2021-IP25: UKCCSRC Stakeholder Engagement on the Next Generation Capture Technologies

A virtual industry engagement workshop was held on the 30th of September 2021 as part of a **BEIS-funded review to determine interest in the commercial deployment of the next generation capture technology. The review targeted industrial operations with a capacity of 500 to 1000 tCO_2 per day (tpd) between 2025 and 2035.** The aim of the workshop was to collate feedback from industry stakeholders on the types of next generation capture technologies under consideration for deployment. The workshop also included secondary objectives to identify opportunities and barriers associated with the development of capture projects across the UK.

BEIS has appointed AECOM and the University of Sheffield to assess the carbon capture technologies applicable to the UK industrial, waste and power sites, with the following aims:

- Review of next-generation carbon capture technologies
- Understand the suitability of the next-generation carbon capture technologies to different industrial sectors
- Conduct techno-economic analysis of the next generation capture technologies
- Support UK industries gain an understanding of the next generation carbon capture technologies
- Engage with industrial sites to understand site specifics challenges and the cost of deploying the technology in different industrial sectors.

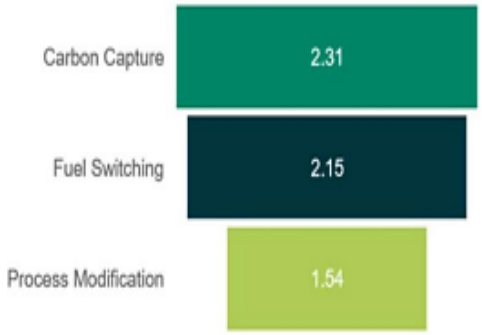
The findings of the review will help inform government decisions relating to the provision of innovation support funding for CCUS deployment.

The response of participants to a broad spectrum of questions was collated during the meeting.

This was achieved via asking multiple choice questions and recording comments made anonymously on different subjects. The X-Leap software platform was used to anonymise and facilitate the interactive part of the workshop. The questions asked during the course of the workshop were designed to gain an insight into the current thoughts and opinions of different sectors on a range of issues relating to the deployment of the next generation capture technologies.

The findings to some of the questions presented to the stakeholders are summarised:

Question 1: Participants were asked to rank the approaches that have the greatest decarbonisation potential for their sector. Three options were presented and are ranked in order. The top approach being the option with the greatest potential. The results are presented in Figure 1.



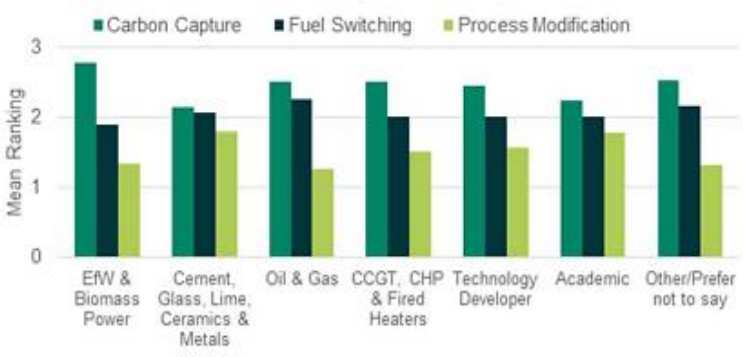


Figure 1. Decarbonisation approach ranking results (left) and the breakdown of decarbonisation approach ranking results by industry (right).

Note: Results are generated from participants at a CCS event, therefore, participants may be more likely to have a positive view of the role of CCS. There were 80 responses to this question and the average (mean) ranking for each approach is given in Figure 1. The 'petrochemical, fertilisers and fine chemicals' sector was omitted from this graph because no responses were obtained.

The deductions from the findings of question 1 are as follows:

- Carbon capture is preferentially favoured as a decarbonising option compared to fuel switching or process intensification.
- CCS application in EfW (energy-from-waste) was especially favoured, supposedly from the limited options to decarbonise the sector.
- Responses with regards to the cement, glass, lime, ceramics and metals industries was observed to be somewhat even as compared to the other sectors. This may be due to more options for fuel switching and process intensification as a decarbonizing endeavour.

Question 2: Participants were asked to indicate the time their industrial sites (or wider sector) might commence the first full-scale, or near full-scale, decarbonisation of individual sites. The results from question 2 are presented in Figure 2.

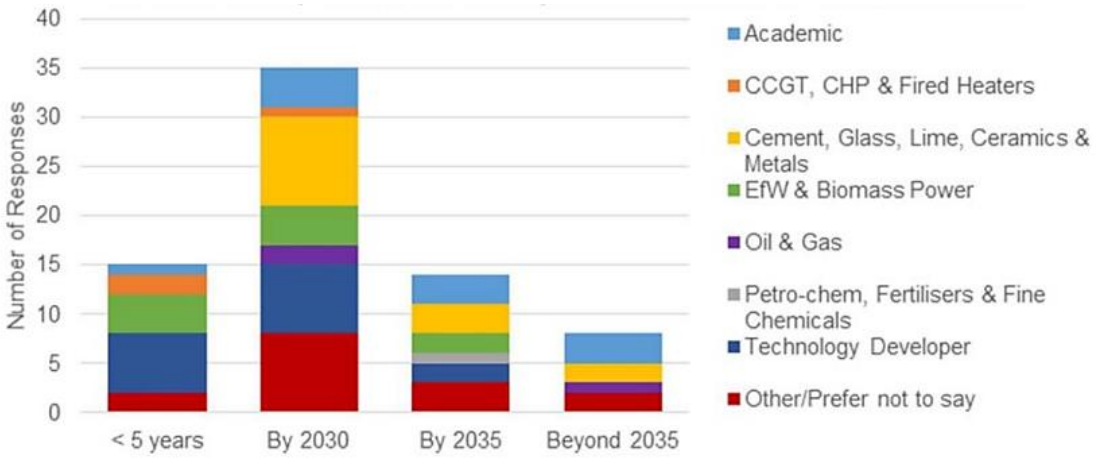


Figure 2. Time to commercial deployment results by sector.
Note: There were 72 responses from this question 2.

The current thoughts and opinions of the participants reflects higher confidence for CCS deployment by the year 2030 rather than earlier or later. The inclination of the participants to favour this date is on the backdrop of the UK Government's strong commitment to CCS in its ten point plan for a green industrial revolution strategy. The UK Government's ten-point plan includes deployment of CCUS in a minimum of two industrial clusters by mid-2020s, and four by the year 2030, with the aim of using the technology to capture and store 20-30 Mt/CO_2 per year by 2030 as set out in its net zero strategy. Consequently, the strategic vision underpins future investment and potential export opportunities. Further, this enterprise, alongside hydrogen production, can create 'SuperPlaces' in areas such as the Humber, the North-East, the North-West and southern England, as well as in Scotland and Wales.

The UK government is commitment to becoming a world leader in capture technology, with a target to remove 10Mt of CO_2 by 2030. Thus, shareholder's attitude is expected to improve and investment in assets are likely to mature before 2030, setting the stage for the commercial CO_2 capture.

Question 3: Participants were asked to select the most promising next generation technologies for carbon capture and given the option to select up to four answers. The findings of question 3 are presented below.

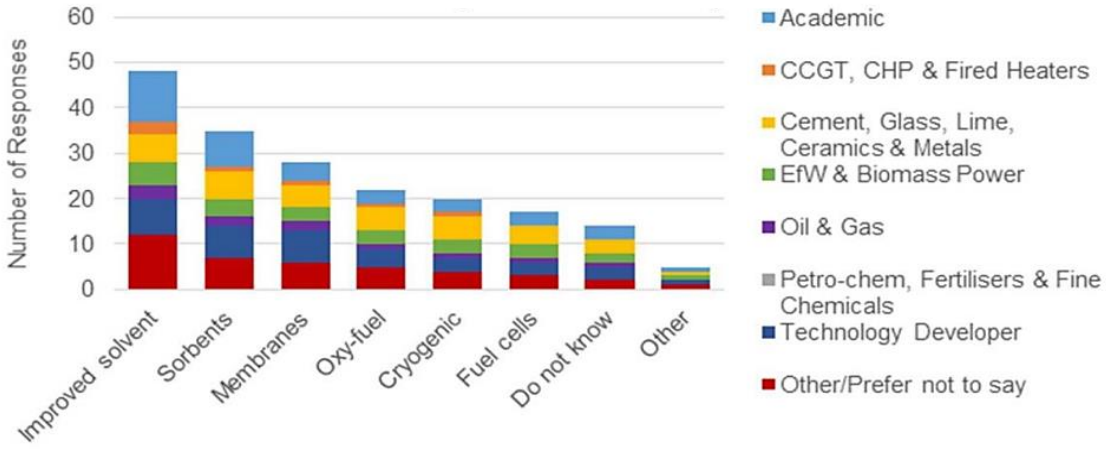


Figure 3. Most promising next generation technology results by sector.

The participants view the improved solvents to be the most promising next generation capture technology. This is the most matured capture technology which has gone through about a century of research and development. To date, no one solvent reigns supreme (in terms of CO_2 capture performance) over the others. Sorbents and membranes closely follow improved solvents as the most preferred next generation capture technologies.

Question 4: Participants were asked to indicate the scale they envisage the deployment of CO_2 capture technology.

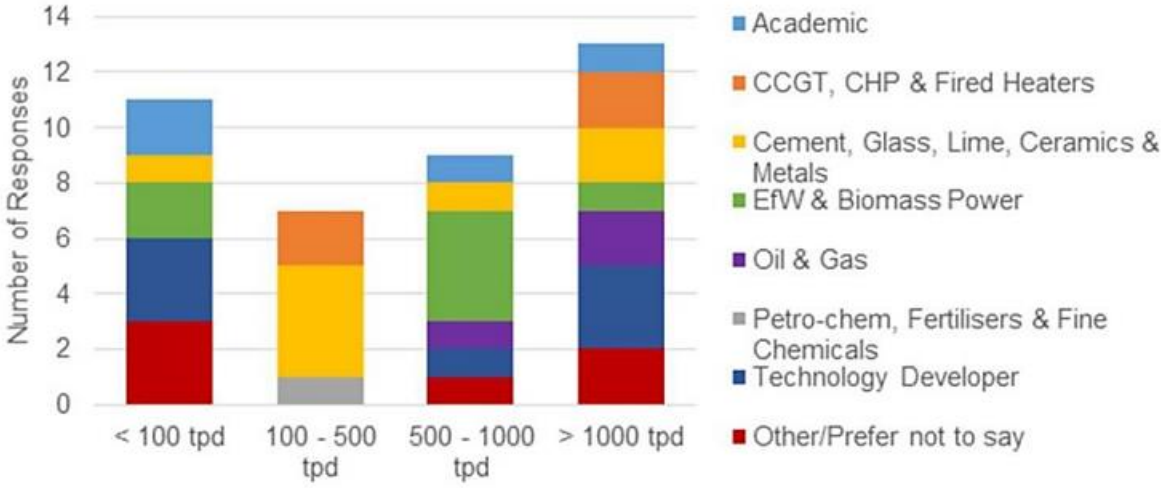


Figure 4. Carbon capture technology deployment scale results by sector

Participants were jointly more in favour of < 100 tpd and up to 500 tpd CO_2 capture capacity with regards to question 4. This may indicate the cautiousness with regards to the speed at which some stakeholders may want to see the deployment of CCS projects in the UK.

All other feedbacks on this stakeholder engagement can be accessed on the UKCCSRC website. The feedback on the opportunities and barriers will be reported in the WP 2 report, which is scheduled to be published by BEIS in May 2022.

In summary, carbon capture was viewed by most participants as having better prospects to decarbonise than either fuel switching or process modification, although the enthusiasm for carbon capture varies depending on the sector. Improved solvent-based technologies were viewed as being the most promising next generation carbon capture technology. The deployment of carbon capture, and other decarbonisation technologies, by the year 2030 seemed more likely by most participants. The majority of the participants expected carbon capture technologies to be capable of deep carbonisation with capture capability of more than 90% of total emissions from their plant. Further most participants believed that 'false starts' in the carbon capture industry have been a cause of disappointment and have the potential to weaken investor confidence. Transport and storage are not within the scope of this study.

The inputs provided by participants represent their opinions and for some industry sectors there were only a small number of attendees. Therefore, the results obtained do not necessarily represent the wider views of the industries concerned.

The second stakeholder engagement workshop is scheduled to take place on the 20th of January 2022. This is intended to provide a progress update, give technology developers a platform to present their technologies, and provide an opportunity for further interaction and industry engagement.

Abdul'Aziz A. Aliyu
11/11/2021