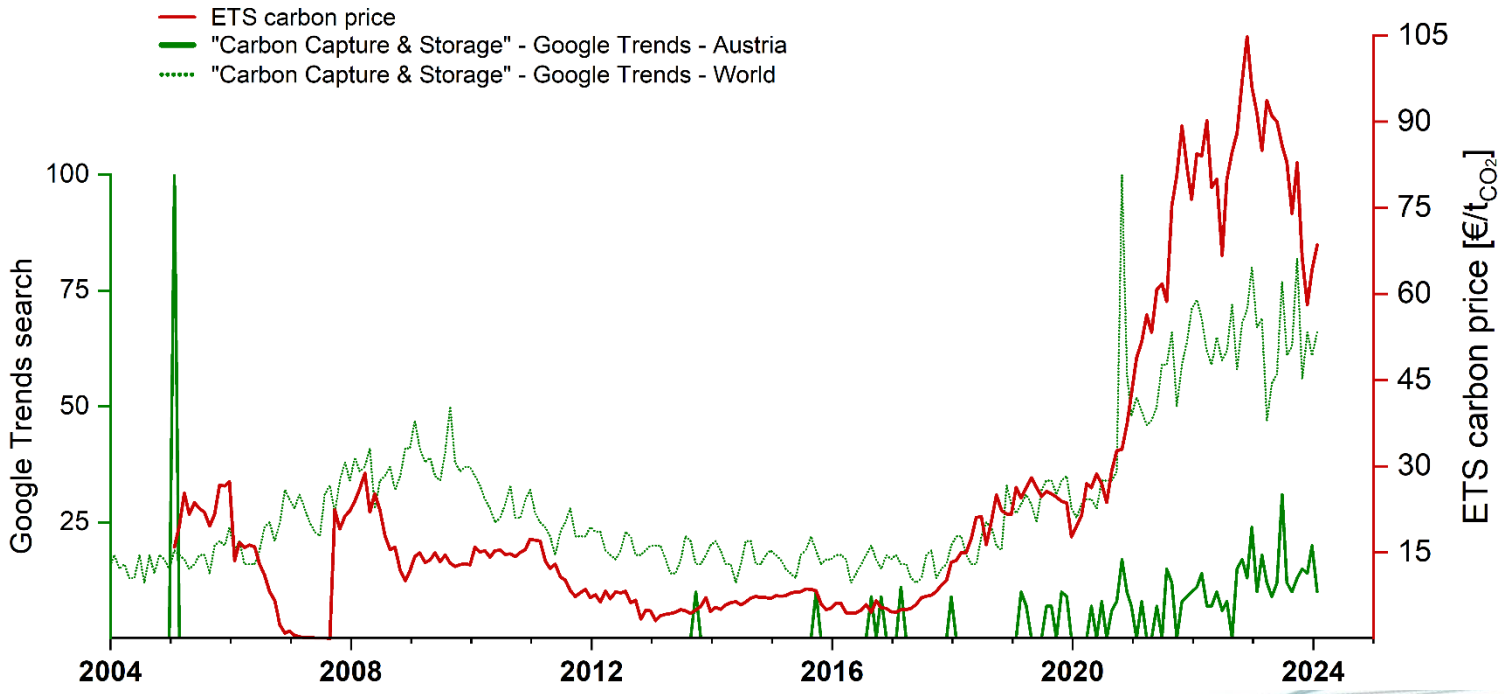
CaCTUS project (2022)

CMS (2024)

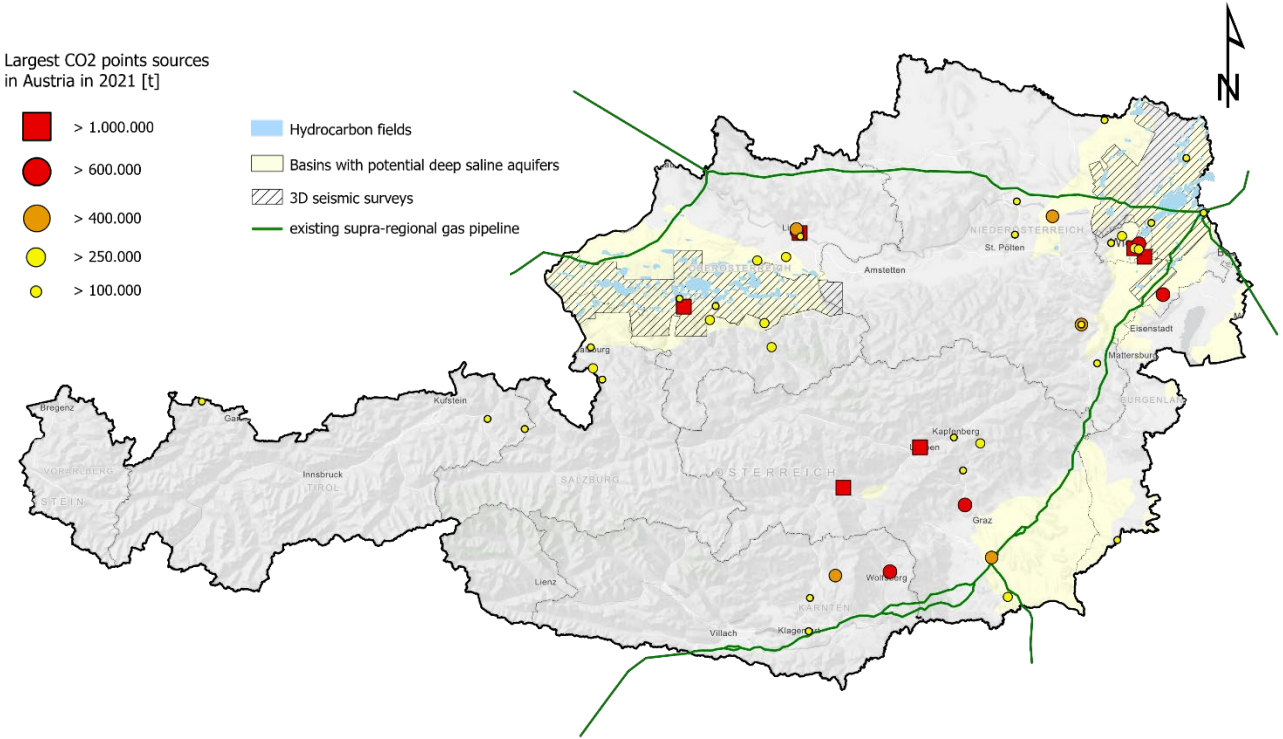
"CCS EU" Directive 2009/31/EC

CO2GeoNet (State of play report)

Situation in Austria



Current situation in Austria



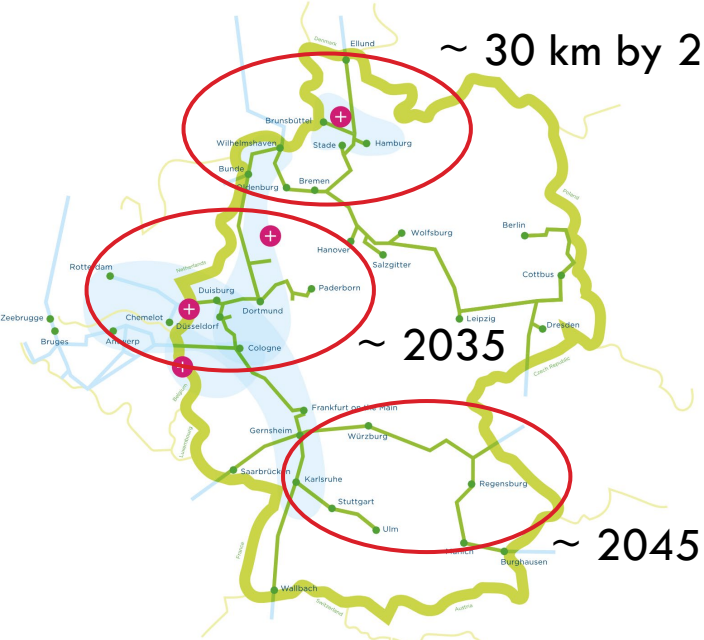
Kulich et al. (2024)

Oil and gas production since 1942:

>130 Mt of oil
>83 bn m^3 of gas

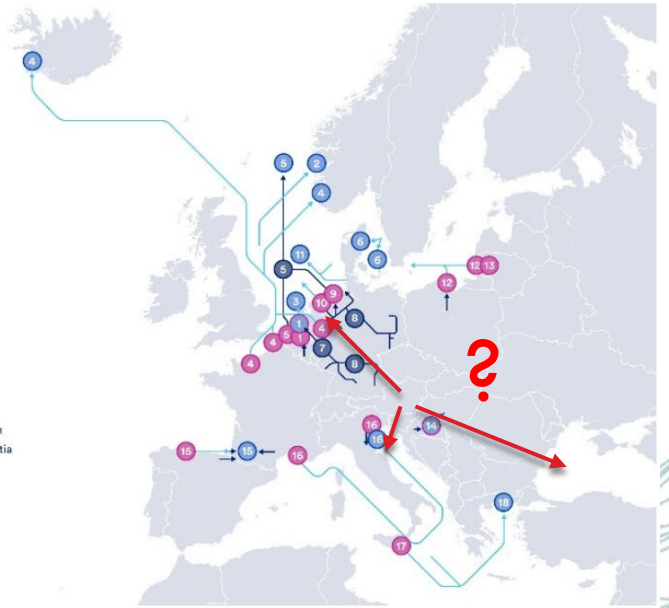
Most of oil & gas fields are depleted or close to depletion

Export to offshore storage projects?



source: OGE website

source: CATF

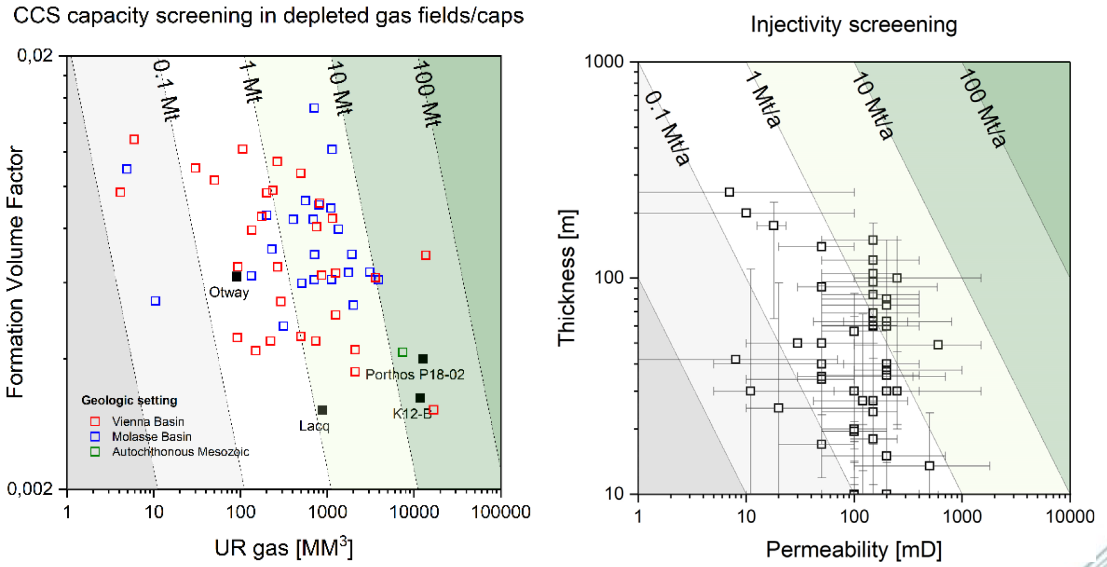


CCS screening in Austria – hydrocarbon fields

Creating database with reservoir parameters

Calculating CO_2 density and Formation Volume Factor according to reservoir conditions and fluid composition

Calculating theoretical potential after Bachu et al. (2007)

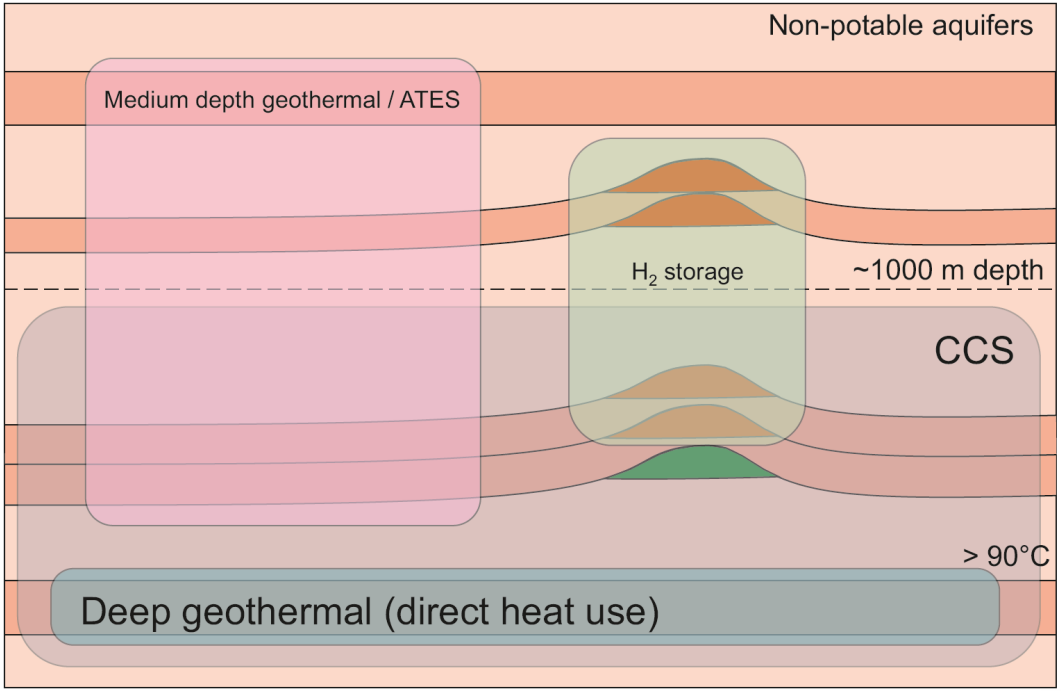


Kulich et al. (2024), after Bump (2022) and Hofmann et al. (2015)

Storage capacity in oil and gas fields in Austria?

Storage structure	CCS capacity literature [Mt]	CCS capacity screening (KULICH, 2024) [Mt]
Schönkirchen Übertief	**37,2** (Secklehner 2010), **32** (Scharf, 2006), **31** (P50, Welkenhuysen 2016)	**29,1**
Hoeflein	**18** (P50, Welkenhuysen 2016)	**15,0**
Reyersdorf Dolomite	**6** (P50, Welkenhuysen 2016)	**8,8**
Aderklaa Trias	**18,5** Mio m3 pore volume available (Scharf 2006), **23** (P50, Welkenhuysen 2016)	**3,9**
Atzbach-Schwanenstadt	**13,44** (Scharf 2006), **8,2** (Polak 2009), **13** (P50, Welkenhuysen 2016)	**11,3**
Voitsdorf	**6,1** (Scharf 2006), **31** (P50, Welkenhuysen 2016)	**2,6**
Schönkrichen Tief Öl	**16-17** (Scharf, 2006), **20** (P50, Welkenhuysen 2016)	**9,0**
Matzen Baden	*Comment: 8th, 9th and 16th TH of the Matzen Field were drilled more than 800 times…*	**70,9**
Zwerndorf Baden	*Comment: capacity in Austria, fields borders to SVK, Additional ~ 3 Mt*	**45,6**

Competitive usage of the subsurface

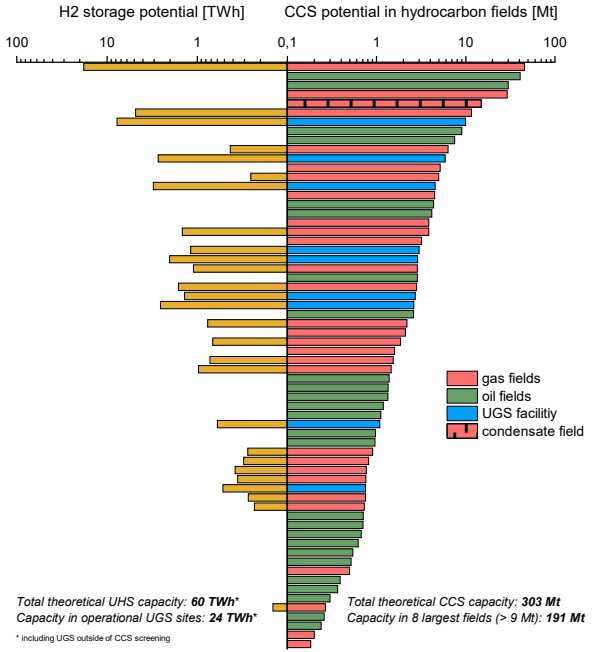


CCS and H_2 storage – competitive usage of the subsurface

Calculated H_2 storage potential: 60TWh

H_2 storage demand Austria: 32-56 TWh *(Clemens et al. 2022)*

H_2 demand: Steel industry ~ 17 TWh (total demand)



Kulich et al. (2024)

CO_2 storage potential ~ 300 Mt_{CO2}

In fields above >9 Mt: ~190 Mt_{CO2}

Reasonable Storage in AUT ~100 Mt_{CO2}

CCS+BECCS demand for 'moderate pathway' **~ 10 Mt_{CO2}/a** by 2040 *Hochmeister et al. (2024)*

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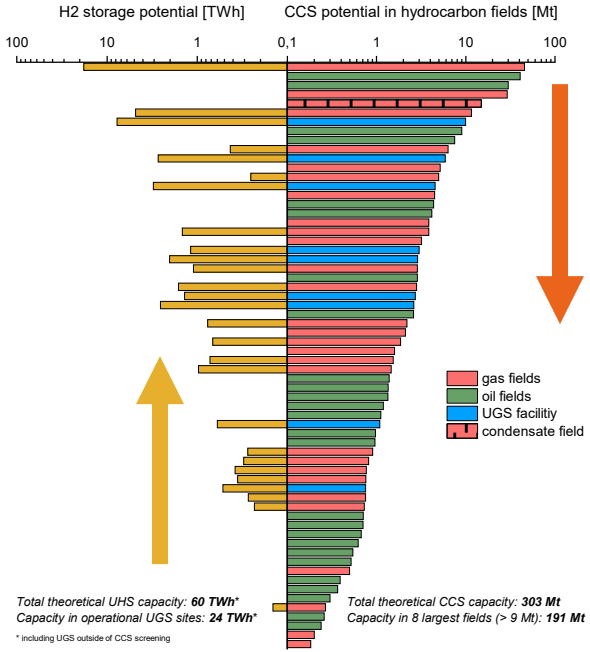

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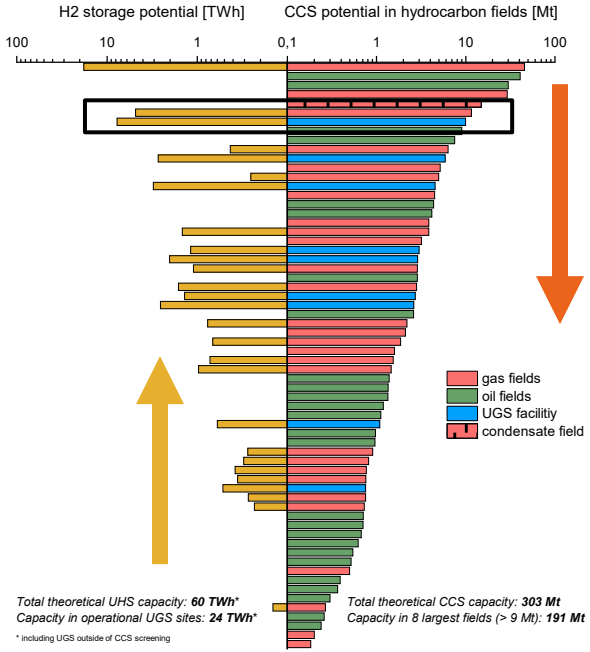

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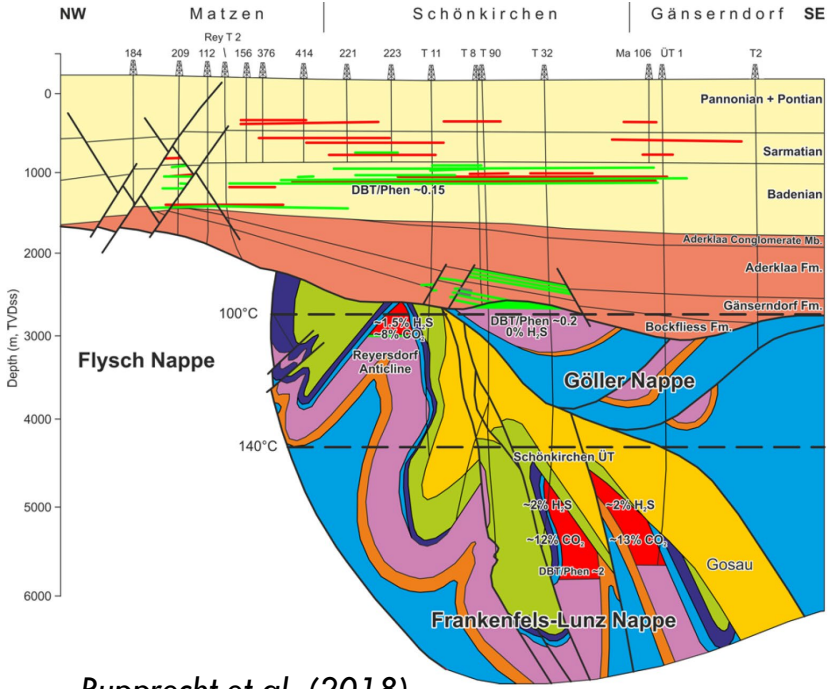
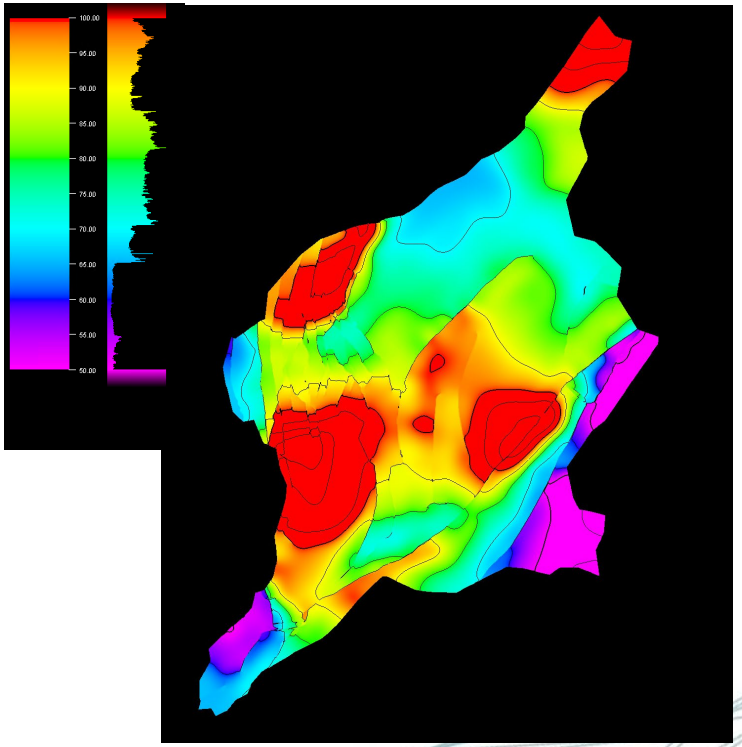
Storage in saline aquifers – example from Vienna Basin



Rupprecht et al. (2018)



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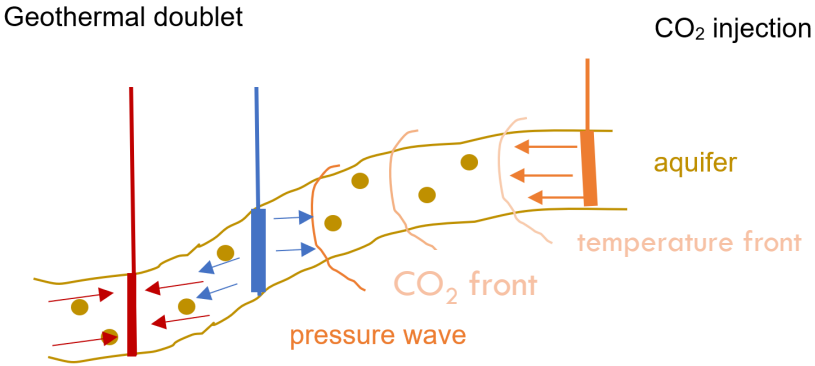

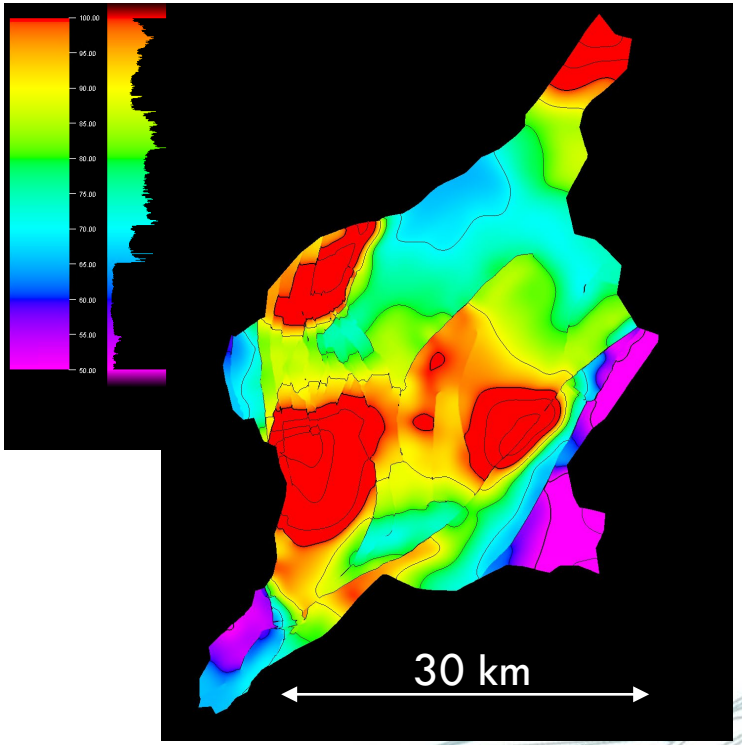

Conclusions

- Ongoing Carbon Management Strategy in Austria
- Geodata is (still) hardly accessible
- Reasonable storage potential in hydrocarbon fields in Austria is in the order of 100 Mt CO_2
- Additional storage potential in saline aquifers is very likely.
- Competitive usage of the subsurface: rather than generally prioritizing one technology, each field should be investigated individually while considering the needs of the public, the industry and the environment.

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