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Benefits, design and financing of a CO2 transport and storage infrastructure

Presentation at European Round Table on Coal in Brussels, January 22th 2013
Mitigation of climate change in the EU two stages – two speeds

For the EU, this means reducing GHGs from 5.8 bn t/a in 1990 to some 4.6 bn t in 2020 and some 1 bn t/a in 2050.
Decreasing industrial shares in GDP in the European Union

% in GDP

- Germany
- France
- Italy
- Spain

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Industrial share of CO2-emissions 14%, energy-production share 41.5% in Germany
(source: von Hirschhausen 2011)

**CO₂ Emissions from Heavy Industry Sources**

- **CO₂ Emissions Germany:** 837 Mt
  - **Transport:** 152 Mt
  - **Households:** 128 Mt
  - **Energy:** 348 Mt
  - **Commerce:** 89 Mt

- **Industry:** 120 Mt
  - **Iron & Steel:** 41 Mt
  - **Cement:** 26 Mt
  - **Refineries:** 27 Mt
  - **Pulp & Paper:** 1 Mt
  - **H₂ & NH₃:** 6 Mt
  - **Petrochemical:** 19 Mt

*CO₂-free alternatives*
China’s increase in energy consumption higher than Germany’s total
Coal provides for 16% of EU-27 primary energy today

Source: IEA (2011)

EC memo 10/2012:
“Currently, industry accounts for about 16% of the EU's GDP. Strengthening the industrial base of the Union would require reversing the declining industry trend observed for a long period of time, to approach 20% of GDP by 2020”
Possible routes of CCS infrastructure in Europe
(source: DIW/Hirschhausen)
Core questions to be answered by a study on CCS infrastructure

- What is the climate and energy policy significance of CCS in Central Europe?
- What could be the consequences of the absence of a CCS infrastructure concerning the future prospects of industry in Europe and their role for the European economies as a whole?
- Which options do we have for the development, financing, and operation of a CCS infrastructure in Central Europe?
Potential impairment of CO2-emissions
(Source: Wuppertal-Institut u.a., reccs-report 2007)
70% of CCS costs are for separation and compression
(source: Wuppertal-Institut u.a., reccs-report 2007)
Costs for renewable-subsidies rise exponentially in Germany

Quelle: BDEW (2010)/RWI-Position #45, BMU, Juli 2012. Erneuerbare Energien in Zahlen

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CO2-sinks and -sources in Europe
(source: Wuppertal Institut/Hirschhausen 2010)
Fossil and nuclear energy sources have still a share of 89% in Germany`s primary energy supply (source: BMU)
High numbers of small and medium CO2 sources in Europe

### Major CO₂ sources in Central Europe

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of operations &gt; 10 m t/a</th>
<th>Number of operations 10 – 3 m t/a</th>
<th>Number of operations 3 – 0.35 m t/a</th>
<th>Total CO₂ emissions of selected operations, in m t/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>0</td>
<td>10</td>
<td>33</td>
<td>86</td>
</tr>
<tr>
<td>Belgium</td>
<td>0</td>
<td>5</td>
<td>33</td>
<td>51</td>
</tr>
<tr>
<td>Germany</td>
<td>9</td>
<td>23</td>
<td>153</td>
<td>434</td>
</tr>
<tr>
<td>Poland</td>
<td>2</td>
<td>10</td>
<td>56</td>
<td>162</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>0</td>
<td>8</td>
<td>33</td>
<td>74</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>56</strong></td>
<td><strong>308</strong></td>
<td><strong>807</strong></td>
</tr>
</tbody>
</table>

CO2 sources and sinks in Germany
(Quelle für Abb: C.v. Hirschhausen)
Core questions to be answered concerning a CO2 transportation infrastructure

• What is the optimal size and shape?
• Who should pay for the costs?
• What would be an appropriate tariff structure?
• Who should provide and operate the infrastructure?
Thank you for your kind attention