

Driving CCS Forward in a Below 2°C World

Greenhouse Gas Technologies Conference-13 (GHGT-13)

The Greenhouse Gas Control Technologies conferences is the leading international technical conference on CO2 mitigation globally. The Thirteenth conference (GHGT-13) was held in Lausanne, Switzerland in November 2016. The conference had 991 attendees drawn from 34 countries. In total some 840 technical presentations on CO2 mitigation, with particular emphasis on Carbon Capture and Storage (CCS) were made at the conference. See www.ghgt.info. The proceedings from the conference will be published in Energy Procedia an open access publication focussing entirely on publishing high-quality conference proceedings across the energy field. Previous proceedings from the GHGT conferences have been well cited in the IPCC Assessment Reports.

Summary of the Closing Panel at GHGT-13

Panel Background

With the Paris Agreement now ratified we are committing ourselves to achieving a temperature target of below 2°C. We know that getting to 2°C represented a significant mitigation challenge but going below that temperature target increases the mitigation challenge immensely. Carbon Capture and Storage (CCS) has been identified as a key mitigation technology option by the UNFCCC. The IPCC 5th Assessment report showed us that the least cost mitigation portfolio needs to include CCS and that most assessment models suggested 2°C could not be met without CCS. We can therefore strongly assume that CCS will be more important in a below 2°C world and that negative emission technology like BIOCCS will also be critical post 2030 should we not meet stringent early emission reduction targets. CCS has not been deployed as quickly as we would have liked to date and we need to increase the momentum on CCS demonstration and deployment.

The aim of the closing session was to look at initiatives that are underway but also ask the critical questions; are we doing enough and what more needs to be done to replot CCS more rapidly?

The Closing Panel Members

- Jean-Francois Gagne, Head of the Energy Technology Policy Division, International Energy Agency
- Jonas Helseth, representing the EU Zero Emissions Platform
- Tim Bertels, representing the Oil and Gas Climate Initiative
- Jarad Daniels, Office of Fossil Energy, Director of Planning and Environmental Analysis, US DOE
- Niall Mac Dowell, Head of the Clean Fossil and Bioenergy Research Group, Imperial College, UK.

The panel members presented on questions set by the facilitators (John Gale and Kelly Thambimuthu, IEAGHG).



Panel Left to Right: Jean-Francois Gagne, Jarad Daniels, Tim Bertels, Jonas Helseth, Niall Mac Dowell, John Gale, Kelly Thambimuthu

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Questions Posed to the Panel

Jean Francois Gagne - "Has Policy failed CCS to date and what more work in this area is needed?"

CCS is a climate technology but Pre-Paris climate ambitions were not high enough. As a result Policy support has fluctuated, leading to CCS not being on track for 2 degrees or for Paris ambitions. The start-stop policy cycle for CCS has impacted on investment. But the Paris Agreement can change that. In the last 20 years we have learnt a lot and the technology has advanced significantly.

Going forward we needed targeted support to advance CCS. We will need both Capital and operational incentives. Such incentives can be in the form of grants, tax incentives, feed-in tariffs, CO₂ purchase contracts etc. etc. whoever best suits the appropriate market situation.

Jonas Helseth - "CCS has not taken off in Europe what new efforts/initiatives are needed?"

Europe needs an Executable Plan for CCS at scale. Such a plan would involve 3 phases:

1. Deliver existing / planned single source/sink CCS projects in prime locations which can be expanded into strategic European CO₂ hubs;
2. Source CO₂ from nearby emitters to create the CCS hubs and ensure that the storage capacity identified and is appraised well in advance of its need, driven by hub expansion;
3. Expand the hubs over a wider region and across neighbouring countries. This could be coordinated and financed by regional CO₂ Market Makers like Norway capitalised by EU/national funds such as Horizon 2020 and the Innovation Fund (NER400)

Tim Bertels – "What more can the oil and gas industry do to stimulate the deployment of CCS?"

The Oil and Gas Climate Initiative, was launched at COP21 by 10 oil and gas who committed to spending \$1 billion over the next 10 years on innovative greenhouse gas reduction technologies that includes CCS. The Oil and Gas Industry has the skills and expertise to help develop a CO₂ transport and storage framework for the future. They can play a key role by sharing the information they have gained from existing CCS projects as well as advising stakeholders on what it takes to deliver CCS projects. Also they can contribute to storage mapping activities in regions where CCS will need to be deployed in the future but first steps are needed to assess and then develop the storage resource. The industry should take a lead on the deployment of gas fired CCS projects, which is a critical technology to achieve the below 2°C target.

Jarad Daniels - "How can technology Innovation contribute to the deployment of CCS?"

We need technology deployment of current CCS technology now and innovation. In addition we need accelerated deployment of new generation CCS technology going forward. Innovation is needed on both capture and storage components of CCS. It is needed to drive down the costs of CCS components and the plants themselves to make them competitive in the market place with other low carbon technologies.

Developments like Mission Innovation, launched at COP21, where 20 countries have committed to double their R&D budgets on low carbon technology developments show that governments are taking low carbon technology innovation seriously.

R&D efforts need to be guided by and help inform techno-economic and Integrated Assessment Models. These is work that needs to be done to inform the modelling and policy discussions at of the value of CCS.

Niall Mac Dowell – "Is CCU a game changer or distraction for CCS?"

Meeting the 2°C temperature target involves the mitigation of > 800 GtCO₂, estimates based on the projected technological growth rates suggest contribution that CO₂ conversion/utilisation accounts for only 0.49 – 0.6% of the CO₂ that needs to be mitigated under the 2°C target. The reason for this low contribution is that most CCU options do not correspond to permanent storage removal of CO₂ and therefore do not contribute to offsetting climate change.

A key bottleneck to industrial scale deployment of many CO₂ conversion technologies is likely to be cost effective availability of low carbon/renewable H₂. The argument that CO₂ and electricity will be available at no cost is flawed.

With CCU you also need to be aware of the unintended consequences for example converting CO₂ to methanol and using as a transport fuel results in 115% of the CO₂ emissions associated with gasoline. Also you taking a concentrated point source of CO₂ and converting it to a diffuse source making it more difficult and expensive to capture in the future.

The presentations given by each panel member can be found at: www.ghgt.info/ghgt-13/ghgt-13-programme/item/plenary-sessions-4.

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Kelly Thambimuthu questioned the panel members on the issue of communicating the benefits of CCS to stakeholders. There was a general feeling from the panellists that CCS has not projected the benefits it can bring to Governments and the wider community. The CCs community has a lot of information but does not generate information that is easily understood by the lay community.

CCS does not see itself as a competitor to renewables but a complementary low carbon technology in any power system because of the high variability of renewables electricity supply. However the renewables community do see CCC as a competitor. A key message to the policy community was that: If we are going to achieve the goal set at Paris we are going to need ALL low carbon technologies, and mitigation in ALL sectors not just power and industry. No one technology will achieve the below 2°C target on its own.

Panel Outcomes

The panel outcomes were summarised by the Moderators as follows:

- **Incentives**, Post Paris targeted support in the form of incentives are needed to advance CCS.
- **Infrastructure**. A critical objective is to develop the transport and storage infrastructure to allow large quantities of CO₂ to injected and stored offshore.
- **Innovation** is needed to drive down the costs of CCS and it competitive in the market place with other low carbon technologies.
- The Oil and Gas **Industry** has the skills and expertise to help develop a CO₂ transport and storage framework for the future.
- The CCS research community has a lot of **Information** but we need help from communication experts to better frame the messages to stakeholders

If we get these right we can drive the **Implementation** of CCS forward in the coming years.

Finally CCU, apart from CO₂-EOR, does not involve permeant storage and is therefore not a technology that will contribute to reducing global greenhouse gas emissions to meet the below 2°C target.