EC initiatives on CCS - Research Dimension

IEA - MOST CCUS Workshop:
Joint Activities and Opportunities, 18-19 September, Beijing

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European Commission
DG Research - Directorate for Energy
EU Strategic Policy Objectives

- **Europe 2020** – smart, sustainable and inclusive growth

- **EU energy policy targets** - sustainability, competitiveness and security of supply

- **Innovation Union flagship initiative** - COM(2010) 546
  - A strategic and integrated approach to research and innovation

- **Horizon 2020** - a Common Strategic Framework for research and innovation focusing on societal challenges, competitiveness and research excellence

- **Energy research and innovation**
  - Strategic Energy Technology Plan (SET-plan)
    - Joint programming, Public Private Partnerships (PPPs)
SET-Plan – the technology pillar of EU energy and climate change policy

**Objective:**

- To accelerate the development of a portfolio of low carbon technologies leading to their market take-off

**Implementation:**

- European Industrial Initiatives (EII)
- European Energy Research Alliance (EERA)
- Trans-European Energy Networks and Systems of the Future
Simplified SET Plan governance

Steering Group
Member States and Commission

SETIS
Information System

European Industrial Initiatives

EERA
European Energy Research Alliance

➢ SET Plan Conference in Poland 28-29 November 2011
European Industrial Initiatives (EII)

- **Launched**
  - Wind, Solar, **CCS**, Electricity Grids, Sustainable Nuclear, and Bioenergy (launched in 2010)
  - Fuel Cells Hydrogen (on-going since 2008)
  - Smart cities and communities (launched 21 June 2011)

- All parties committed to support:
  - Technology Roadmaps 2010-2020
  - Implementation Plans 2010-2012
  - Close cooperation, light governance structure
EII on CCS – Technology Roadmap 2010-2020

2010

Construction of CCS demo plants

2012

Establishment and operation of a network of CCS projects (knowledge sharing, joint activities)

2015

Up to 12 CCS demonstration plants

Operation of the full CCS chain (capture/transport/storage) At large scale

2017

Demonstration of CCS chains using existing technologies

2020

R&D on power plant efficiency

Power plants with > 50% efficiency

R&D and pilots on capture technologies

CCS plants with > 40% efficiency

R&D on CO2 transport and storage

Atlas of storage sites

R&D and pilots for CCS in industrial applications

CCS deployment in industry
European Energy Research Alliance (EERA)

Initiative by a number of leading European research institutes (Oct. 2008)

- more than 1000 researchers from more than 70 research organisations
- European University Association (EUA) joined as an observer

Aim: to accelerate development of new energy technologies through Joint Programmes (JPs):

- **CCS**, Nuclear, Bioenergy, PV, Smart Grids, Wind and Geothermal launched in 2010

- Two new Joint programmes: Concentrated Solar Power and Marine Energy to be launched in November 2011 in Warsaw

- The **CCS** Joint programme has 32 members, 12 MS, 270 py/year, two sub-programmes: CO2 Capture and CO2 storage
EC initiatives for CCS

• Demonstration funding:
  – Economic Recovery programme (EEPR)
    6 CCS demo projects supported (1.0 bn €)
  – New Entrance Reserve 300 (NER300) with industry/MS resources - award decision in second half 2012 (~4.5 bn €)

• Public Engagement: CCS Project Network, FP7 projects, Zero Emission Platform (ZEP)

• Knowledge sharing: CCS Project Network, ZEP

• Legal: Transposition of the Directive and permitting in MS is due in 2011

• Storage capacity and infrastructure: European storage atlas

• R&D Funding: CCS research and pilot-scale projects through FP7
EEPR Locations

**Don Valley**
- UK
- (ex-Hatfield)
- 900 MW, IGCC

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

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

**Porto Tolle**
- IT
- 250MW, post-combustion

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

**Bełchatów**
- PL
- 250MW, post-combustion, lignite
CCS Demonstration Project Network

• **Overview**
  – Provide first movers with a means of coordination, exchange of information and experience and identification of best practices
  – current members: EEPR projects

• **Objectives**
  – Knowledge sharing
  – Public engagement
    • Consistent, collective and coordinated communication will have a higher impact
  – Co-operation with 3rd parties
    • Global CCS knowledge sharing to accelerate commercial deployment
    • Coordinate EU CCS demonstration
EU Framework Programmes

About 86 M€ spent on CCS in FP5 & FP6

FP7 : 2.3 b€ for Energy

✓ About 140 M€ spent or earmarked for CCS so far

FP7: Support to CCS in 2012

✓ FP7 Call (2012-1) DG RTD: Indicative EC funding: 21.5 M€

Deadline: 25 October 2011 at 17:00:00 (2-stage call)

✓ FP7 Call (2012-2) DG ENER: Indicative EC funding: 22 M€

Deadline: 08 March 2012 at 17:00:00 (1-stage call)
**CCS topics**

- Sizeable pilot tests for CO2 geological storage
- Pilot plant-scale demonstration of post-combustion CO2 capture processes
- Pilot plant-scale demonstration and integration of emerging and new combustion technologies (Chemical looping)
- Impact of the quality of CO2 on transport and storage behaviour *(Partners from the CSLF in particular the U.S., Canada and China are encouraged)*
- Secretariat for the ZEP Technology Platform
International Cooperation

Membership of international level:

- Carbon Sequestration Leadership Forum (CSLF)
- International Energy Agency (IEA)
- Global CCS Institute (GCCSI)

Established bilateral S&T cooperation:

- USA – EU-US Energy Council Working Groups
- Japan – expert workshops and site visits planned
- Canada – visit in May 2010
- China – NZEC project, multiple participation in FP6 & FP7 projects
- India – OPTIMASH project on Clean Coal Technologies
- South Africa – fact finding mission 2009
- Australia – Visit to take place in Dec. 2011
EU-China NZEC Phase I

- Phase I: Conclusion in October 2009 in Beijing
- Phase II: Signature of a EU-China MoU in Nanjing in 2009
  - Phase IIA: pre-feasibility and project identification with support from EC, UK and Norway.
### EU Projects on CCS with Chinese Participation

<table>
<thead>
<tr>
<th>Project</th>
<th>Project title</th>
<th>Chinese participants</th>
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<tbody>
<tr>
<td>EU GEOCAPACITY</td>
<td>Assessing European Capacity of Geological Storage of CO2</td>
<td>Tsinghua University</td>
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<tr>
<td>(1.9 M€)</td>
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<tr>
<td>CACHET</td>
<td>Carbon Dioxide Capture and Hydrogen Production from Gaseous Fuels</td>
<td>Dalian Institute of Chemical Physics</td>
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<td>(7.5 M€)</td>
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<tr>
<td>COACH</td>
<td>Cooperation Action with CCS China MoU</td>
<td>9 including: ACCA21, Greengen, PetroChina</td>
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<tr>
<td>(1.5 M€)</td>
<td></td>
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<tr>
<td>STRACO2</td>
<td>Support to Regulatory Activities For Carbon Capture and Storage</td>
<td>3 including: ACCA21</td>
</tr>
<tr>
<td>(0.86 M€)</td>
<td></td>
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<tr>
<td>CACHET II</td>
<td>Carbon Capture and Hydrogen Production with Membrane</td>
<td>2 including : Dalian Institute of Chemical Physics</td>
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<tr>
<td>(3.89 M€)</td>
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<tr>
<td>iCap*</td>
<td>Innovative CO2 capture</td>
<td>Tsinghua University</td>
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<tr>
<td>(4.25 M€)</td>
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<tr>
<td>CO2PipeHAZ</td>
<td>Quantitative Failure Consequence Hazard Assessment for Next Generation CO2 Pipelines</td>
<td>Dalian University of Technology</td>
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<td>(2.07 M€)</td>
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* EU-China Workshop on Innovative CCS Technologies on 19-20 September 2011 in Beijing organised by iCap
Public Awareness and Acceptance

- The deployment of CCS will not take place without public acceptance at local level

- Research is needed to understand the nature of various public concerns (e.g. environmental, ethical, economic, cultural…) and mechanisms

- CCS Project Network, ZEP and FP projects play an important role in public outreach

- FP Research projects: ACCSEPT, NEARCO2, FENCO-ERANET, SiteChar, CO2GeoNet, CGSEUROPE, 1 in negotiation

- AAAS-2012 Annual Meeting: 16-20 February, Vancouver “CCS: A Global Solution to a Global Challenge”
Looking ahead

- Continuation of public research efforts on CCS, in FP7 and Horizon 2020 as part of the SET plan priorities
- Interaction between research, pilot scale and demo projects needs to be ensured
- Continuation of international cooperation efforts on CCS research
- Knowledge sharing has to be ensured at an international level
- Extension to other carbon-intensive industries is needed
- Public awareness and understanding of CCS needs to be addressed at an early stage