Developing CCS in the UK and beyond: insights from the UK CCS Research Centre

Ciara O'Connor [1], Hannah Chalmers [1], Bruce Adderley [2], Jon Gibbins [2]

[1] UK Carbon Capture and Storage Research Centre (Edinburgh Office),
Sanderson Building, The King's Buildings, University of Edinburgh, Edinburgh, EH9 3FB, UK

[2] UK Carbon Capture and Storage Research Centre (Sheffield Office),
Sir Frederick Mappin Building, University of Sheffield, Sheffield, S1 3JD, UK

Abstract

The UK Carbon Capture and Storage Research Centre (UKCCSRC) leads and coordinates a programme of underpinning research on all aspects of CCS in support of basic science and UK government efforts on energy and climate change. It brings together over 250 of the UK's world-class CCS academics to provide a national focal point for CCS research and development. The Centre is a virtual network where academics, industry, regulators and others in the sector collaborate to analyse problems, devise and carry out world-leading research and share delivery, thereby maximising impact.

This paper will present progress and 'lessons learned' from the Centre's activities in recent years, with a particular focus on effective development and use of pilot scale facilities and encouraging industrial and other stakeholder engagement in research. It will also highlight key features of an extensive programme of international engagement activities undertaken by the Centre, identifying and added value for both the UK CCS community and global development of CCS.

The national UKCCSRC PACT facilities (www.pact.ac.uk) are located across 3 sites with complementary capability and are operated, managed and supported by a consortium of six leading academic institutions. Through recent expansion new state of the art analytical facilities have also been made available through PACT. The UKCCSRC PACT Core facilities have recently completed/are currently involved in a broad range of research projects including industry-academia collaborative projects funded by industry, UK Government and the UK Research Councils. The projects involve 24 universities and 31 industrial and other organisations. The total project value exceeds £24M, with around 2/3 of PACT's project income originating from collaborative projects with industry.

As well as undertaking high quality research, the PACT facilities have provided a valuable opportunity to engage with a broader range of individuals and organisations including policy-makers from several countries and relevant industrialists. Over 700 visitors from more than 250 (including many non-academic) organisations have visited the UKCCSRC PACT Core facilities since autumn 2012. Additionally, the PACT facilities have provided high quality training opportunities for early career researchers. For example, postgraduate research students in the Centres for Doctoral Training in Bioenergy and in Carbon Capture and Storage and Cleaner Fossil Energy funded by the UK Energy and Physical Sciences Research Council have been provided with hands on training on the facilities.

Alongside the programme of core UKCCSRC activities, the Centre has awarded £4.8M to 27 research projects covering a broad range of CCS topics. This flexible research funding has been complemented by £2.1M co-funding from project partners. The paper will provide an overview of research highlights emerging from this project portfolio which includes, for example, several projects contributing to improved understanding of the impacts of CO_2 impurities in CCS pipelines, development of both close to commercial and more novel CO_2 capture technologies and collaborative projects that provide knowledge and understanding to improve characterisation and monitoring of CO_2 storage sites.

Another important achievement for the Centre has been the development and implementation of an international engagement vision that has included targeted engagement activities, relationship building and links to international organisations and events. The use of different strands of activity has allowed the Centre to support the delivery of collaborative projects involving both UK and overseas academics, as well as raising the profile of UK-based CCS R&D internationally.

Targeted engagement activities take advantage of overseas collaborations to progress research and other UKCCSRC objectives. For example, the UKCCSRC International Research Collaboration Fund (IRCF), has offered a mechanism for UK based researchers to collaborate with other CCS researchers around the world, to support and strengthen both emerging and existing international collaborations. To date, 9 academic members representing 8 different UK institutions have received awards. In addition, a special call of the IRCF was run to support UK researchers seeking to collaborate with CMC Research Institute's Field Research Station, in Canada an initiative that arose from discussions that began at GHGT-12.

Relationship building activities include ongoing dialogue and networking interactions with other leading research organisations working on CCS, typically supported by a formal MOU or other statement of intent once relationships have been identified and sufficiently developed. Currently the UKCCSRC has MOUs in place to support research collaboration with SaskPower, CMC, CATO, RCN-CCUS, CO2CRC Ltd. and jointly with SCCS, GEDI and CFEDI, to help set up the Guangdong CCUS Centre. This paper will illustrate different activities that can be facilitated by developing formal relationships of this type, opening up valuable opportunities for the development of both people and insights that support the development and delivery of CCS.

Finally, experience has also demonstrated that more informal links to major international organisations, including through meetings and workshops covering one or more relevant themes that are primarily intended to bring together a range of national or international attendees are important. Since many key stakeholders are in one place, these types of event can be a cost-effective way to communicate and network. This paper will highlight benefits of attending (or organising) such meetings, for example information exchange and benchmarking, supporting state-of-the-art surveys and dissemination of research findings.