Overview on Knowledge Exchange Activities

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BACKGROUND

Working Party on Fossil Fuels (WPFF): Workshop on Fossil Fuel Technologies
June 2010, Beijing

Work streams identified by WPFF & MOST
• CCS knowledge sharing
• Early opportunities for CCS
• Financing CCS projects

Focus of all activities:
China & Non-IEA countries
IEA CCS UNIT FOCUS AREAS

New IEA CCS Unit since summer 2010

- CCS Strategy & Policy
- Technical & Economic
- Legal & Regulatory
- Global Collaboration

Global Collaboration and Knowledge Exchange: Shared IEA CCS Unit priorities with WPFF
## KNOWLEDGE EXCHANGE ACTIVITY

### Initial participants identified by WPFF
- Porto Tolle
- Mongstad
- GreenGen IGCC
- Shenhua CTL
- Mountaineer
- FutureGen

<table>
<thead>
<tr>
<th>Location</th>
<th>ENEL</th>
<th>AEP</th>
<th>Mongstad Phase 2</th>
<th>FutureGen</th>
<th>Shenhua Phase 2-3</th>
<th>GreenGen Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Porte Tolle</td>
<td>Mountaineer</td>
<td>Mongstad</td>
<td>Illinois</td>
<td>Ordos</td>
<td>Tianjin</td>
</tr>
<tr>
<td>Capture rate</td>
<td>1 Mt/a @ 90%</td>
<td>1.5 Mt/a @ 90%</td>
<td>1 Mt/a @ 90%</td>
<td>1.3 Mt/a @ 90%</td>
<td>&gt;1 Mt/a @ 90%</td>
<td>&gt;1 Mt/a @ 90%</td>
</tr>
<tr>
<td>Type of capture</td>
<td>Post-comb.: amines</td>
<td>Post-comb.: NH₃</td>
<td>Post-combust.</td>
<td>Oxy-combustion</td>
<td>Pre-comb. (CTL)</td>
<td>Pre-combustion</td>
</tr>
<tr>
<td>Retrofit</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Repowering</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Baseline plant</td>
<td>264 MW PC slipstream</td>
<td>235 MW PC slipstream</td>
<td>CHP</td>
<td>139 MW PC</td>
<td>2 Mt crude oil CTL</td>
<td>400 MW IGCC</td>
</tr>
<tr>
<td>CO₂ transport</td>
<td>Pipeline</td>
<td>Local injection</td>
<td>Pipeline</td>
<td>Pipeline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂ storage</td>
<td>Deep saline aquifer in North Adriatic Sea</td>
<td>Deep saline aquifer (Rose Run Sandstone)</td>
<td>tbd</td>
<td>Deep saline aquifer</td>
<td>tbd, Saline aquifer / EOR</td>
<td>tbd</td>
</tr>
<tr>
<td>Budget or funding</td>
<td>EEPR: 100 M€ applied for NER300</td>
<td>668 Mill. USD, 50% DOE share</td>
<td>1.3 Bill. USD (77 % DOE) CCS: 42%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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## FROM PILOTS TO DEMO PLANTS

### Pilot-scale projects

<table>
<thead>
<tr>
<th>Location</th>
<th>ENEL</th>
<th>AEP</th>
<th>TCM</th>
<th>Shenhu Phase 1</th>
<th>GreenGen Phase 2</th>
<th>ENEL</th>
<th>AEP</th>
<th>Gassnova</th>
<th>FutureGen</th>
<th>ENEL</th>
<th>AEP</th>
<th>GreenGen Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Brindisi</td>
<td>New Haven</td>
<td>Mongstad</td>
<td>Ordos</td>
<td>Tianjin</td>
<td>Porte Tolle</td>
<td>Mountaineer</td>
<td>Mongstad</td>
<td>Illinois</td>
<td>Ordos</td>
<td>Tianjin</td>
<td></td>
</tr>
<tr>
<td>Type of capture</td>
<td>Post-comb.: amines</td>
<td>Post-comb.: NH₃</td>
<td>Post-comb.: amines &amp; NH₃</td>
<td>Pre-comb.: (CTL)</td>
<td>Pre-combustion</td>
<td>Post-comb.: amines</td>
<td>Post-comb.: NH₃</td>
<td>Post-combustion</td>
<td>Oxy-combustion</td>
<td>Pre-combustion</td>
<td>Pre-combustion</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Repowering</td>
<td>No</td>
<td>No</td>
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</tr>
<tr>
<td>Baseline plant</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
<td>PC</td>
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<td>PC</td>
<td>PC</td>
<td>PC</td>
<td></td>
</tr>
<tr>
<td>CO₂ transport</td>
<td>Local injection</td>
<td>(release)</td>
<td>17 km by truck (liq.)</td>
<td>Pipeline</td>
<td>Local injection</td>
<td>Pipeline</td>
<td>Pipeline</td>
<td>Pipeline</td>
<td></td>
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### Commercial-scale demo projects

- **CO₂ captured per year**
  - 0.1 Mt
  - > 1 Mt

### Key Notes:
- FID = Final Investment Decision
- NH₃ = Chilled ammonia
- CTL = Coal-to-liquids plant
- PC = Pulverized coal power plant
- IGCC = Integrated Combined Cycle

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### Diagram:
- Pie chart showing CO₂ captured per year:
  - 0.1 Mt
  - > 1 Mt

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**Table Legend:**
- **Location:** City or geographical location
- **Operation:** Year the project started or was scheduled to start
- **Capture rate:** Amount of CO₂ captured per year and percentage efficiency
- **Type of capture:** Method of CO₂ capture
- **Retrofit:** Indicates if the project was retrofitted
- **Baseline plant:** Type of plant that the CO₂ capture is integrated with
- **CO₂ transport:** Method of transporting CO₂
- **CO₂ storage:** Method of storing CO₂
- **Budget or funding:** Financial details of the project
JOINT WORKSHOPS

1) TCM CO₂ Capture Pilot Mongstad, Norway, 3-4 March 2011
2) ENEL CO₂ Capture Pilot Brindisi, Italy, 16-17 May 2011
KEY PRIORITIES

Example of feedback from project owners

- **Permitting**
  - Applications, regulations, acceptance requirements

- **Liabilities**
  - CO₂ Storage Liabilities
  - CO₂ Storage Liabilities

- **Financing**
  - Electricity premium

- **Methodology & HSE**
  - Design specs, capture rates definitions
  - HSE/Environmental impact assessment

- **Operational Experience**
  - General operation; measurement & instrumentation
  - Plant integration & reliability

- **Storage**
  - Storage capacity & plume dynamics

Categories:

- Non-Technical
- Technical

Projects:

- TCM
- FutureGen
- Porte Tolle
FUTURE COLLABORATION OPPORTUNITY

IEA WPFF – MOST/ACCA21 Initiative
- Sharing Early Mover CCS Experience-

- Foster Knowledge Exchange between IEA and Non-IEA member countries
- Support dialogue on global CCS pilot or demonstration operation
- Synthesize policy-relevant messages from participants

Key CCS Pilot & Demonstration Projects
from IEA and Non-IEA member countries

CCS Knowledge and Data Management, e.g.

- Provide legal and technical framework for data exchange between participants
- Support in-depth collaboration and related project management
- Link to regional CCS Knowledge Exchange Networks

Coordination with existing Knowledge Exchange networks is critical
Thank you!

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