



IEAGHG Information Paper: 2015-IP27; “Pathways to Commercialisation” Event

The great and the good from the international CCS world gathered in London to consider pathways to commercialisation for CCS, bringing international experiences and perspectives onto the UK situation. This event was held on the 9 November in London in conjunction with the IEAGHG members meeting (48th ExCo) and was jointly organised and hosted with CCSA and UKCCSRC.

After a welcome by Kelly Thambimuthu as Chair of the IEAGHG Executive Committee, Jo Coleman from the UK’s Energy Technologies Institute (ETI) gave a scene-setting talk on the role of CCS in the UK in achieving the 80% GHG reduction by 2050 using existing technologies, and the tools that ETI are providing to assist this including an online database of UK storage sites. She highlighted the need for CCS clusters, and clusters’ needs for large anchor projects.

The first panel looked at international experiences with industrial-scale projects. This panel benefited from the previous week which saw a successful Carbon Sequestration Leadership Forum (CSLF) Ministerial meeting in Saudi Arabia and the opening of Shell’s Quest project in Alberta. Jarad Daniels of the US Department of Energy (DOE) emphasised the need for global collaboration as shown by CSLF and by IEAGHG to share experiences and data from existing projects.



Tim Bertels of Shell highlighted their view on critical successful factors for CCS demonstration projects: a licence to operate (both social and political); to be able to build in confidence – including noting the lack of benefits for first-movers; and replicability of what was being demonstrated. He also talked of the need for short-term and long-term policies to support CCS. Commercialisation of CCS technologies requires the costs to be lower than the returns, and cost reductions are achieved by a cycle of cost reductions through implementation of demonstration projects. These are helped by collaborations across nations such as in the IEAGHG, IEA, and CSLF.

Peter Emery of Drax presented on the promise of CCS from their perspective, with CCS and just 10% co-firing to achieve net zero emissions on large-scale electricity generation from coal. Also for the UK to reduce costs of CCS from £160/MWhr to £94 by 2028. The White Rose project is an anchor project for the regional CCS cluster there, and he announced the name of the storage part of that project as “Endurance”.



Questions and discussion were encouraged from the audience of over a hundred and twenty people, and there was discussion around the level of engagement on CCS by coal producers.

The second panel focussed on delivering commercial deployment of CCS. Tony Ripley of UK DECC opened the session and covered the UK government extensive portfolio of actions to deploy CCS including the Energy Market reforms, the UK CCS competition, the funding of the UKCCSRC and the cost reduction task force action.

Mike Monea of SaskPower talked about the challenges of the world's first full-scale CCS on a coal power plant operating at Boundary Dam. He observed that the technology is easier to deal with than dealing with some of the media. He announced that SaskPower and BHP Billiton are wanting to share knowledge so as to advance CCS around the world, based on Boundary Dam, the Carbon Capture Test Facility at Shand and the Aquistore storage site, and so are seeking collaborations with research organisations globally. He noted that the UK is advanced as any country on CCS, as is Saskatchewan Province. In Saskatchewan it took them 12 years to get to where they are now with CCS, hence the need to help developing countries to learn from them and move forward more quickly.

Discussion centred on media challenges, and the benefits of media training for engineers. Mike also made the point that SaskPower didn't want to be the first project, but the other projects ahead of them didn't proceed for various reasons, so now they are the first and so they want to share with others to help them.

Hans Jorg Fell of Gassnova described the Norwegian policies and priorities for CCS support around the whole value chain of CCS.



The third panel looked at capture technologies involved in recent developments in CCS. Richard Smith of Howden indicated that there had already been significant technical convergence on post combustion and it was leading the field in terms of capture technology deployment. The challenge going forward as the scale increases and transportation of ever larger vessels are issues relating to construction of units and their transportation. One option that other industry sectors had used successfully was standardisation i.e. using multiple smaller standard units instead of single very large ones.

Mike Monea described how SaskPower looked at oxy-combustion first before deciding on post-combustion capture, and then undertook three parallel FEED studies on PCC providers before choosing Shell's Cansolv process for capture plant.



Mohammad Abu Zahra of Masdar talked about the Emirates Steel Project by ESI. This will use Direct Reduced Iron method (DRI) to provide a greater than 99% pure CO₂ stream into a 45km pipeline for enhanced oil recovery (EOR) onshore, and will start injecting in March 2016.

The fourth panel looked at realising the storage resource. Ward Goldthorpe of The Crown Estate (TCE) talked of the UK having storage potential for 78Gt (p50) and 8.5Gt (high-ranked), and so can service the UK and Northern Europe's needs for storage. TCE is looking at decisions on strategic infrastructure under uncertainty, looking at 3 future CCS scenarios, including considering strategic vs project development, and so going for no regrets capacity building decisions. There are four areas of risk that markets can't handle: a 'market' for storage is missing; technical risk, leakage risk; and performance guarantees; and all of these causing some investment risk. Hence TCE are looking at commercial models for pre-Financial Investment Decision (FID) and post-FID stages.

Britta Paasch of Statoil talked on the Norwegian experiences with CCS. Sleipner has provided the world with lots of knowledge on storage processes and deep monitoring, building confidence also in modelling. In Salah provided a wide range of monitoring data. Snøhvit provided experience in integrating geomechanics and reservoir management, and need for robust injection system design and a plan B for injection geology.

John Kaldi CO2CRC talked on the political and economic context for CCS in Australia, which recently has been a rather 'dynamic policy context'. He also described how Boundary Dam is helping international researchers working in Australia and Australian researchers working internationally. The CO2CRC Otway project stage 2 will inject into a deep saline formation so as to demonstrate deep saline formation storage in Australia.

Dominique Copin from Total talked on Total's activities such as the Lacq pilot project and working with other oil companies in the Oil and Gas Climate Initiative, and how can they can contribute to development of CCS.

The discussion covered the language around CCS, how to take the drama out of CCS news.





Mike Gibbons, Chairman of the CCSA, provided concluding remarks to the day. He reminded the audience of the case for CCS being made in so many studies such as from the IPCC and IEA, and the 'imperative' case for CCS in flexible electricity markets responding to climate change. He also noted the need for leadership by politicians and by fossil fuel companies, with many of the oil companies providing positive examples.

In terms of the Pathway to Commercialisation, his six 'take ways' were:

- Dependency on getting the right business model – balancing risk and reward.
- Importance of cost reduction potential – need to build projects to achieve this
- Importance of good public communication
- Importance of knowledge sharing
- Importance of 'Anchor' projects for CCS clusters to develop
- Importance of developing a commercial framework for storage.

"So, we need to start building projects" he concluded.

Overall an interesting day of new material and updates being provided, and good lively discussion with all agreeing on what is needed for Pathways to Commercialisation of CCS. Many of the ppts will be on the IEAGHG website at <http://www.ieaghg.org/ccs-resources/technical-workshops/19-ccs-resources/technical-workshops/612-pathways-to-commercialisation> .

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