

Carbon Capture & Storage – New Challenges for Climate Policy. The German Case.

Conference

“Towards a Green New Deal: The New Energy & Climate Policy”

Schloss Leopoldskron

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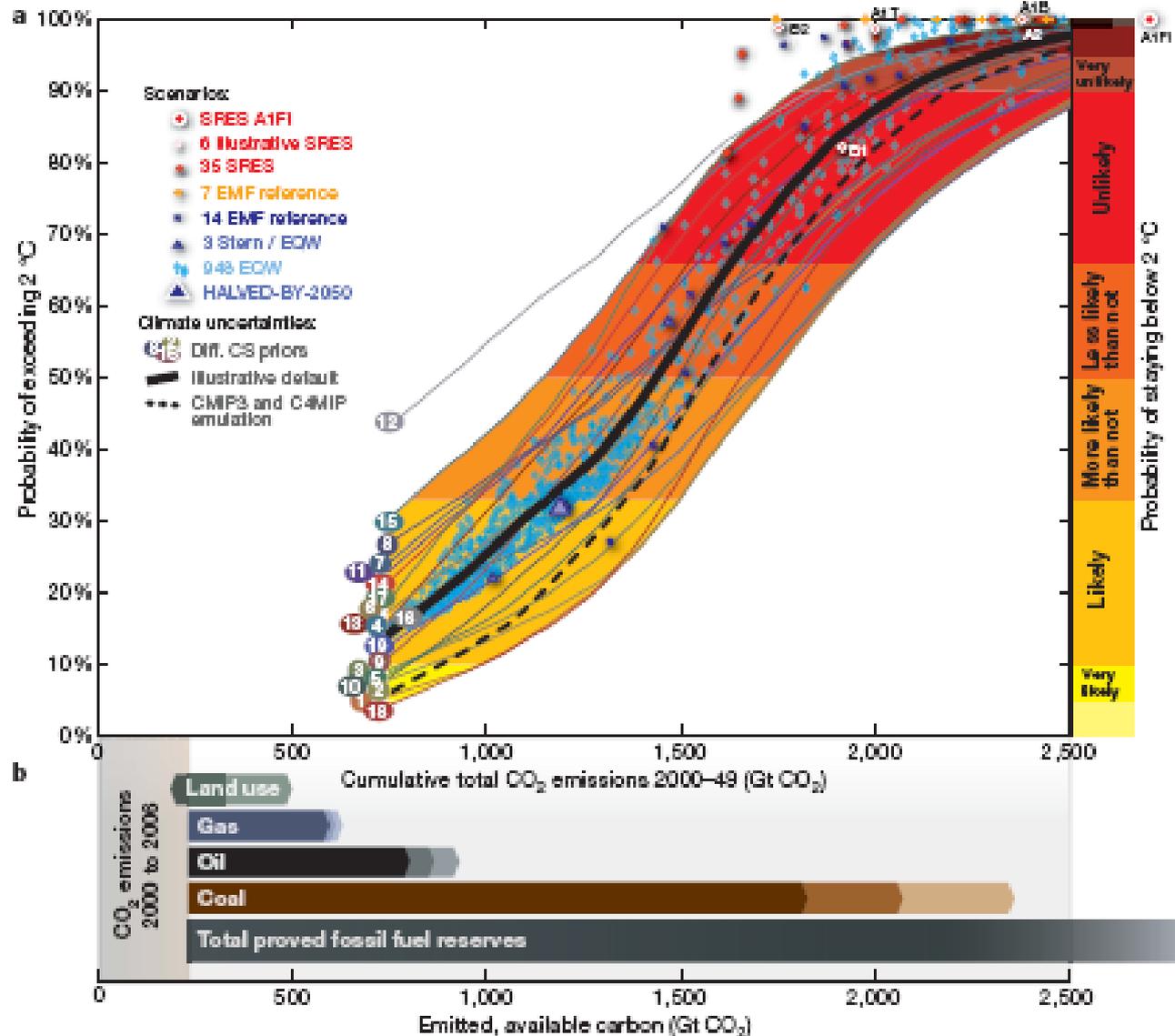
CCS – CO₂ Capture and Storage

Why is this an interesting issue

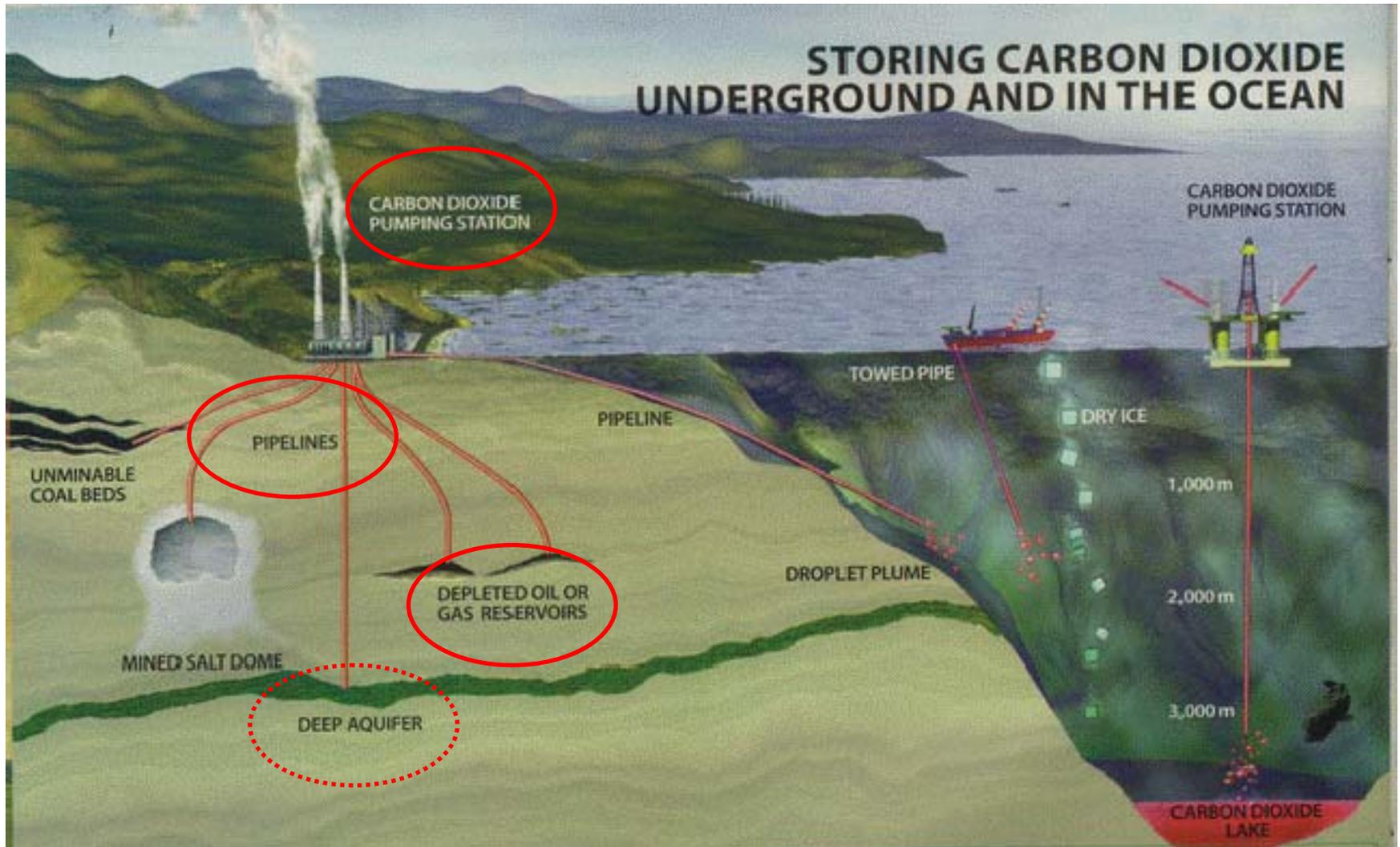
- **A controversial (and complicated) issue**
 - The technology system itself
 - The ‘clash of systems’ debate
- **The first case-study on non-evolutionary infrastructure roll-out within the framework of ambitious climate policy**
- **One of the first focused clash of regulatory streams**
 - Carbon regulation: new patterns of production and consumption
 - Infrastructure regulation: enable access to infrastructure for all interested parties at the lowest costs
 - Energy security regulation: more and more diverse (long-distance) infrastructure is necessary
- **The new question on the role of the state**

The CO2 budget: a new approach

Full decarbonisation as new paradigm



CO2 Capture and Storage (CCS) A complex technology chain



- **Decarbonisation of fossil fuel use**
 - “Residual” supply from fossil fuels (capacity, energy, competitiveness, grid stability, energy security, etc.)
 - OECD, EIT und DC
 - Coal and gas
- **Process emissions**
 - Iron & steel, cement (DE ~ 80 Mt CO₂, globally 2.5 Gt CO₂)
 - There is no alternative
- **Additional net sinks**
 - Biomass & CCS = net sinks
 - Power sector, biofuel production
 - Can avoid the switch from forest sinks to forest sources (DE ~2020)
 - There is no alternative
- **Abatement potential: DE ~150 Mt CO₂, global 5...10 Gt CO₂**

CCS – CO₂ Capture and Storage

Some key characteristics

- **Capital intensive option**
- **Costs and competitiveness significantly depend from fuel prices (net efficiency losses) removal rates (and CO₂ price), and the CO₂ infrastructure (and the respective market model)**
- **Technology system (with very different challenges in the value chain)**
- **Storage reservoirs are scarce resources (and concentrated in certain regions)**
- **CO₂ storage puts ultimately rivaling uses of the underground on the agenda (hydrocarbons, gas storage, geothermal energy, compressed air reservoir, etc.)**
- **Non-evolutionary roll-out of infrastructure is essential**
- **Many options for use**
 - However, coal industry as the recent driving force
- **Limited risks – for health and ecosystems**

- **CO₂ capture**
 - Technologies (process innovations vs. pure end-of-pipe)
 - Costs (investment & operation)
 - Commercial plant operation requirements
 - Retrofit vs. new-built
- **CO₂ transport**
 - Public acceptance
 - Costs (depending on distances)
 - Transport corridors
 - Roll-out of infrastructure and regulation under uncertainty
- **CO₂ storage**
 - Public acceptance
 - In-depth knowledge on storage sites, long-term modeling
 - Regulation under uncertainty

- **CCS legislation**
 - Implementation of EU CCS Directive
 - Access to EU funding for demonstration projects (X bn €)
- **German CO₂ Storage Act (last legislative proposal)**
 - Assessment of storage sites and capacities (nationwide)
 - Licensing of CO₂ pipelines (case-by-case)
 - Licensing of investigation of storage sites (case-by-case)
 - Licensing of building, operating and decommissioning of storage facilities (including provisions on liabilities, financial securities, etc. – case-by-case)
 - Regulation of non-discriminatory access to CO₂ infrastructure

- **Blind spots, further needs for an advanced regulatory framework**
 - A more systematic approach to manage rivaling plans on the use of the underground – beyond a case-by-case approach
 - A broader approach to identify transport needs and corridors
 - A proactive approach to deal with the different dimensions of a (potential) infrastructure roll-out (network design, sizing, financing, ownership, regulation, etc.)
 - CCS with biogenic CO₂ is not incentivised by the recent design of the EU ETS
 - ... and the issue of technology transfer

- **Complex structure of the arena**
 - The post-2007 coal debate: no public acceptance for coal
 - The Asse (nuclear storage facility) scandal: public licensing faces accountability problems
 - Lessons from the financial crisis: who carries long-term risks?
 - The ‘clash of systems’ debate
 - It remains to be dark in the underground (for all uses ...)

- **A new setting of players**
 - Utilities
 - green-washing of coal
 - a strong nuclear agenda
 - no sense for public acceptance
 - Ignorant, helpless and extremely technocratic public authorities & lawmakers at all levels
 - A broad range of fundamentalists
 - it's the new hazard (comparable with nuclear) ...
 - ... and we can solve the climate problem without CCS
 - CCS realists (mostly from the long-term climate policy planning camp)
 - minority and non-coordinated
 - missing link to coal moratorium

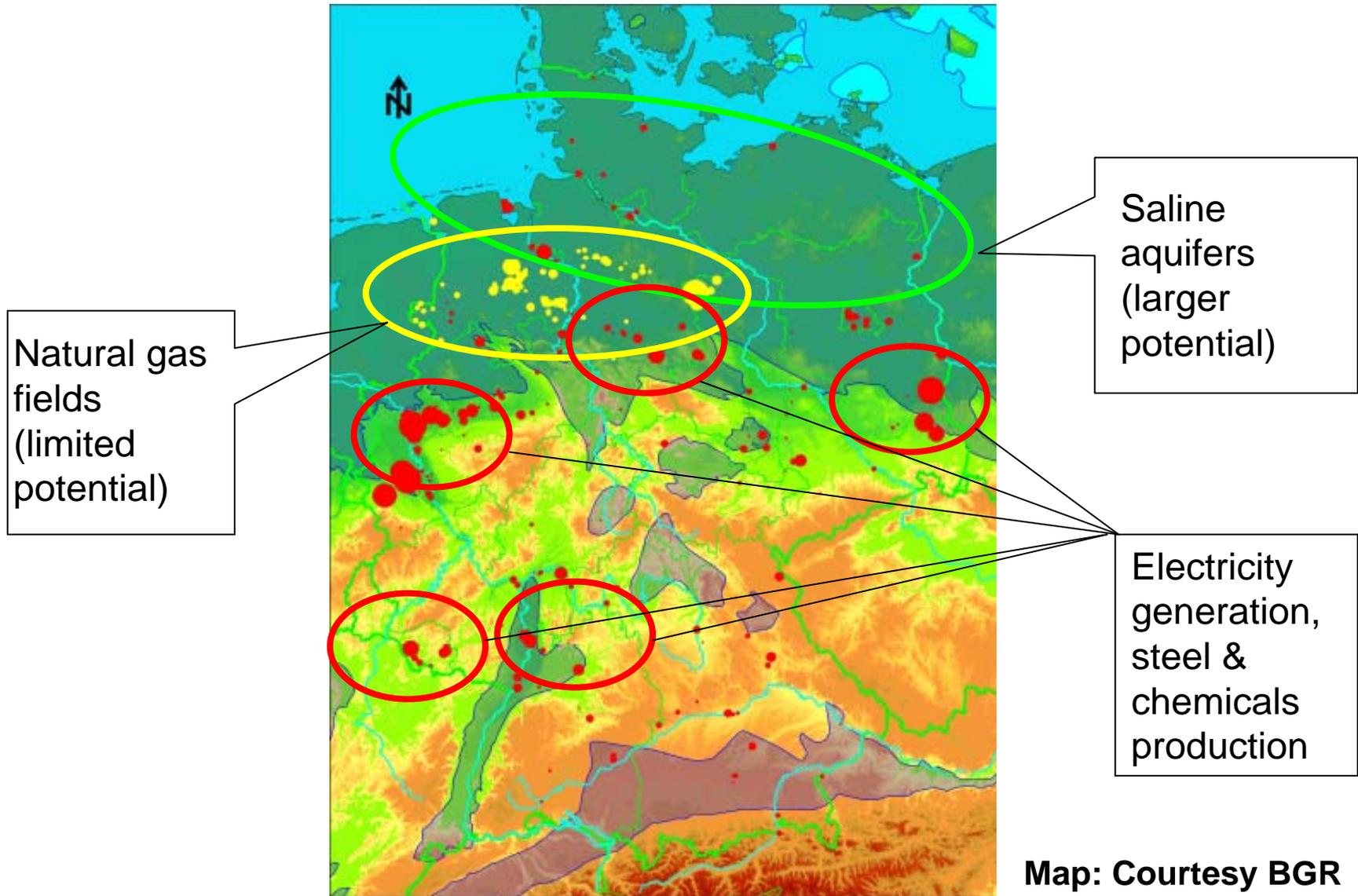
- **Lessons**

- Infrastructure-intensive climate options need a wider frame and clear and accountable lines of climate policy – and a honest vision of an fully decarbonised economy
- Nimby, Nomby and Numby (and their interventional power) and the ‘deceleration approach’ with regard to licensing procedures get more and more problematic – for ambitious and infrastructure-intensive climate policies
- Distribution of benefits is a key issue
- Accountability of players is key, the main public perception is : old dogs never learn new tricks (indeed, they don’ t) – a new role of state planning and state responsibility
- A new quality of climate policy planning processes and political communication is needed, this needs a broad common understanding/acceptance of the urgency of the climate problem (which not yet really exists)

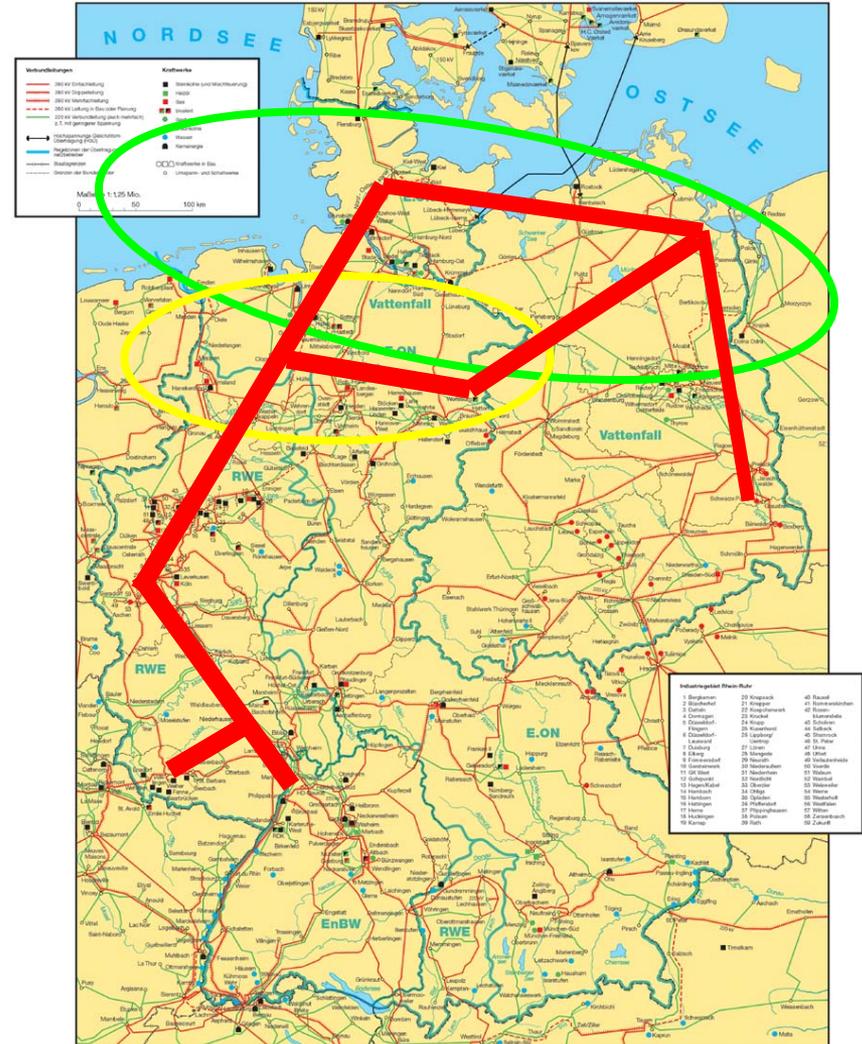
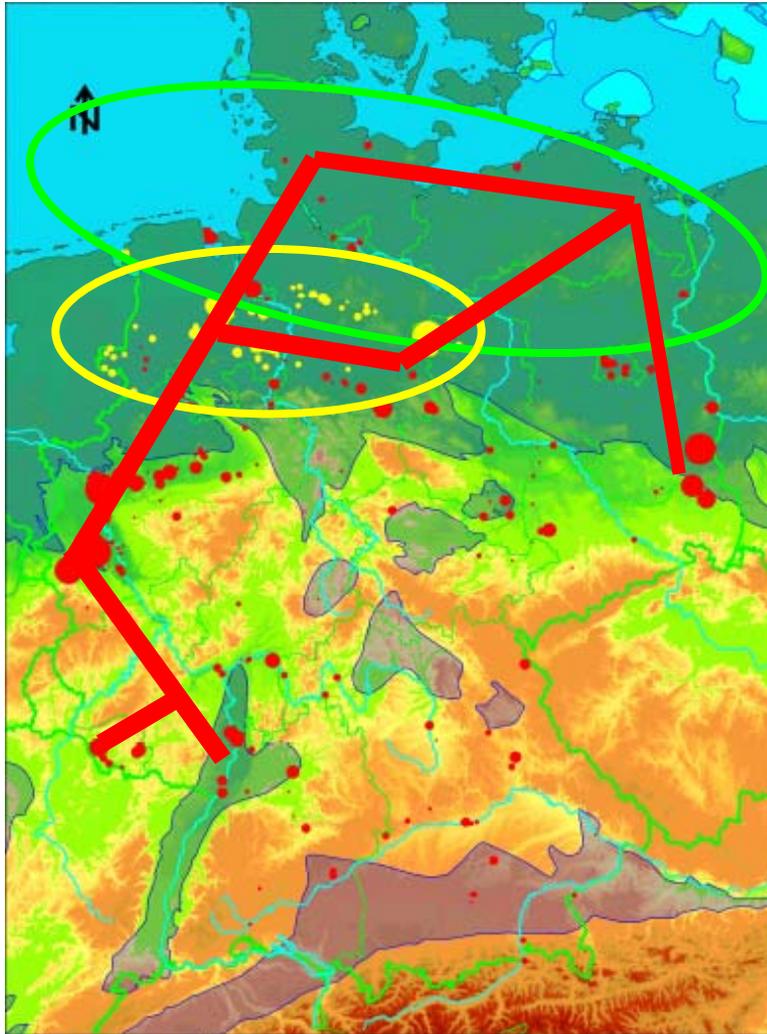
- **CO₂ transport is one of the vulnerable parts of the CCS chain**
 - Public acceptance
 - Costs and financing (transport distances could be significant)
 - Complex regulation (regional planning and licensing with many stakeholders, financing, non-discriminatory third-party access)
 - Significant lead-times for planning, licensing and roll-out
- **Infrastructure issues must be addressed at an early stage**
 - A broad and early vision is needed to create a reference for the necessary debates on the advanced regulatory approaches
 - In the pilot/demonstration phase this is difficult to communicate (at least politically) – but inescapable
 - Cost-effective infrastructure roll-out approaches must be assessed versus significant uncertainties
(fourfold capacity of a demonstration project pipeline for 50% additional cost is significant for the longer-term economics of CCS – but is there a reliable future need for this capacity?)

Planning a CCS infrastructure

Mismatch of capture & storages sites



A long-term view on CCS infrastructure Electricity-/steel-CO2 storage network?!



Planned capacity 100 mln t CO2. For illustration purposes only.

CO₂ transport in the CCS chain

Key issues from the planning perspective

- **Developing an early and robust vision on the necessary/potential CO₂ transport infrastructure is important (even parallel to the CCS demonstration phase)**
 - Transport corridors will be a scarce resource (at least in countries like Germany), careful and early planning will be necessary, strong links to the emerging analysis on storage capacities and sites must be established
 - Uncertainty management will be an overarching issue: Who carries the (economic, regulatory) risk of decisions on (long-term) cost-effective roll-out strategies for infrastructures?
 - State planning and pre-financing of infrastructures could emerge as a complementary option to support CCS
- **Running into regulatory infrastructure problems could create major problems/delays for CCS to deliver the necessary CO₂ abatement on time (the bizarre experience from the energy market liberalisation in the EU is a negative blueprint!)**

CO₂ transport in the CCS chain

Beyond the technocratic approach

- **Public and political acceptance is a scare (but potentially renewable/expandable) resource**
- **Acceptance can only be raised within an accountable framework and with a new quality of stakeholder involvement**
 - Clear and ambitious long-term climate targets/visions
 - Defining CCS as an (interim) part of the necessary, climate policy-driven changes: neither BAU nor BAU-BNWS* is an option (*business as usual – but now with scrubbers)
 - Developing CCS not only as an exclusive option for the future use of coal – a wider scope must emerge: all fossil fuels including natural gas, process emissions and net-sinks (biomass combustion, biofuel production)
 - CO₂ infrastructures create risks – these risks and the countermeasures must be made transparent
 - Fair compensation approaches must be developed
- **These issues are not only relevant for CCS ...**

**Thank you
very much**

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