



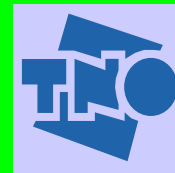
GESTCO
European Potential
for the Geological Storage
of CO₂ from Fossil Fuel Combustion

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Bundesanstalt für Geowissenschaften und Rohstoffe



Participants:



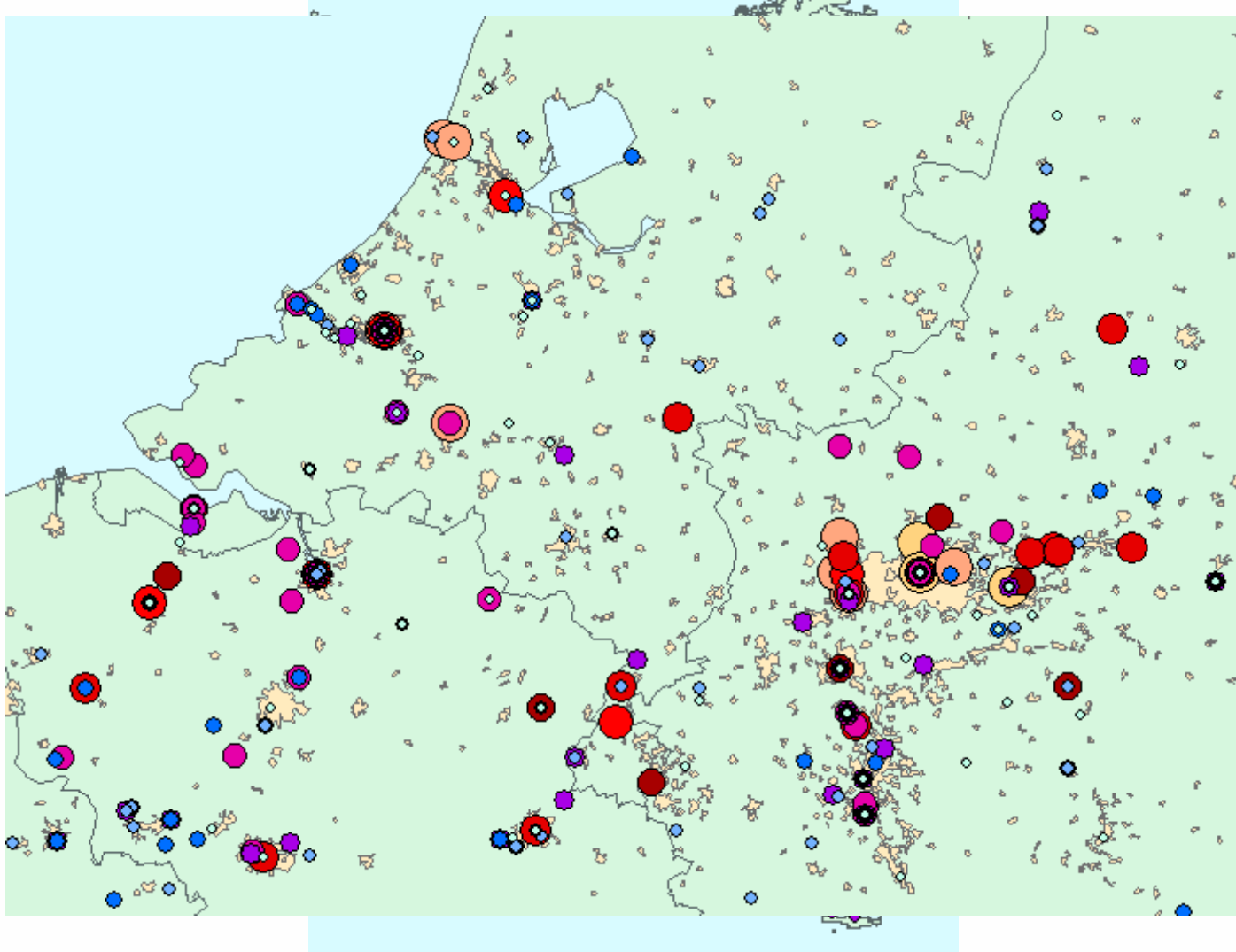
End-users:

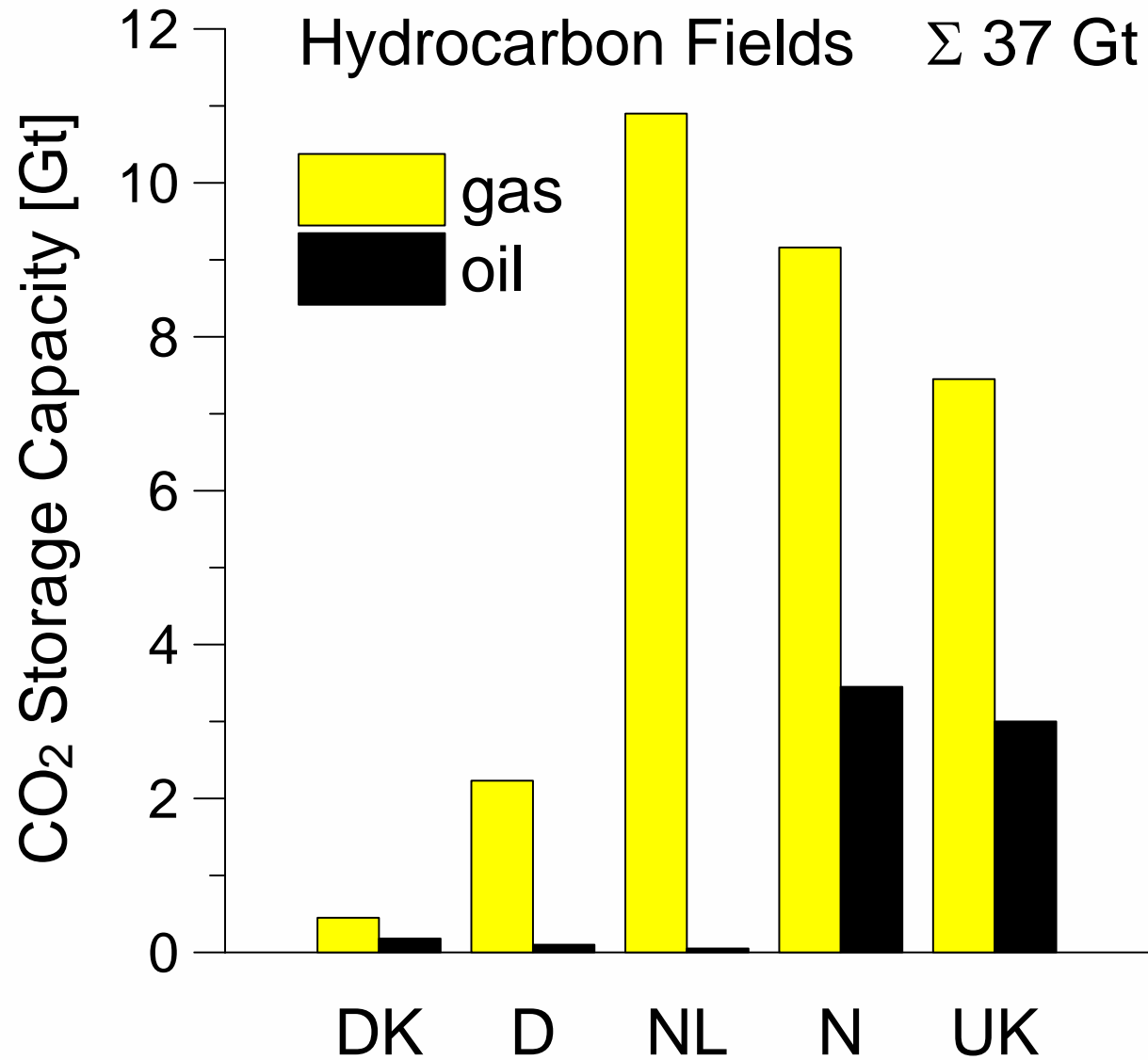
- BP
- Shell
- Statoil
- Norsk Hydro
- TotalFinaElf
- Gaz de France
- BEB Exxon Mobile Production Germany
- Norwegian Petroleum Directorate
- UK Department of Trade and Industry
- Danish Energy Authority
- Vattenfall
- IEA Greenhouse Gas R&D Programme

Sub-contractors:

- Public Power Corporation of Greece
- French Geothermal Company (CFG)
- Danish Oil and Natural Gas Company
- CE-Transform (Netherlands)
- Tyndal Centre (UK)
- Vito Engineering (Belgium)

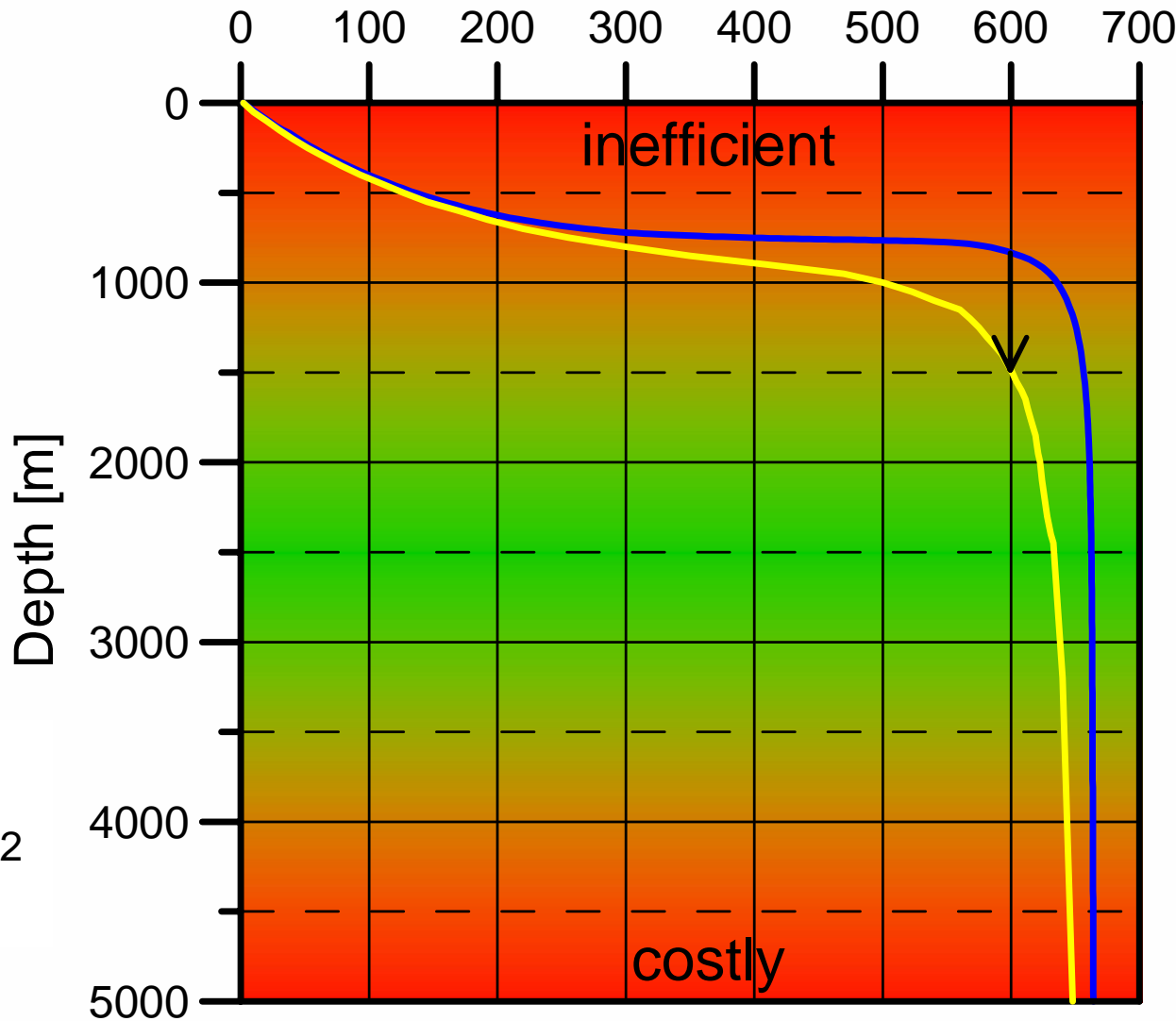
Inventory of major industrial Sources of CO₂





CO₂ Storage in Aquifers

Density [kg/m³]



- pure CO₂
- 97.25% CO₂ (oxy-fuel)

inefficient

costly

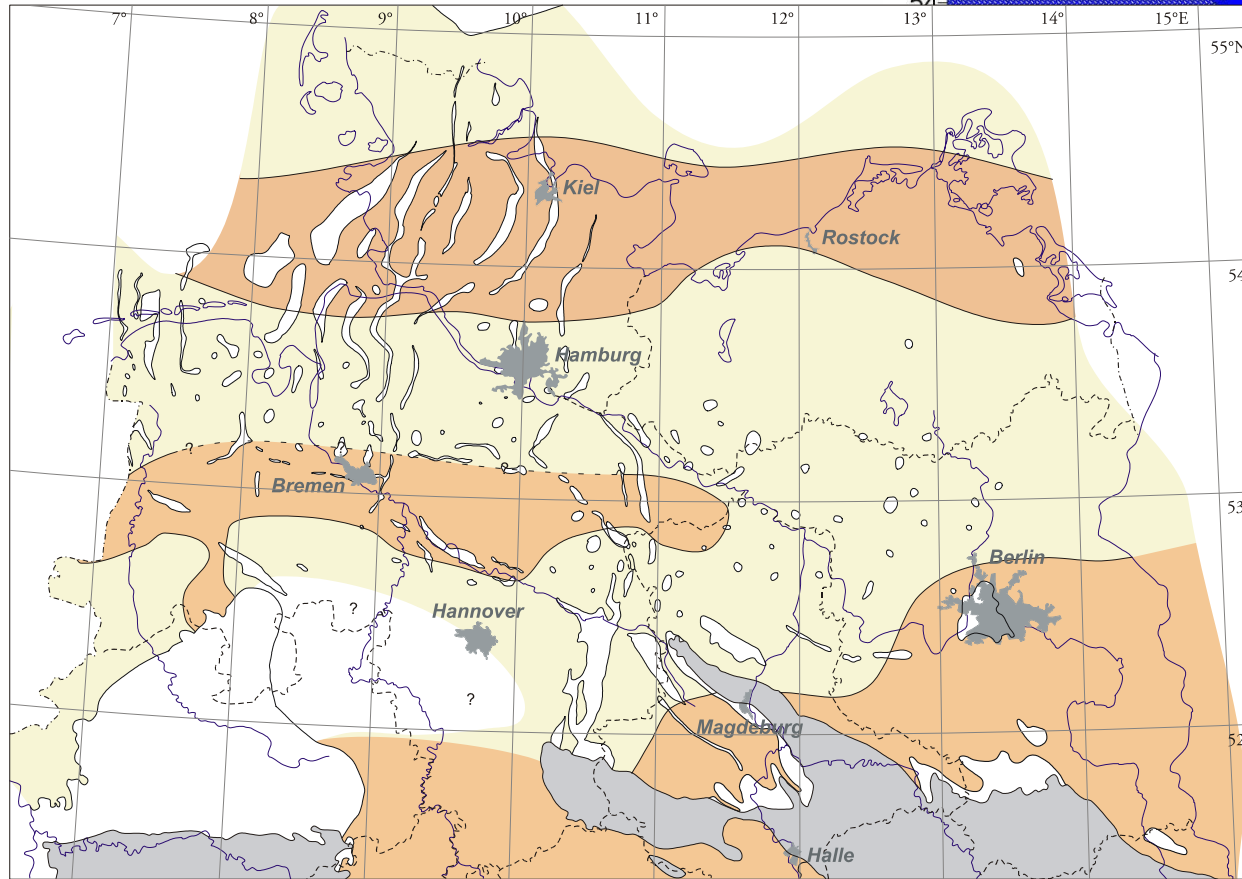


Aquifer Storage Capacity

Case study area	CO ₂ storage capacity (Gt)
Denmark, selected onshore & near shore aquifers	16
UK, southern North Sea	up to 14.7
Germany, onshore	20 ± 8
Norway, off-shore traps	13
Netherlands on- and off-shore	1.6
Greece, on- and off-shore	2.2
Campine Basin, Belgium	0.1
Paris Basin	0.66

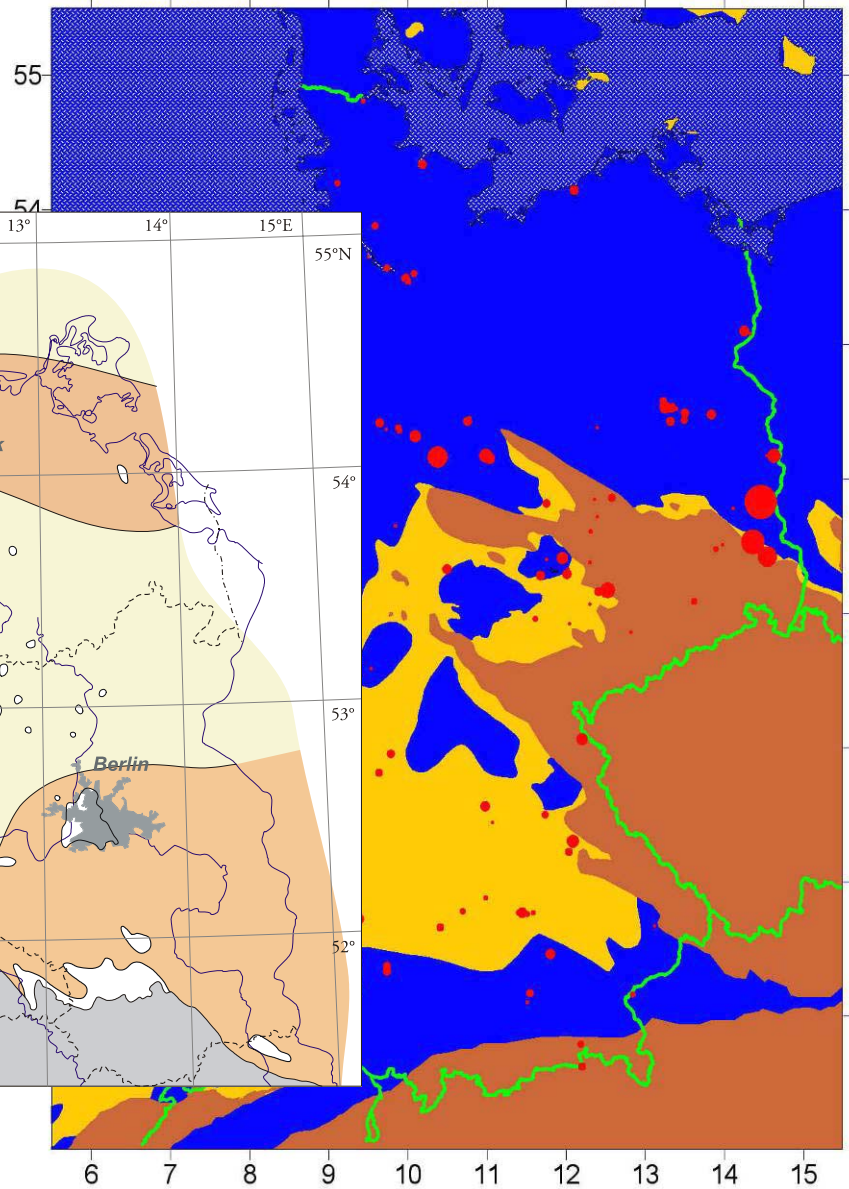


Mapping of potentially suitable Aquifers



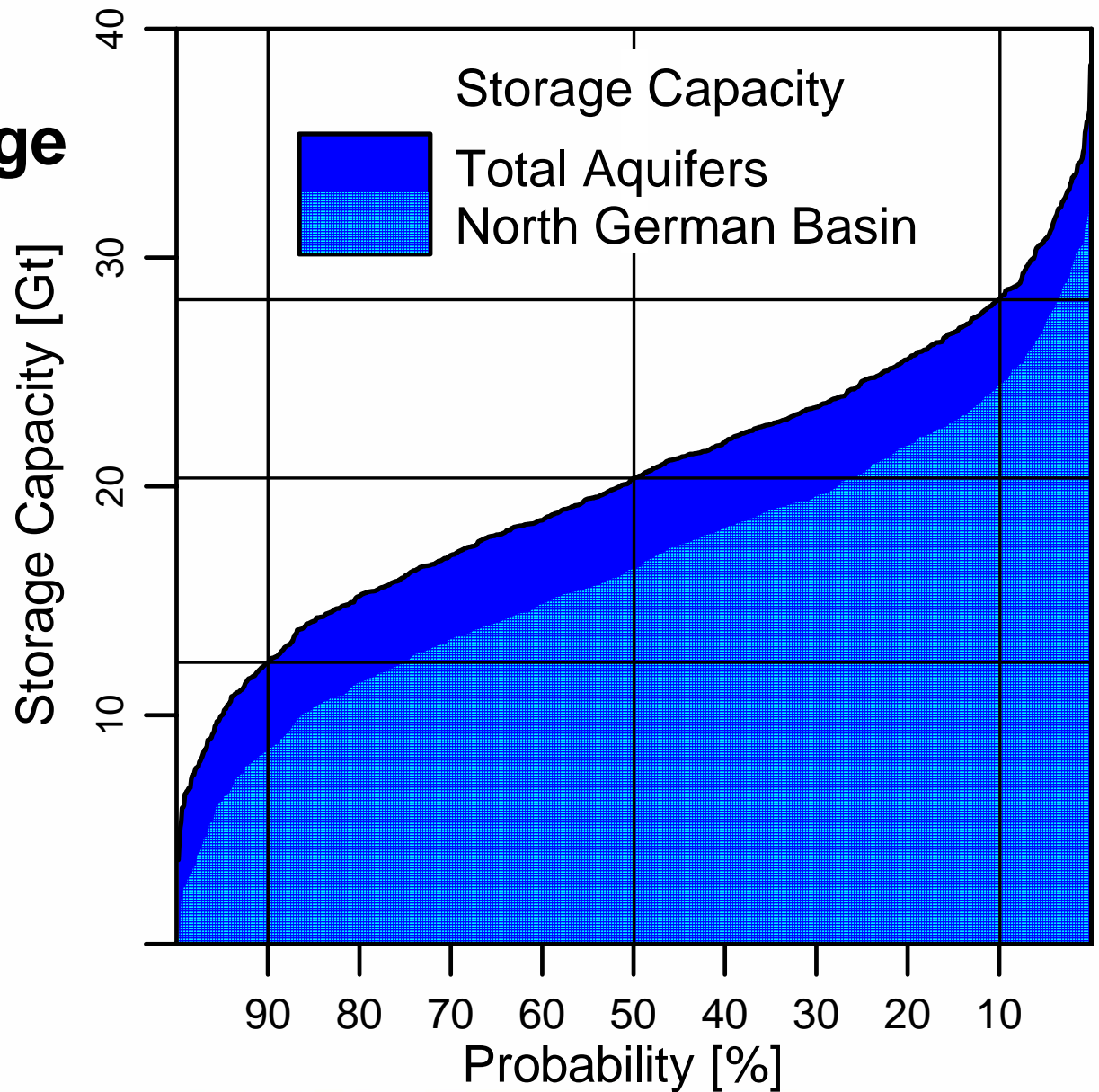
Aquifers
 Areas without aquifers
 Basement below Cenozoic cover

Present day distribution of the Scythian ("Mittlerer Buntsandstein")
 (a. RÖHLING 1991, RÖHLING et al. 1999, DIENER et al. 1984)



Capacity of Aquifer Storage in Germany

Estimate of uncertainty



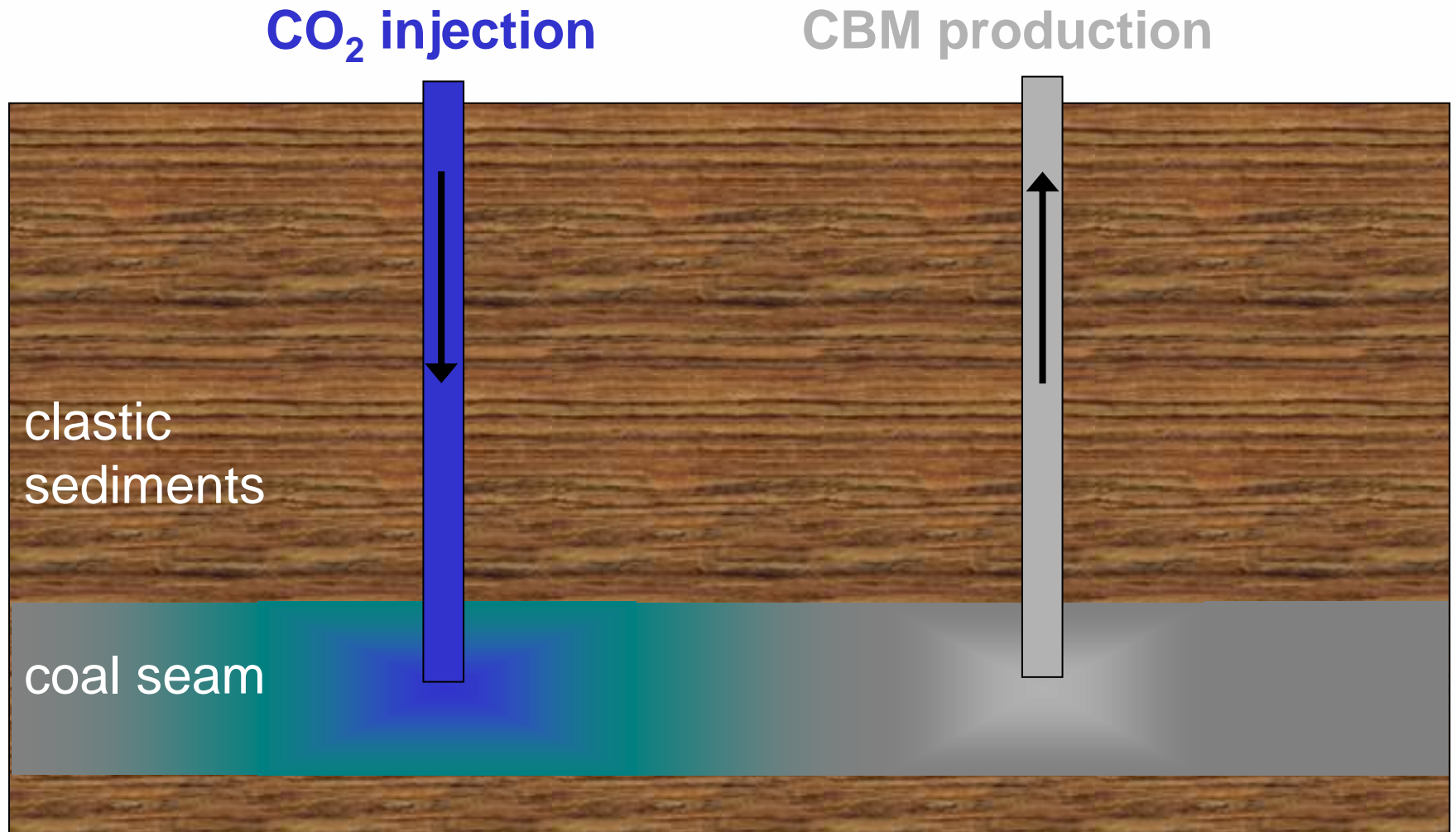
Salt and Coal Mines

Salt mines: - little capacity (30 Mt)
- conflicts of use (toxic waste)
- safety (shaft seals)

Coal mines: re-activated mines (F, GB, E, D)
- absorption of residual coal
- conflicts of use (methane gas, coal mining)
- fractured overburden (F, area)
- shallow depth (density)
- potential uncertain



Deep unminable Coal Seams, ECBM



Potential e.g. NL & B

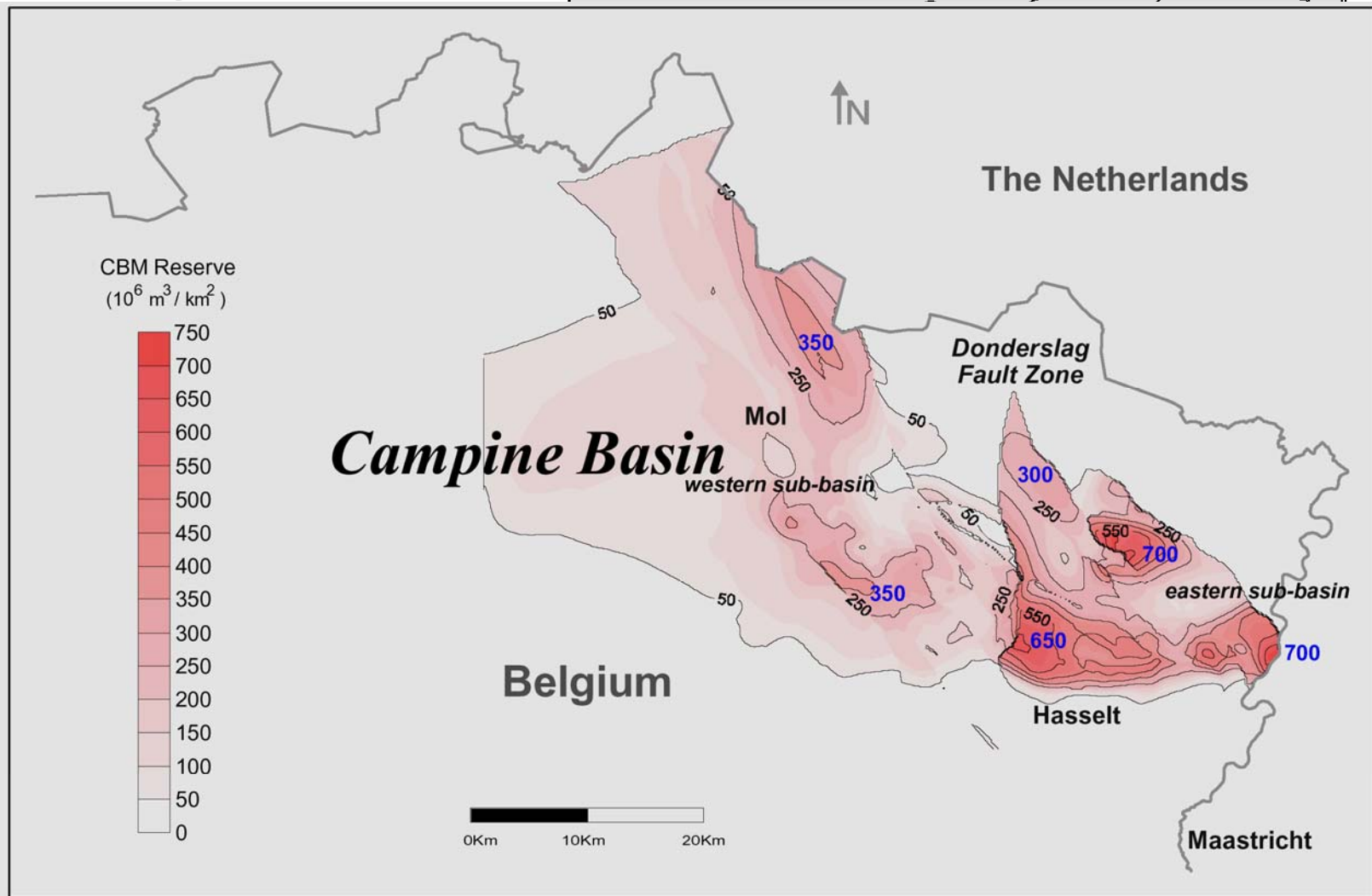
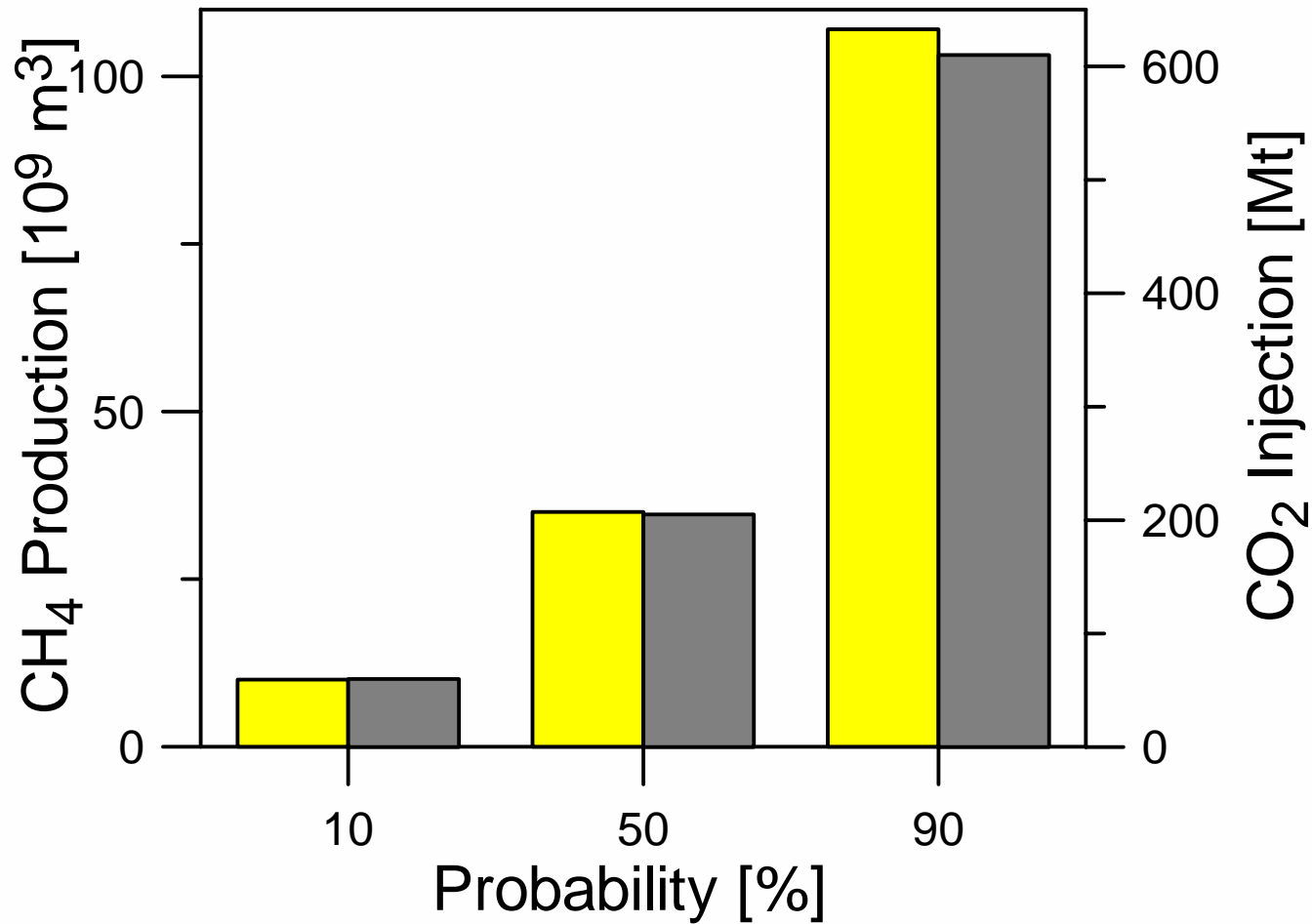


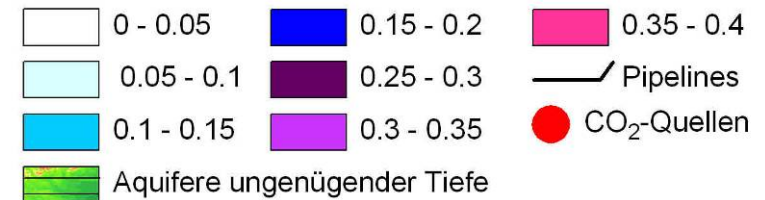
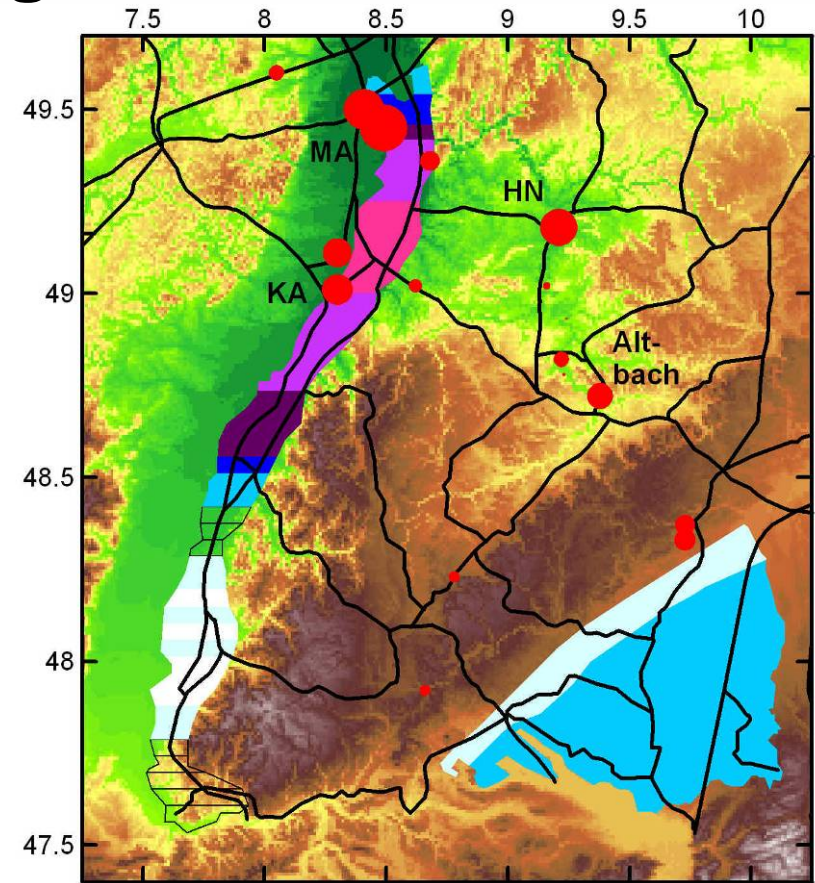
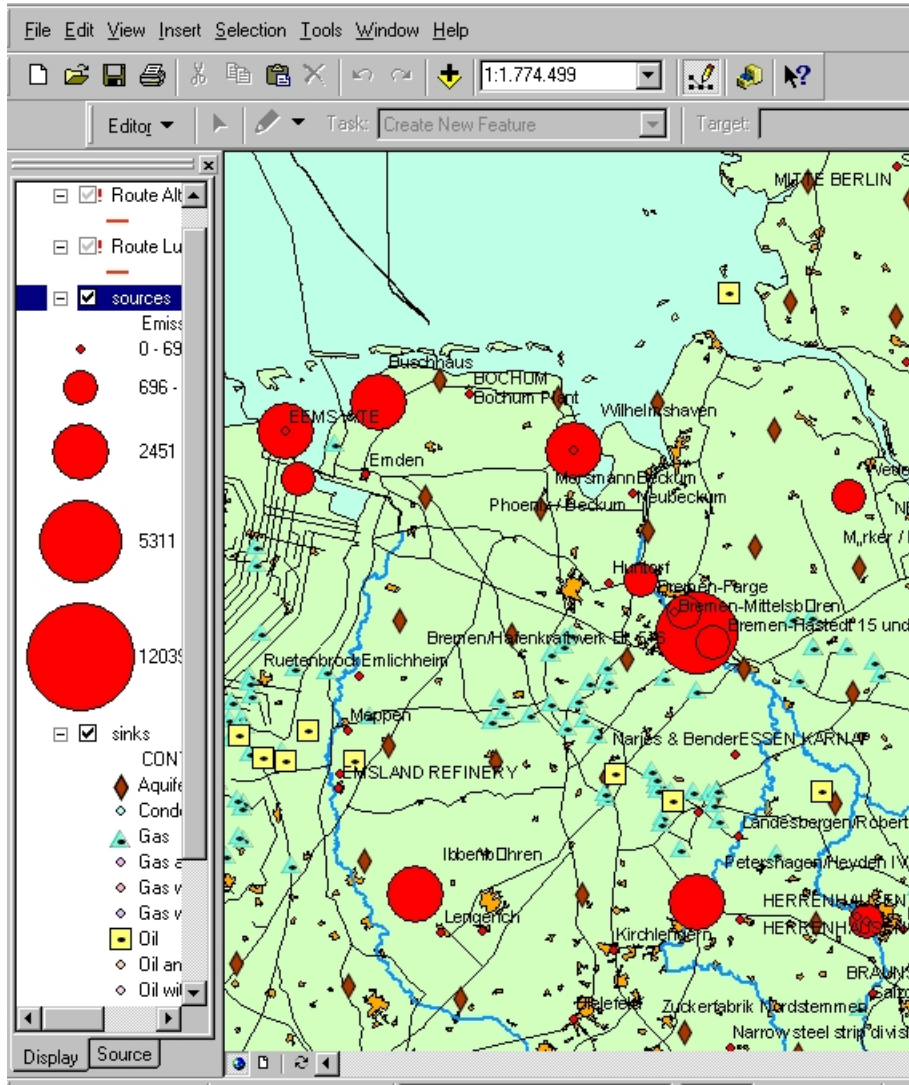
Figure 9. Coalbed methane reserves in the Campine Basin (after Van Tongeren et al. 2000).

Uncertain ECBM Potential and Storage Capacity

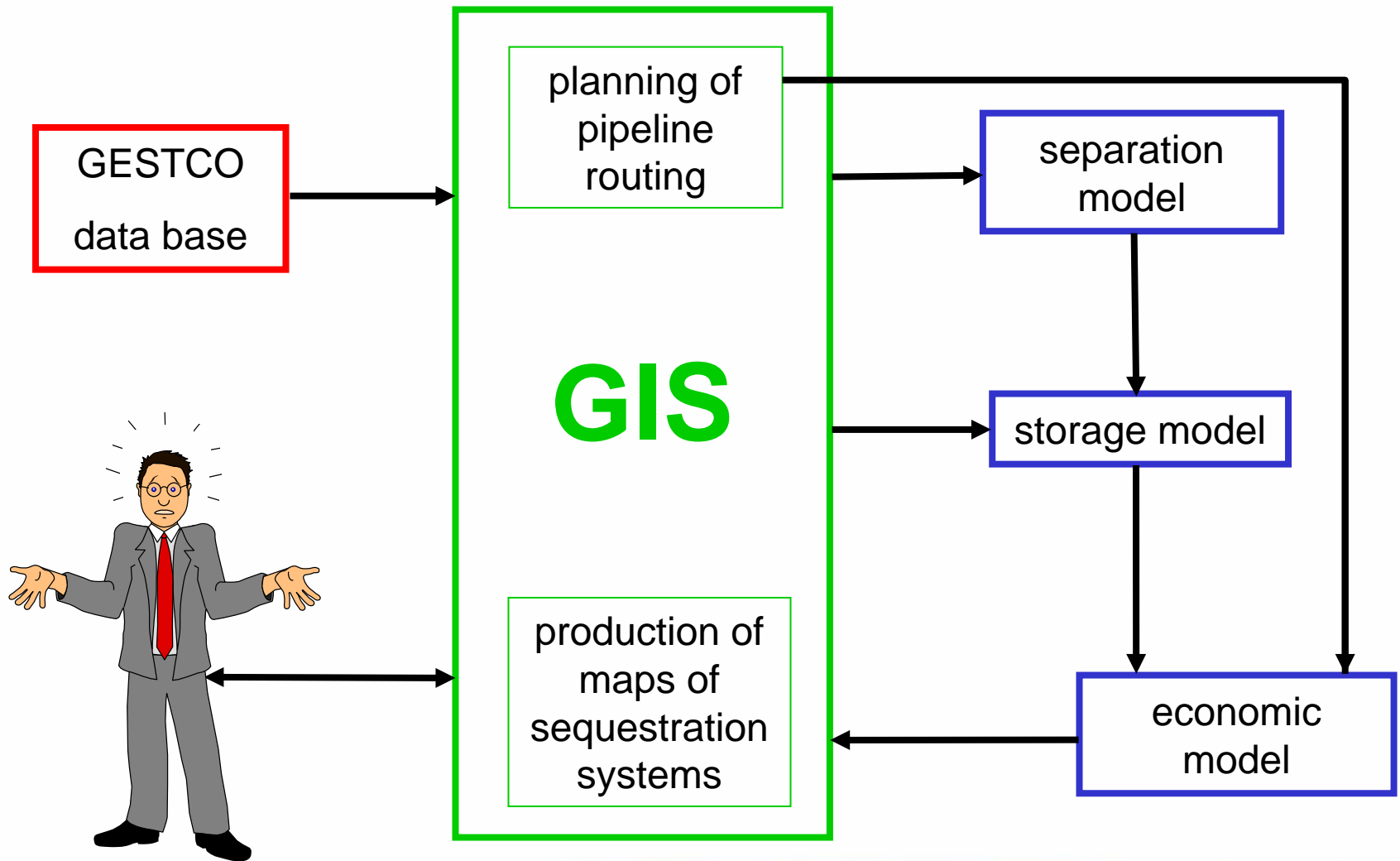


CO₂ storage and ECBM potential in the Netherlands up to 1500 m depth

The GESTCO GIS -- matching sources and sinks



GESTCO Decision Support System (DSS)



General Manager

Graphical User Interface

Route Alt

Route Lu

sources

Emiss

0 - 69

696 -

2451

5311

12035

sinks

CON

Aquife

Condi

Gas

Gas e

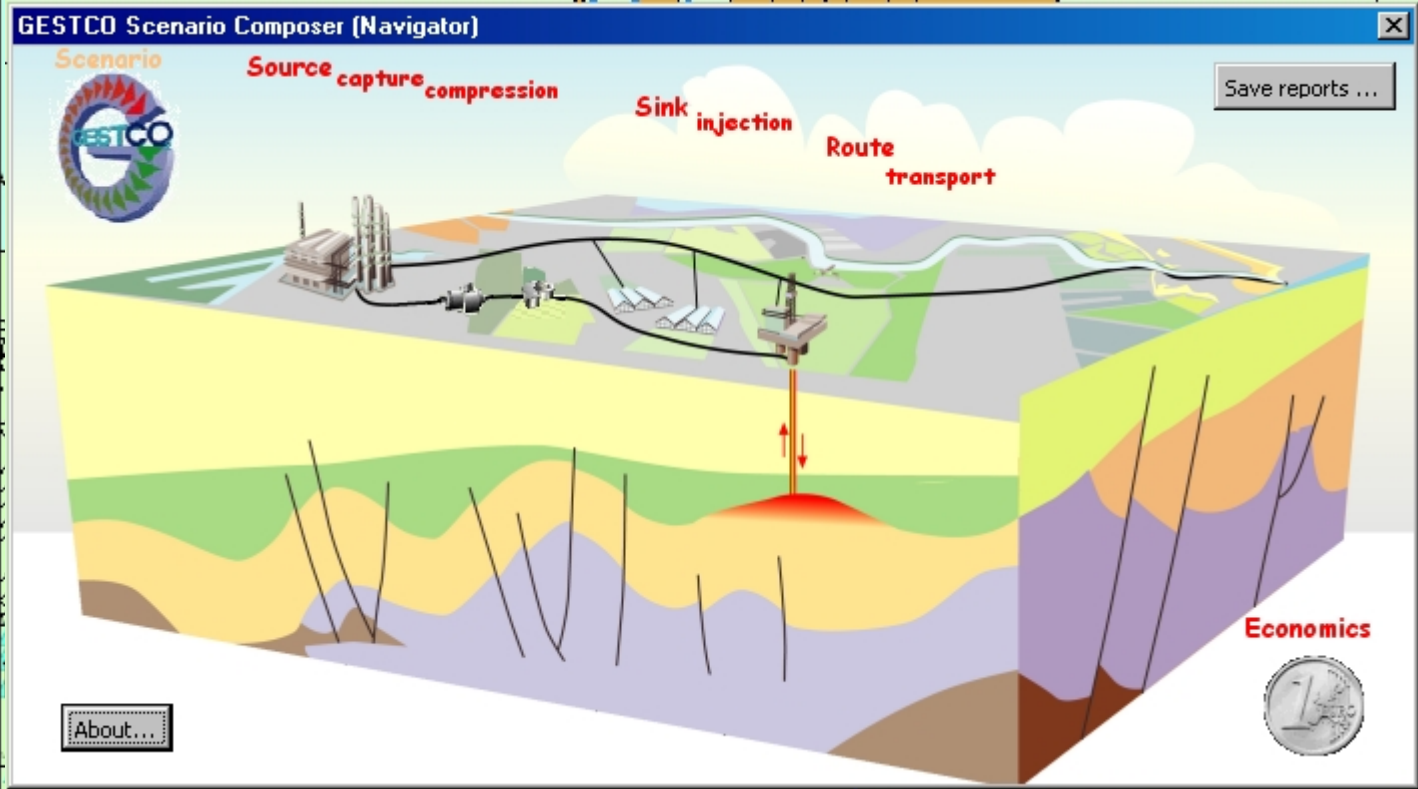
Gas v

Gas v

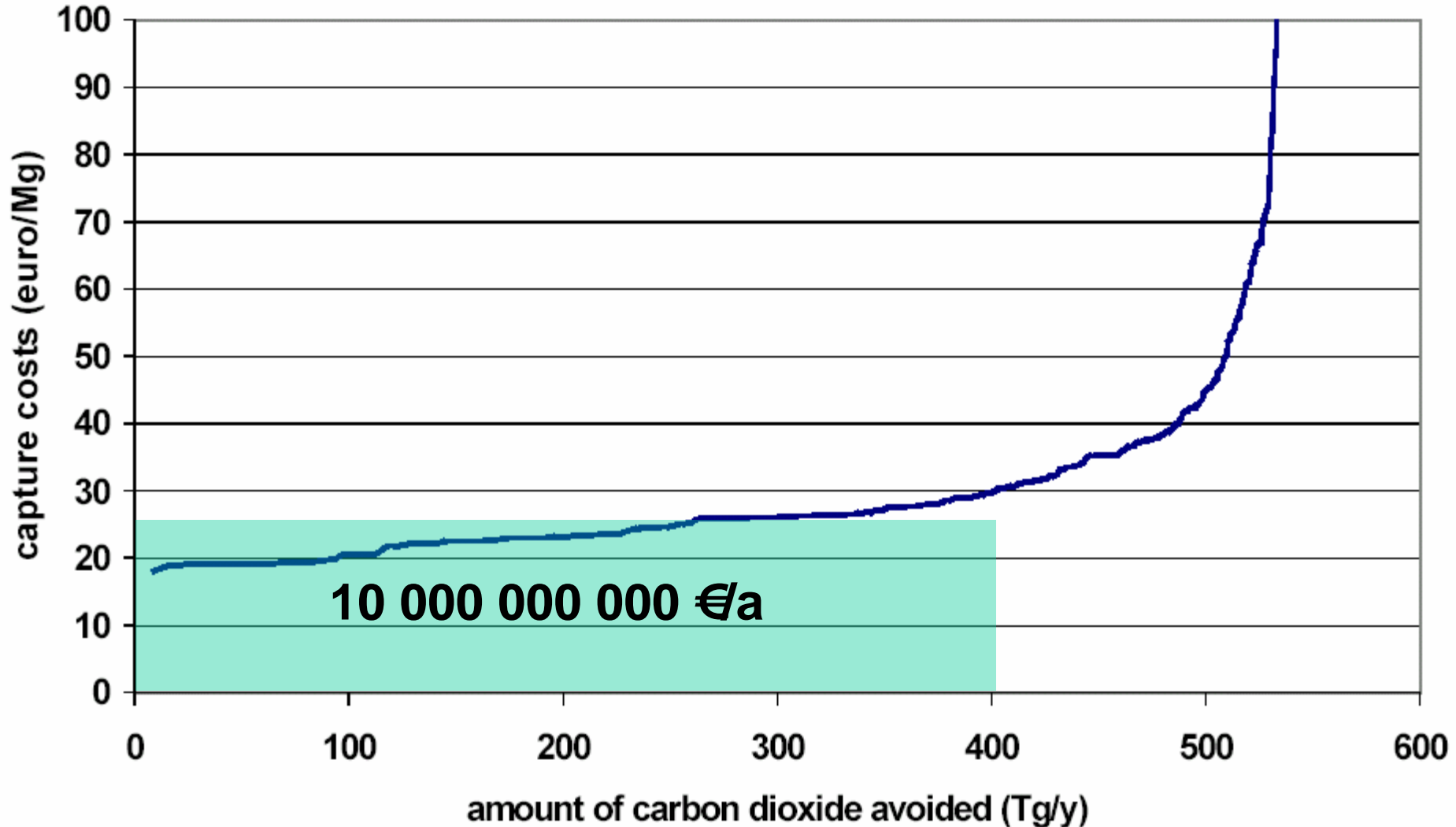
Oil

Oil an

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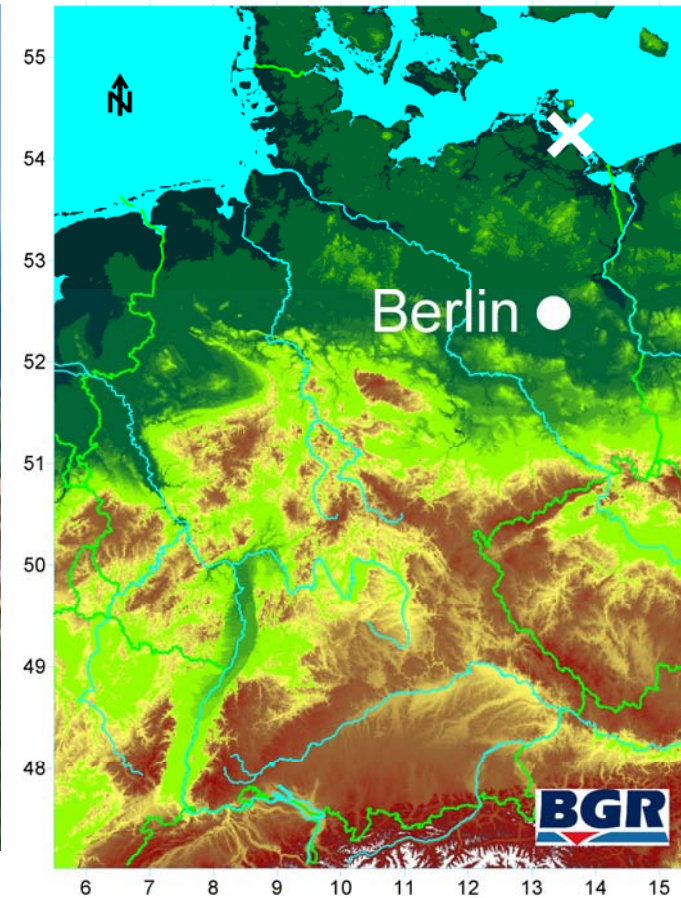
Capture Cost Analysis



Post-combustion capture costs for power plants in the GESTCO data base



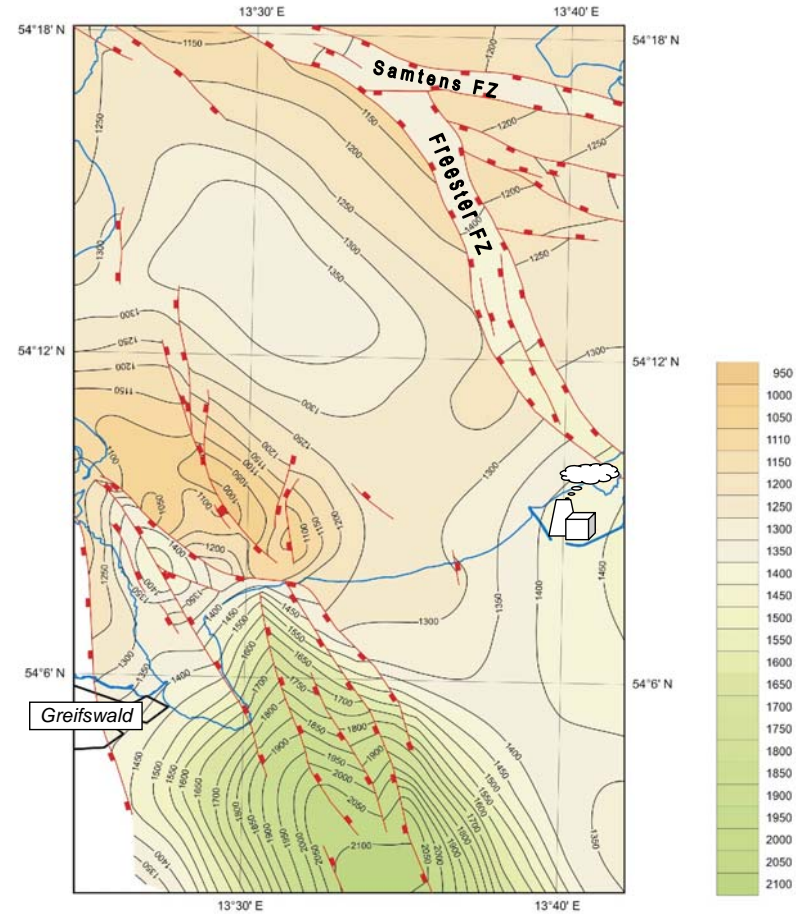
Case Study Greifswalder Bodden



Case Study Greifswalder Bodden

Geological Structure


Depth of the Middle Bunter Sandstone near Lubmin



Isobath map of seismic S2 reflector

base of the Röt-Folge, top of the middle Bunter reservoir

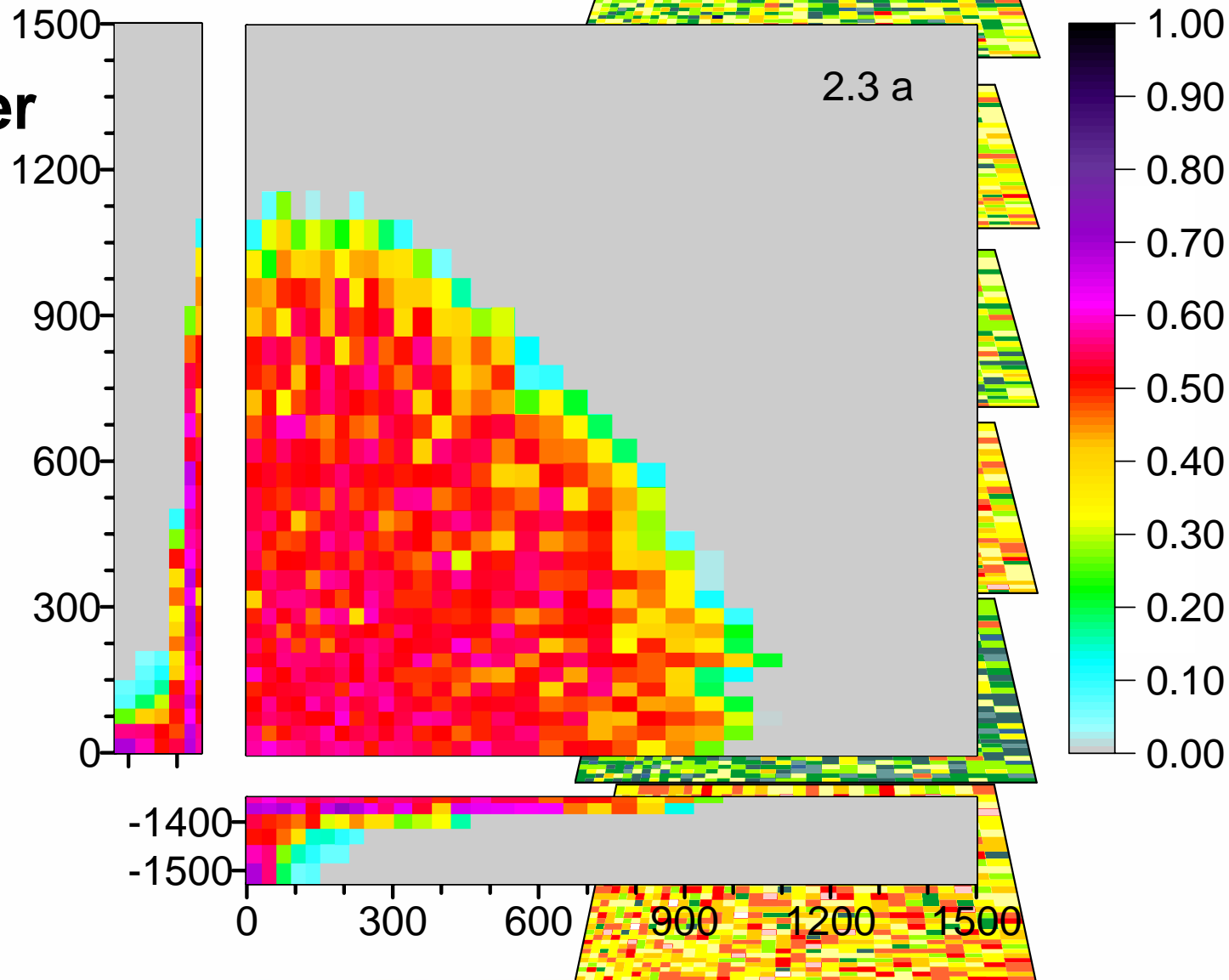
shore line 

site of Lubmin power plant 

Case Study

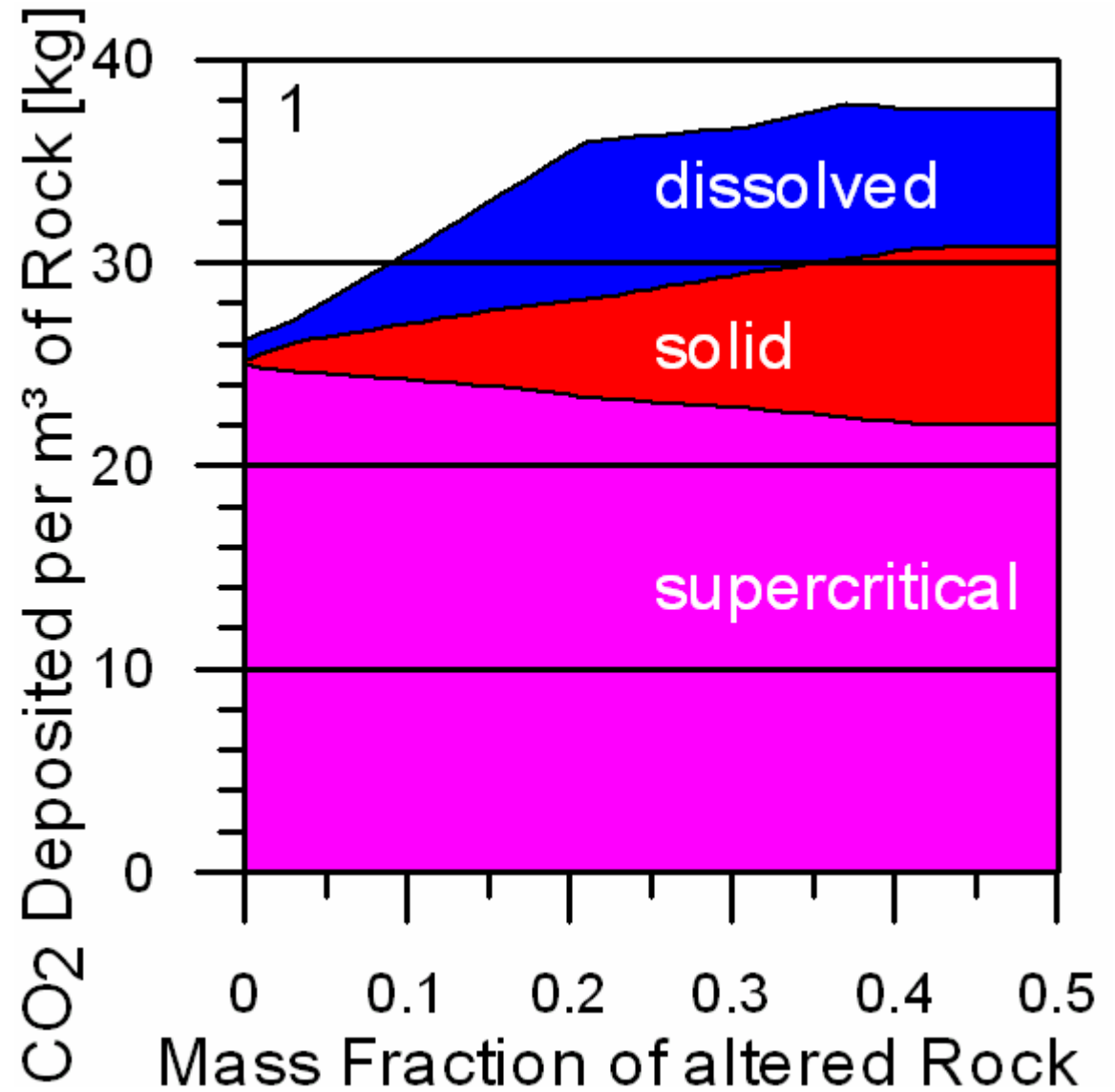
Greifswalder Bodden

Reservoir simulation



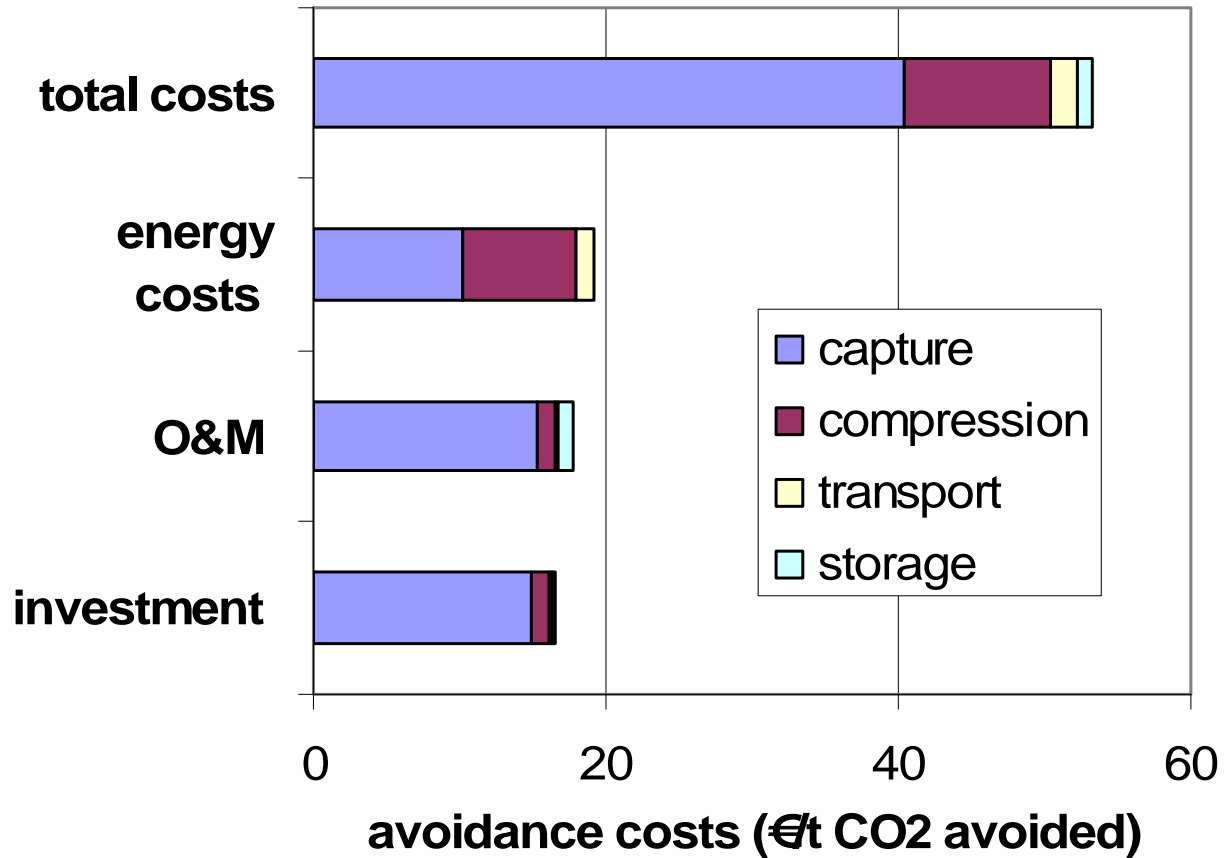
Case Study Greifswalder Bodden

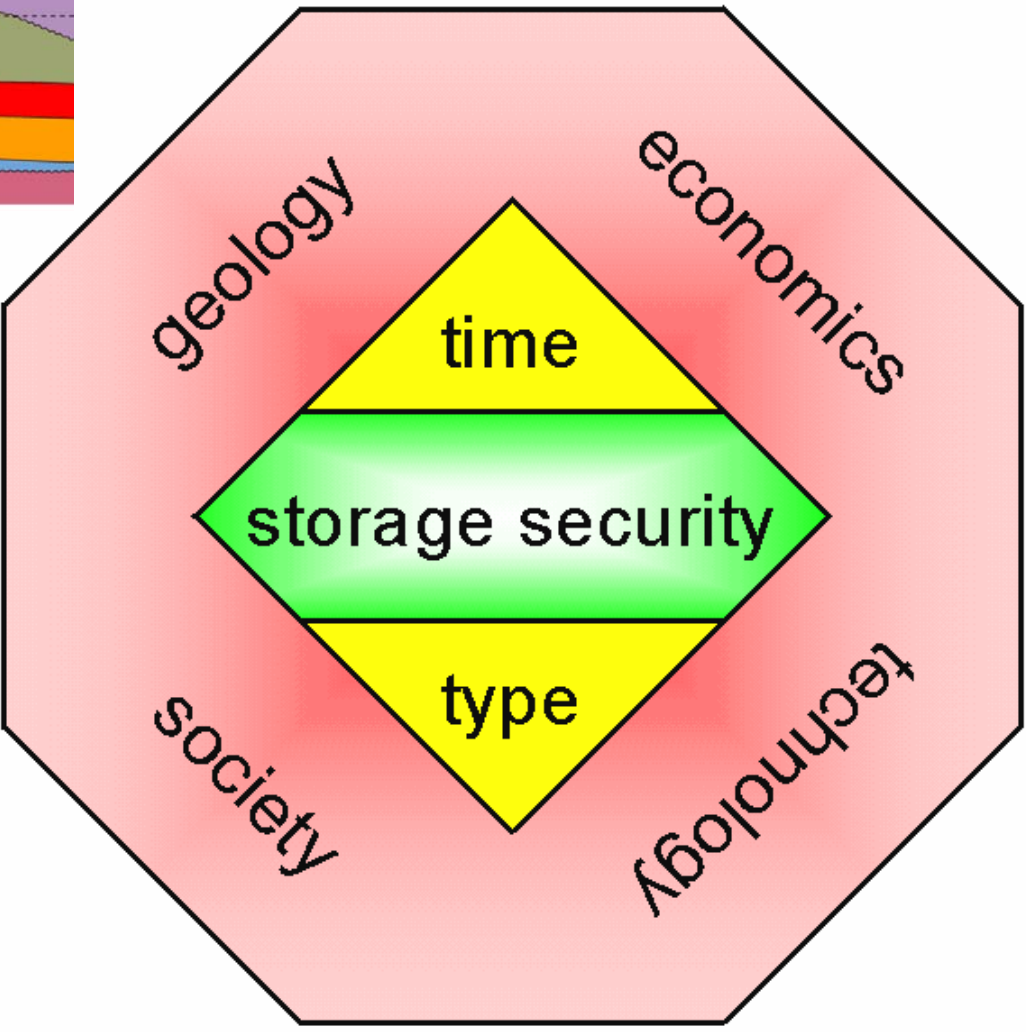
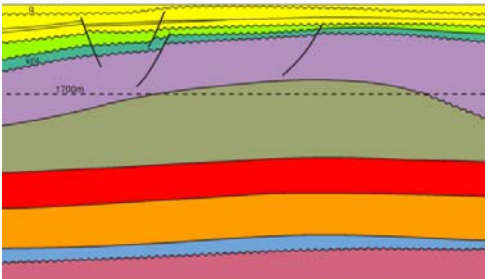
Geochemical modelling



Case Study Greifswalder Bodden

Cost Estimates



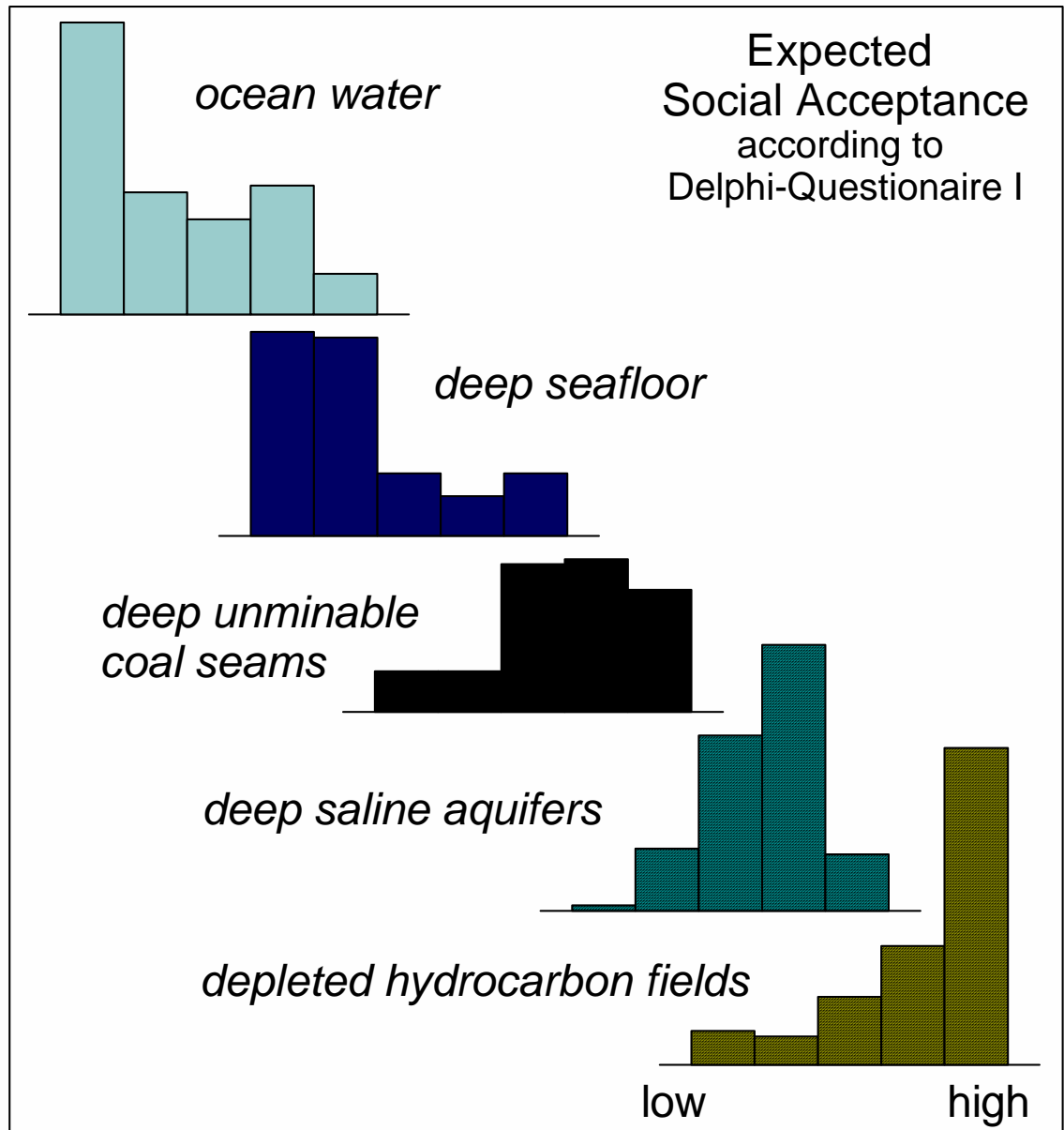
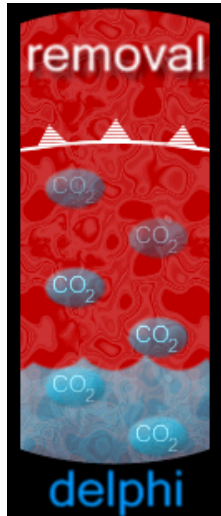


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F. May

Public Acceptance



Public Acceptance

importance of mass media



**CO₂ eruption in potassium mine
Marx-Engels**



protected natural CO₂-source

BGR Bundesanstalt für
Geowissenschaften
und Rohstoffe

GEOZENTRUM HANNOVER

EU GeoCapacity

Assessing European Capacity for geological Storage of Carbon Dioxide

