IEA Greenhouse Gas R&D Programme

Update Report from IEAGHG

Tim Dixon

CSLF Technical Group, Chatou, France
4 November 2019
**Who are we?**

Our internationally recognised name is the IEA Greenhouse Gas R&D Programme (IEAGHG). We are a Technology Collaboration Programme (TCP) and are a part of the International Energy Agency’s (IEA’s) Energy Technology Network.

**Disclaimer**

The IEA Greenhouse Gas R&D Programme (IEAGHG) is organised under the auspices of the International Energy Agency (IEA) but is functionally and legally autonomous. Views, findings and publications of the IEA Greenhouse Gas R&D Programme do not necessarily represent the views or policies of the IEA Secretariat or its individual member countries.
Greenhouse Gas R&D TCP

What We Are:
- Part of the IEA ETN since 1991
- 36 Members from 15 countries plus OPEC, EC and CIAB
- Members set strategic direction and technical programme
- Independent Technical Organisation
  - We don’t define policy
  - We are not advocates
IEA Greenhouse Gas R&D Programme (IEAGHG)

- A collaborative international research programme founded in 1991
- Aim: To provide information on the role that technology can play in reducing greenhouse gas emissions from use of fossil fuels and biomass in power and industrial systems.
- Focus is on Carbon Dioxide Capture and Storage (CCS)
- Producing information that is:
  - Objective, trustworthy, independent
  - Policy relevant but NOT policy prescriptive
  - Reviewed by external Expert Reviewers
IEAGHG

- **Flagship activities:**
- **Technical Studies** >330 reports published on all aspects of CCS
- **International Research Networks**
  - Risk Assessment/Management
  - Monitoring
  - Modelling
  - Environmental Research
  - High Temperature Solid Looping
  - Costs

- **GHGT conferences** –
  - GHGT-14, Melbourne, Australia, 22-26 Oct 2018
- **PCCC conferences**
  - PCCC5, Kyoto, 17-20 Sep 2019
Other activities include:

- International CCS Summer Schools: 636 alumni, 58 countries
- 2019 – 8-12 July, International CCS Knowledge Centre, Regina
- 2020 – 12-18 July, Bandung, Indonesia

- Peer reviews, eg US DOE, US EPA; CO2CRC
- Collaborations with IEA, CSLF, CCSA, EU ZEP and many others
London Convention:
Regular updates on CCS:
ROAD permit assessment,
Offshore workshops,
CO₂ Export

CCS Side Events at COP20, COP21,
COP-22, COP-23, COP-24

IEAGHG Technical reports
to CSLF Technical Group

ISO Technical Committee on CCS, TC-265
4 draft standards, 2 technical reports
IEAGHG input

Input to WPFF

Expert Reviewers,
Accredited Observer
London Convention/Protocol

- Treaty for marine environmental protection
- LC41 and LP14 meeting at IMO London, 7th-11th October 2019

Ratification of the London Protocol’s 2009 CO2 export amendment

- Needs two thirds of the now 50 Parties to the London Protocol to ratify for it to come into force (ie 33).
- Only Norway, UK, Netherlands, Iran, Finland and Estonia ratified to date (6)
- **Norway and Netherlands proposal to LP14 for “Provisional Application” of export amendment (joined by UK).** Drawing on IEA report 2011 (IEAGHG input)
- IEAGHG supported with Information Paper 2019-IP11, and evidence-base in plenary with paper LC41/INF3
- **Success! – Resolution for Provisional Application adopted 11 October 2019**
“RESOLUTION LP.X(Z) ON THE PROVISIONAL APPLICATION OF THE 2009 AMENDMENT TO ARTICLE 6 OF THE LONDON PROTOCOL”

Approved on 11 October 2019

2 pages of preamble then the operative clauses as follows:

• 1. DECIDES to allow for the provisional application of the 2009 amendment pending its entry into force by those Contracting Parties which have deposited a declaration on provisional application of the 2009 amendment;

• 2. INVITES Contracting Parties to deposit with the Depositary a declaration on provisional application of the 2009 amendment of the London Protocol pending its entry into force;

• 3. FURTHER RECALLS the obligation to notify the Depositary of agreements or arrangements mentioned in article 6, paragraph 2 of the London Protocol (as amended by resolution LP.3(4));

• 4. AFFIRMS that the export of carbon dioxide under the provisional application of article 6 of the London Protocol (as amended by resolution LP.3(4)), and in compliance with the requirements of paragraph 2 of the article (as amended by resolution LP.3(4)) will not be in breach of article 6 as in force at the time of the export; and

• 5. URGES Contracting Parties to consider accepting the amendment to article 6 of the London Protocol adopted through resolution LP.3(4).
London Convention/Protocol

- This means that countries can now legally export and import CO₂ for offshore geological storage.

- The guidance documents for permitting and for agreements which were revised/finalised for transboundary activities in 2012 (CO₂ Specific Guidelines) and 2013 (Agreements or Arrangements) should be used.

IEAGHG Members
Update on CSLF and IEAGHG Collaboration
Arrangement between CSLF Technical Group and IEAGHG

• **How CSLF TG/PIRT and IEAGHG will interact for mutual benefit through increased co-operation**
  • Mutual representation of each at CSLF TG and IEAGHG ExCo (no voting)
  • Liaison with PIRT co-chairs to discuss potential activities or projects – two way process
  • Activities would require approval by ExCo or TG
  • Due reference to organisation providing the resource

• **Agreed by IEAGHG ExCo Oct 2007 and CSLF Technical Group Jan 2008**
IEAGHG – Study generation

IEAGHG ExCo members

IEA GHG Studies

Proposal
ExCo
Proposals
ExCo

Outlines
Member Voting

and Reports

CSLF TG
CSLF proposed/related studies


• 3rd International Workshop on Offshore Geologic CO2 Storage. 2018/TR02. Aug 2018

Additional new study ideas invited from CSLF TG
Outline required by 7 Jan 2020
# Reports published (1)

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Report number</th>
<th>Proposed by</th>
<th>Publication date</th>
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<tbody>
<tr>
<td>CCS in Energy and Climate Scenarios</td>
<td>UCC, ICL and UoOxford</td>
<td>2019-05</td>
<td>Shell</td>
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<tr>
<td>Proceedings of 6th CCS Cost Network</td>
<td>Edited by E S Rubin</td>
<td>2019-06</td>
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<tr>
<td>Proceedings of workshop on representing CCUS in Energy Systems Models</td>
<td>University College Cork</td>
<td>2019-08</td>
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<tr>
<td>Techno-Economic Evaluation of CO₂ Capture in LNG Process</td>
<td>Costain</td>
<td>2019-07</td>
<td>IEAGHG</td>
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<tr>
<td>Further assessment of emerging capture technologies and their potential to reduce costs</td>
<td>CSIRO</td>
<td>2019-09</td>
<td>IEAGHG</td>
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<tr>
<td>The Shell Quest Carbon Capture and Storage Project</td>
<td>Carolyn Preston</td>
<td>2019-04</td>
<td>US DOE</td>
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Reports in progress to be published - 1

<table>
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<tr>
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<tbody>
<tr>
<td>Costs of Reducing Water Usage</td>
<td>CSIRO</td>
<td>IEAGHG</td>
<td>March 2020</td>
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### Reports in progress to be published - 2

<table>
<thead>
<tr>
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<tr>
<td>Refineries and Electricity Production</td>
<td>Wood plc</td>
<td>48-04</td>
<td>OPEC</td>
<td>December 2019</td>
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<tr>
<td>Beyond LCOE - Value of CCS in different generation and grid scenarios</td>
<td>Imperial College</td>
<td>51-04</td>
<td>UK</td>
<td>December 2019</td>
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<td>Gas and coal-fired power plant with CO₂ capture</td>
<td>Wood plc</td>
<td>51-03</td>
<td>Equinor</td>
<td>November 2019</td>
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<td>Modelling and monitoring of CO₂ storage: the potential for improving the cost-benefit ratio of reducing risk (Stage 1)</td>
<td>Battelle</td>
<td>52-09</td>
<td>Australia</td>
<td>November 2019</td>
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## Studies underway (1)

<table>
<thead>
<tr>
<th>Title</th>
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<th>Draft Report date</th>
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<tbody>
<tr>
<td>CCS and Sustainable Development Goals</td>
<td>TNO</td>
<td>53-14</td>
<td>Shell &amp; IEAGHG</td>
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<tr>
<td>Addressing Challenges of the Powergrid with CCS</td>
<td>Element Energy</td>
<td>52-01</td>
<td>UK</td>
<td>September 2019</td>
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<td>Value of Emerging and Enabling Technologies in Reducing the Costs,</td>
<td>Element Energy</td>
<td>52-12</td>
<td>UK</td>
<td>October 2019</td>
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<td>Risks and Timescales for CCS</td>
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<td>OPEC and EPRI</td>
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<td>Shipping Infrastructure</td>
<td>Element Energy</td>
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<td>NZ and IEAGHG</td>
<td>October 2019</td>
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<td>Waste to Energy and CCS</td>
<td>Wood plc</td>
<td>53-04</td>
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<td>October 2019</td>
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# subject to approved contract extension & proposal
### Studies underway (2)

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<tr>
<td>Techno-economic Potential of Biorefineries with CCS</td>
<td>VTT</td>
<td>52-06</td>
<td>IEAGHG</td>
<td>October 2019</td>
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<tr>
<td>Review of Constructability and Operational Challenges faced by CCS Projects</td>
<td>Element Energy</td>
<td>55-01</td>
<td>IEAGHG</td>
<td>December 2019</td>
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### Studies out to tender

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<th>Expected start</th>
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<tr>
<td>Induced Seismicity Review</td>
<td>November 2019</td>
<td>55-09</td>
<td>IEAGHG</td>
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<tr>
<td>CO$_2$ Conversion Routes Reality Check</td>
<td>November 2019</td>
<td>55-12</td>
<td>Total</td>
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<tr>
<td>Title</td>
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<tr>
<td>Techno-economics of Near-term NETs</td>
<td>December 2019</td>
<td>55-15</td>
<td>IEA &amp; France</td>
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<tr>
<td>Update on Cost of Capture in Refineries, Cement, Iron &amp; Steel</td>
<td>January 2020</td>
<td>55-04</td>
<td>IEAGHG</td>
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<tr>
<td>CO(_2) as Alternative Feedstock: Identification of the most promising CO(_2) conversion pathways gathering environmental and economic benefits</td>
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<td>56-07</td>
<td>France</td>
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<td>Defining and Measuring the Value of CCS</td>
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<td>Achieving Deep Decarbonisation in Worldwide Fertiliser Production</td>
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<td>56-05</td>
<td>UK</td>
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<td>Criteria for depleted reservoirs to qualify for CO(_2) storage</td>
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<td>56-10</td>
<td>IEAGHG</td>
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<td>Prime solvent candidates for next generation of PCC plants.</td>
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<td>56-03</td>
<td>IEAGHG</td>
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Research Networks and other events

2019
- Monitoring Network and Environment Network meeting, hosted by University of Calgary/CMC, 20\(^{th}\) – 22\(^{nd}\) August 2019.
- Fault workshop, hosted by University of Calgary, 23\(^{rd}\) August 2019.
- PCCC5, hosted by RITE, Kyoto, 17\(^{th}\) – 19\(^{th}\) September 2019
- Hydrogen and CCS workshop, with CSLF, hosted by EDF & ClubCO\(_2\) in Paris, France 6\(^{th}\) & 7\(^{th}\) November 2019

2020
- HTSL Network meeting, hosted by TNO in the Netherlands, January 2020 tbc.
- 4\(^{th}\) Offshore CCS Workshop, hosted by STEMM-CCS, in Bergen, Norway, 11\(^{th}\) – 12\(^{th}\) February 2020. CSLF
Hosted by Khalifa University; Conference location - ADNEC, Abu Dhabi, UAE
Call for abstracts opens 1st September 2019

- Deadline to submit an abstract – 7th January 2020
- Early Bird registration opens March 2020
- Draft Technical programme announced online May 2020
- Visit https://ghgt.info/ for all conference information and abstract submission