IEAGHG activities and possible collaboration with ETSAP

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IEA Greenhouse Gas R&D Programme
Cheltenham, UK

71st ETSAP Meeting
Hyattsville, MD, United States
11 July 2017
What We Are:

Part of the IEA ETN since 1991

32 Members from 18 countries, including the EU, OPEC and the CIAB

Members set strategic direction and technical programme

Technical based organisation
- We are not technology advocates
- We don’t define policy
Membership

Cost-shared Technology Collaboration Programme
What do we do?

Our Core Activities Are:

- Assess mitigation options – Focus our R&D on CCS
- Track capture technology developments/costs
- Monitor geological storage performance
- Provide members and policy audience with independent technical input
IPCC Fifth Assessment Report
Synthesis Report

2nd November 2014
Copenhagen
Sources of emissions

Energy production remains the primary driver of GHG emissions

- **35%** Energy Sector
- **24%** Agriculture, forests and other land uses
- **21%** Industry
- **14%** Transport
- **6.4%** Building Sector

IPCC (2014) based on 2010 GHG emissions

AR5 WGIII SPM
IPCC AR5 – Role of different low-carbon energy technologies

Mitigation cost increases in scenarios with limited availability of technologies

[% increase in total discounted mitigation costs (2015–2100) relative to default technology assumptions]

<table>
<thead>
<tr>
<th>2100 concentrations (ppm CO₂-eq)</th>
<th>no CCS</th>
<th>nuclear phase out</th>
<th>limited solar/wind</th>
<th>limited bioenergy</th>
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<tbody>
<tr>
<td>450 (430 to 480)</td>
<td>138% (29 to 297%)</td>
<td>7% (4 to 18%)</td>
<td>6% (2 to 29%)</td>
<td>64% (44 to 78%)</td>
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IPCC AR5 SYR from Table 3.2 (2014)
COP21 – Paris Agreement

Aim:
To strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2.0°Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°Celsius.
CCS is applied across the economy in 2DS, capturing 6.8 GtCO₂ in 2060. In the B2DS, the amount of CO₂ captured in 2060 is 60% higher.
Significant CCS deployment is required by 2040 under the IEA 2DS

Global Status of CCS
November 2016

38 large-scale CCS projects – combined CO₂ capture capacity of approximately 70 Mtpa:

- 21 projects in operation or construction (40.3 Mtpa)
- 6 projects in advanced planning (8.4 Mtpa)
- 11 projects in earlier stages of planning (21.1 Mtpa)

~4,000 Mtpa of CO₂ captured and stored by 2040 (IEA 2DS Scenario)*

With higher capture rates, CCS gets more hours

The B2DS calls for higher capture rates lowering the remaining emissions from generation with CCS

Slide courtesy of IEA
Industrial applications of CCS

CCS in the industrial sector more than doubles when moving to a 2DS as other options are increasingly exhausted

Slide courtesy of IEA
Global CCS update

Very Active region

Active region

R&D/Pilots

Active region

R&D/Pilots

Developing Interest

Active region

R&D/Pilots

R&D/Pilots
1996: World’s first commercial-scale CCS project

- The Sleipner CO₂ Storage facility was the first in the world to inject CO₂ into a dedicated geological storage setting.
- Located offshore Norway. Part of the Sleipner area gas development since 1996.
- The captured CO₂ is directly injected into an offshore sandstone reservoir. Approximately 0.85 million tonnes of CO₂ is injected per annum.
2014: Worlds first integrated coal fired power plant with CCS

- SaskPower’s Boundary Dam Coal-Fired Power Station, Saskatchewan, Canada
  - 110MWe Retrofit
  - Shell/Cansolv post-combustion capture technology.
  - EOR, and storage at Aquistore
  - Started operation October 2014
  - 2016 - International CCS Knowledge Centre
2015

Quest project
Shell, Canada
H₂ refining
1Mt CO₂/a to DSF storage

Lula project
Petrobras, Brazil
Offshore gas separation and CO₂-EOR
CCS in energy scenarios

Context:

- Results obtained from the modelling of long-term energy outlooks are published regularly by many different parties.
- Various approaches are taken and assumptions made by each model; these are often not transparent and mean the roles and contributions for each technology differ from model to model.
- Mixed messages can lead to confusion and misunderstanding and, consequently, either inaction or misdirected action.
- More informed decisions could be made if policy makers, industry, regulators and the general public were given better guidance to the information available.
Scenarios and projections

- Many players
  - International: e.g. IPCC, IEA, OPEC, WEC, MIT, …
  - Industry: e.g. BP, Shell, …
  - National: e.g. China (ERI), India (NITI Aayog), UK (ETI), …

- Long-term global energy outlooks
  - Often to 2050, 2060 or even beyond
  - May be global or national
  - Can have technology or sectoral focus, or both

- Normative
  - Most scenarios aim towards a specific objective such as a particular atmospheric CO₂ level or carbon budget
Project Consortium

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Objectives

To help policy makers, industry, regulators and the public to better understand and make more informed decisions vis-à-vis CCS, the contractor will:

- Compile an overview, for example, of:
  - the most influential models
  - the important scenarios
  - the main assumptions
  - the data sources
  - the key messages

- Assess and report on the reasons for the variations in results and messaging from different models

[Note: there is no intention within the project to advocate particular scenarios, to undertake any modelling or to propose additional modelling activity]
Other potential areas for cooperation?

- Engage on update of ETSAP’s technology brief on CCS?
  - current version dated October 2010
Thank you

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To note:
4th Post Combustion Capture Conference (PCCC4)
5th-8th September 2017
Birmingham, Alabama
www.ieaghg.org/conferences/pccc/52-conferences/pccc/762-pccc4