EGU General Assembly 2020
zoom
Vienna | Austria | 3–8 May 2020
EGU2020-5726 - ERE 6.1

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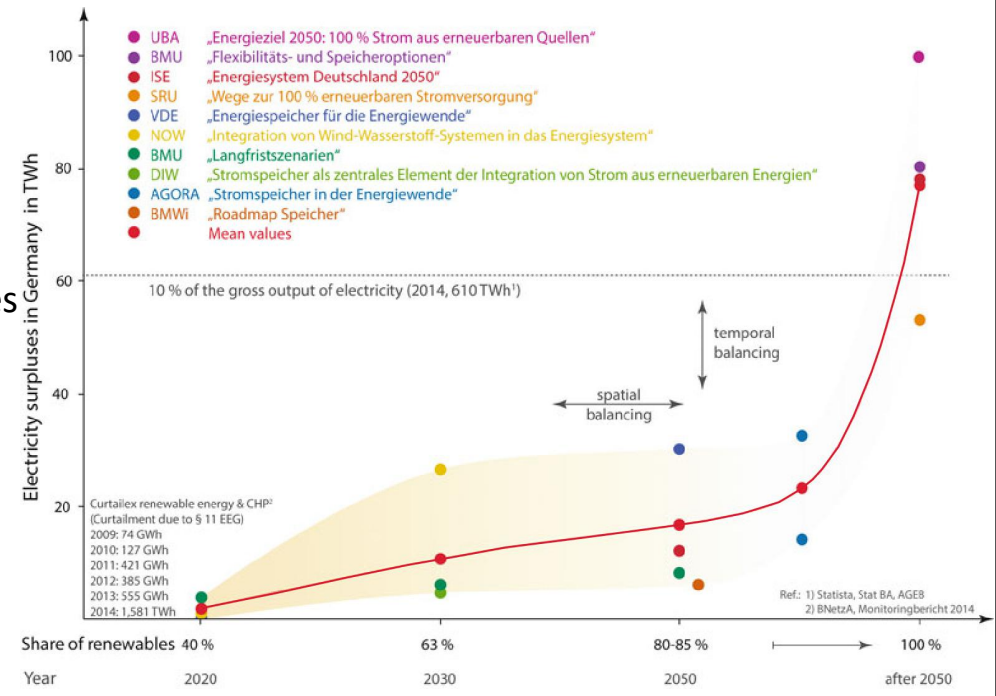
A comparison of the geological potential for CH_4, H_2 and CAES (compressed air energy storage)

Motivation

- Rapid renewables growth triggers storage demand
- Energy balances can be achieved by Power-to-X solutions
- Geological storage provides large potential capacities

Therefore:

- Need for local storage potential assessment
- As a storage site can be used only for one storage technology, **which one should be preferred?**
- Comparison of geological storage technologies in terms of storage capacity and deliverability



Sterner and Stadler (2014)

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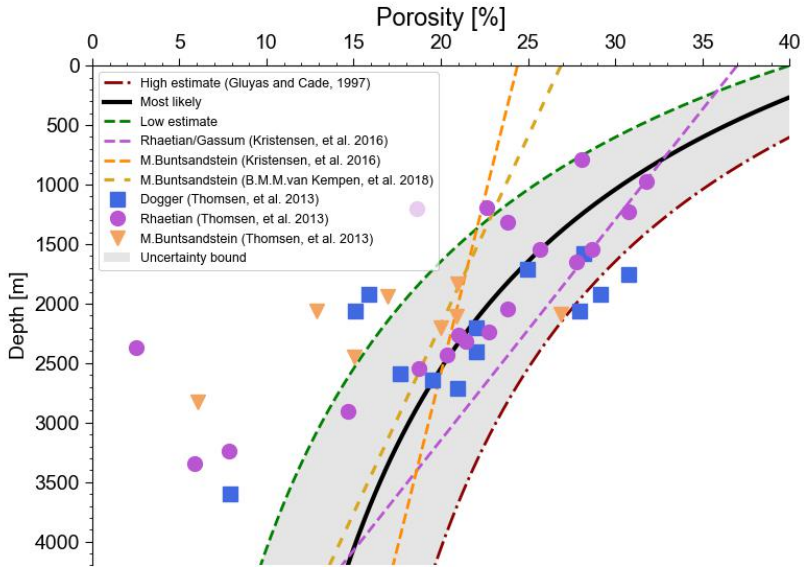
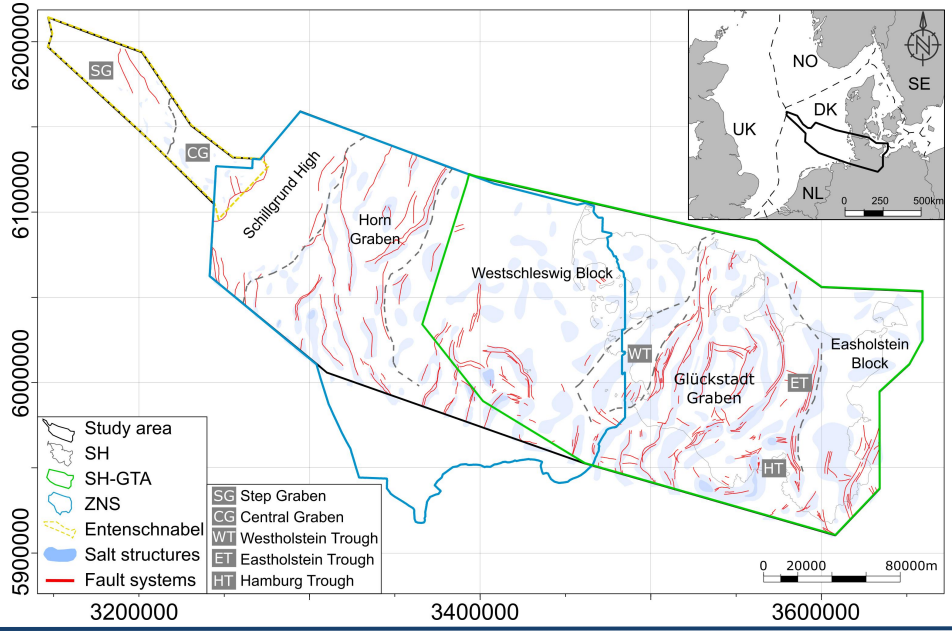
Methodology and Geological settings

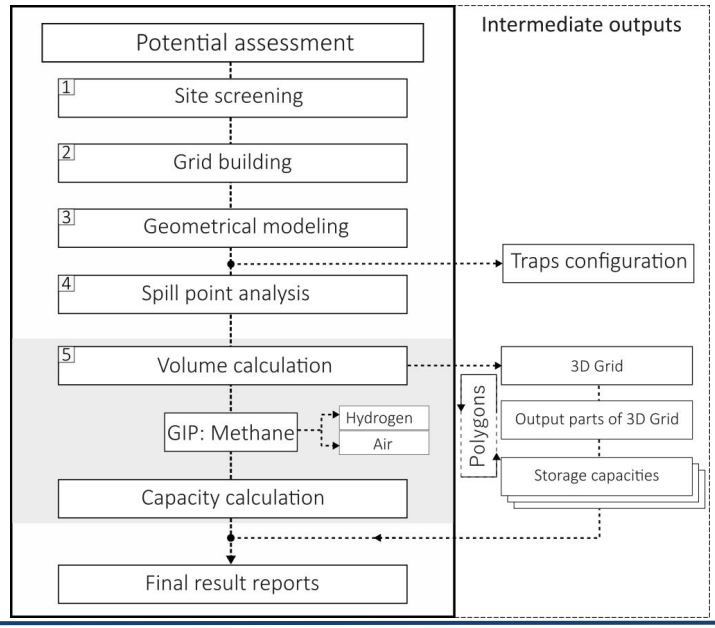
- Study area within the North German Basin (NGB)
- Spill point analysis applied to each storage site
- Volumetric method used for Gas in Place (GIP) calculation
- Exergy analysis is a key factor to compare different storage technologies



Study area



Assessment methodology



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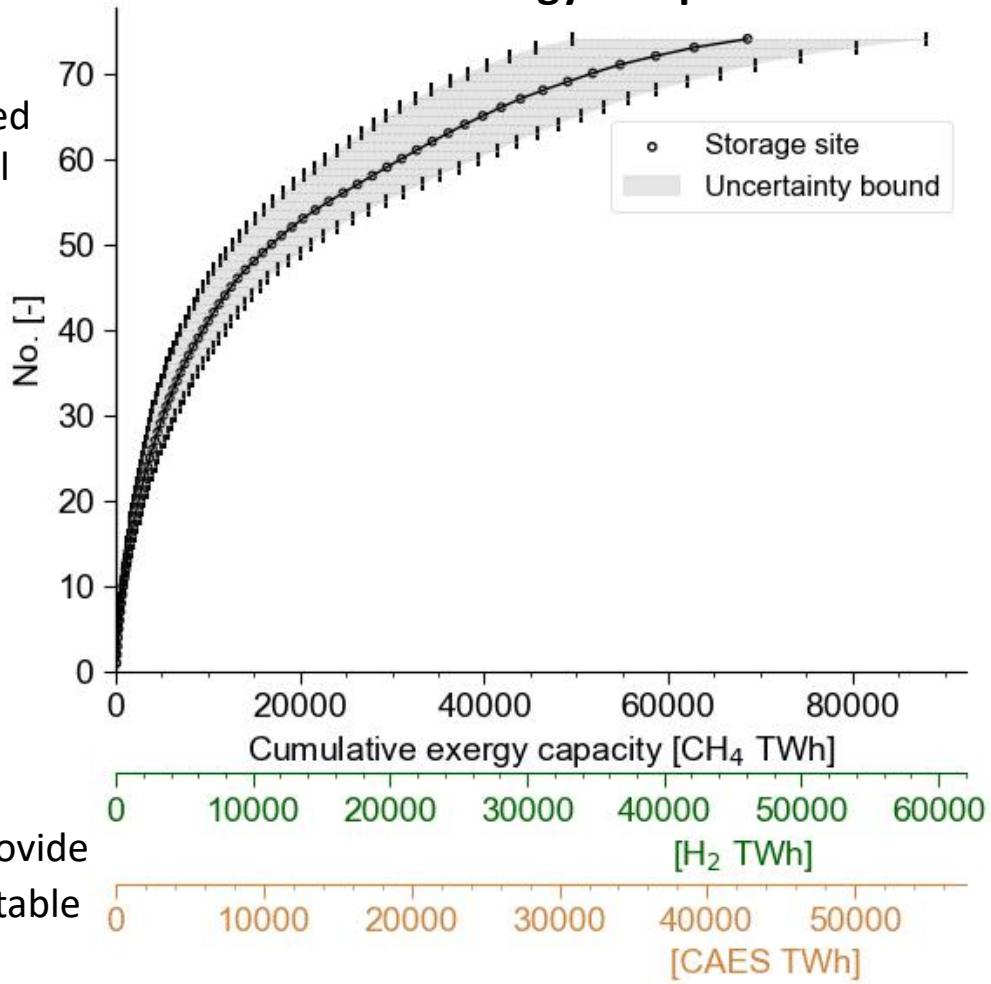
Results

Site screening results:

- Various geological trap types considered
- Regional petrophysical properties were considered
- Identified **74 storage sites** within three geological storage formations

Stored gas	Total exergy (most likehood estimate)
Synthetic Methane	68600 TWh_{CH4}
Hydrogen	48200 TWh_{H2}
CAES	44700 TWh

Theoretical exergy comparison



Key findings:

- Identified storage potential is **large enough** to provide the required storage capacity. Thus, the most suitable sites can be picked for energy geostorage
- Identified storage sites **(350-4000 m)** are suitable for all **three storage** technologies considered

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