Incentives and regulations for CCS in the EU

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Why CCS?

According to the IEA, 19% of achievable CO$_2$ reductions by 2050 can be achieved by CCS.

Source: IEA
Why CCS on gas?

- CO$_2$ reduction by 80-95% by 2050 effectively means that CO$_2$ emissions from electricity generation have to be almost zero
Emission of CO$_2$ in 2007

- Total (Gt CO$_2$ ekv)
  - World: 27.940
  - EU 27: 5.045 (15%)

- Relative (t CO$_2$ ekv per GDP PPP 2000 USD)
  - World: 0.47
  - EU 27: 0.32
**Gross Electricity Generation from Coal in EU (2009) in TWh and percent share**

<table>
<thead>
<tr>
<th>Country</th>
<th>TWh</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU 27</td>
<td>988</td>
<td>30%</td>
</tr>
<tr>
<td>Poland</td>
<td>146</td>
<td>91%</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>53.8</td>
<td>60%</td>
</tr>
<tr>
<td>Denmark</td>
<td>20</td>
<td>50%</td>
</tr>
<tr>
<td>Germany</td>
<td>300</td>
<td>47%</td>
</tr>
<tr>
<td>UK</td>
<td>137</td>
<td>35%</td>
</tr>
<tr>
<td>Spain</td>
<td>73</td>
<td>24%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>25</td>
<td>24%</td>
</tr>
<tr>
<td>France</td>
<td>24</td>
<td>4%</td>
</tr>
</tbody>
</table>
EU Policy Goals

- Demonstrate CCS by 2015
- Commercially viable CCS by 2020
Addressing the challenges

- **Legislative hurdles**
  - Storage is enabled by the CCS Directive (2009/31/EC)

- **Long-term economic viability**
  - CO₂ captured, transported and stored considered as not emitted

- **Non-legislative hurdles**
  - Financing large-scale demonstration
  - Knowledge sharing
  - Public perception
  - Infrastructure needs
  - R&D in CCS
Financing CCS demonstration - EEPR

- €1bn for large-scale CCS demos
  - Max. €180m per project for incremental CCS investment costs

- 6 projects have signed grant agreements in 2009/10
  - Jänschwalde, Hatfield, Porto Tolle, Rotterdam, Bełchatów, Compostilla

Source: Powerfuel
Financing CCS demonstration
EEPR, €1bn funding for 6 projects

**SELECTED PROJECTS**
CO₂ CAPTURE AND STORAGE

- **Hatfield, UK**
  - 900 MW, pre-combustion

- **Rotterdam, NL**
  - 250MW, post-combustion

- **Compostilla, ES**
  - 323MW, oxyfuel

- **Jänschwalde, DE**
  - 300MW, post-combustion & oxyfuel, lignite

- **Bełchatów, PL**
  - 250MW, post-combustion, lignite

- **Porto Tolle, IT**
  - 250MW, post-combustion
Technical layout of CCS Demo Jänschwalde

- 500 MW_{el} unit
- 3 boiler concept
- Boiler F3 – new Oxyfuel
- Boiler F1 – retrofit with PCC

- Post combustion capture
- Oxyfuel boiler
- CO_{2} compression
- Flue gas cleaning
- Lignite drying
- ASU
Financing CCS demonstration
New Entrants Reserve (NER 300)

  - 300 million CO₂ allowances (EUAs)
  - CCS & innovative renewables demos

- Decision on modalities 2010
  - A range of CCS technologies
  - 8 projects with up to 3 in 1 country
  - Award depends on verified CO₂ avoided

- Timetable - 1\textsuperscript{st} call (200m EUAs)
  - Call published 9th Nov 2010
  - Around 20 proposals received
  - 2012 - Award Decision

- Timetable - 2\textsuperscript{nd} call (100m EUAs)
  - Call to be published in 2013

Source: DNV
Knowledge Sharing
CCS Demonstration Project Network

● Overview
  » Provide first movers with a means of coordination, exchange of information and experience and identification of best practices

● Objectives
  » Knowledge sharing
  » Public engagement
    • Consistent, collective and coordinated communication will be more cost-efficient and have higher impact
  » Co-operation with 3rd parties
    • Global CCS knowledge sharing
    • Promote EU CCS demonstration
**CO\textsubscript{2} Infrastructure**

- New infrastructure needed to facilitate a successful transition to a low carbon energy system.

- Communication on new Energy Infrastructure Instrument
  - Covering *inter alia* CO\textsubscript{2} infrastructure
  - Followed by legislative proposal Spring 2011
CO₂ Infrastructure

Connect emission sources & CO₂ sinks

Source: Geocapacity
CO₂ Infrastructure
possible developments 2020/2030

YEAR 2020 - 2005km network - 2.5 billion EUR cumulative investment

YEAR 2030 - 8803km network - 9.1 billion EUR cumulative investment
CCS R&D
SET plan - European Industrial Initiative for CCS
- launched on 3 July 2010 in Madrid

- Dual Approach followed
  - Large demonstration programme
  - R&D building on & complementing CCS demo activities

- Better use of public-private resources
  - Identify synergies
  - Synchronise agendas (timeline, actions)

- Innovative, industry-driven, co-operation
  - Industry, EU Member States, EC, European Energy Research Alliance (EERA), Research Institutes, NGOs

- Next steps - from planning to implementing
  - Refine KPIs for monitoring & progress reporting
  - Identify top R&D priorities for 2011
Conclusions

- Fossil Fuels can only remain part of the energy mix if combined with CCS
- Joint effort of EC, MS and industry are needed to realise the potential of CCS:
  - CCS directive has to be transposed quickly into national law
  - Sufficient financing has to be provided to support CCS demonstration
  - Joint efforts needed to work towards higher public acceptance
- The role of Research
  - Next generation of capture technologies
  - Storage and communication of its safety
Thank you for your attention