

# Evaluation of a public dialogue on Carbon Capture Utilisation and Storage (CCUS)

Report to BEIS and Sciencewise

## Quality Management

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## List of Acronyms

BECCS	Bioenergy with carbon capture and storage
BEIS	Department for Business, Energy, and Industrial Strategy
CCA	Climate Change Assembly
CCC	Climate Change Committee
CCS	Carbon Capture and Storage
CCSA	Carbon Capture and Storage Association
CCUS	Carbon Capture Utilisation and Storage
CO <sub>2</sub>	Carbon dioxide
DACCS	Direct Air Carbon Capture and Storage
DA	Devolved Administration
Global CCSI	Global Carbon Capture and Storage Institute
GHG	Greenhouse Gases
IDC	Industrial Decarbonisation Challenge
ISCF	Industrial Strategy Challenge Fund
OG	Oversight Group
OGCI	Oil and Gas Climate Initiative
PAT	Public Attitudes Tracker
SEG	Socio economic group
UKRI	UK Research and Innovation

# Executive Summary

## Introduction

This executive summary presents a short overview of an independent evaluation of a public dialogue to explore attitudes towards carbon capture, usage, and storage (CCUS). The dialogue was commissioned by the Department for Business, Energy and Industrial Strategy (BEIS), the government department responsible for energy policy in the UK, and co-funded by Sciencewise, a programme led by UK Research and Innovation (UKRI) which helps to ensure that policy is informed by the views of the public.

## Background

The policy context supporting CCUS has developed rapidly over the last year and the recent UK net zero strategy (Oct 2021) sets out ambitious targets, funding support and a CCUS cluster sequencing process over the next decade. However, CCUS is still relatively unknown amongst the members of the public. The findings of the recent Climate Assembly show that attitudes amongst those who know of CCUS are quite mixed. This large, complex dialogue was designed to provide more in-depth understanding of the attitudes of more than 100 individuals to different elements of the CCUS process and a range of CCUS applications. Differences in regional views were also to be explored by involving individuals from four locations local to prospective CCUS clusters (Liverpool, Teesside, Aberdeen and Port Talbot) and national attitudes in one control area (Nottingham). The COVID-19 pandemic and a national lockdown required that the dialogue moved online at the last minute. The online design involved each participant attending seven 90-minute weekday evening sessions. The process involved 20 specialists.

## Governance

BEIS convened a large and broadly representative Oversight Group (OG) which brought together representatives of government, regulators, the CCUS industry, academics and a few NGOs who consider themselves open to the option of using CCUS in some settings. Despite the teams' best efforts, it proved difficult to engage those known to be more opposed to CCUS (although their views were brought into the process via interviews conducted by an OG Co-chair). During the initial stages, almost all OG members contributed actively to the framing, choice of locations and review of stimulus materials. As the dialogue moved online and the timeline was extended, about half remained closely involved – contributing as specialists and

attending final dissemination events - but some inevitably became less engaged or moved to different roles.

## Project Management

The project management split of roles and responsibilities between delivery contractors and commissioners was typical of a Sciencewise project. Both BEIS and the delivery contractors, Traverse, experienced turnover in their core staff as the dialogue moved online. Inevitably this caused some continuity issues for a project which already faced a steep learning curve in moving the process online, analysing the considerable evidence collected from the online process and drafting a high-profile final report. The final drafting process involved some slippage and a number of iterations. However, the final report and presentation of findings were of very high quality and published in July 2021 with a foreword by the BEIS Minister for Energy, Clean Growth and Climate Change.

## Project objectives were all met

The project objectives – set for a face-to-face dialogue - were ambitious and required coverage of a broad range of issues. In the challenging circumstances of a COVID-19 pandemic and being one of the first large dialogues to move online the dialogue successfully met all six of its objectives.

The process successfully engaged and retained a diverse and inclusive sample of the public to explore attitudes towards CCUS in general and for different use cases in industry and the energy sector (Objective 1). Adding a fifth location ensured that blue and green hydrogen production was also covered. The design generated a breadth and depth of findings that met Objectives 2, 3 and 4 by adding a layer of additional understanding of participants attitudes to different CCUS applications and local CCUS cluster projects. The richness of evidence captured allowed analysis of the similarities and differences in attitudes between the five locations. The use of an online platform (Recollective) for individual reflections in their own time generated evidence which provided a useful granularity on the thinking of small groups and individuals.

The process also produced a useful set of co-created 'principles' (objective 5) finalised in a session where participant groups from different locations came together. This would not have been financially or logistically possible if the dialogue had not moved online. Evaluation interviewees agreed that the overall findings chimed with the existing literature but added greater nuance. From policy maker, practitioner and academic viewpoints the understanding of views from different locations really added value to the existing body of evidence (objective 6).

## Impacts on CCUS policy and practice

The findings from the public dialogue appear to already be proving helpful to policy makers, academics and CCUS cluster partners in thinking how to meaningfully engage with local communities around CCUS clusters. The dialogue report has been made available to BEIS policymakers including through dissemination sessions, and the findings will be considered and reflected in future CCUS policy, stakeholder engagement and communications. Stakeholders involved with prospective CCUS projects report that the findings are already proving helpful in shaping their public engagement.

## Costs and Benefits

The total financial cost was £275K plus VAT for dialogue delivery and evaluation. This includes an uplift from the original budget to cover adding an additional location and to cover some of the additional costs of moving online once the dialogue had already been fully designed. After savings in venue, catering, travel and subsistence costs this demonstrates that online dialogues require more staff time for pre-planning, facilitator ratios, filming of stimulus materials and use of online platforms. However, in-kind contributions (estimated at £45k to cover time and travel costs of the OG, specialists and unbudgeted commissioner staff time) were only 15% over and above the financial costs, lower than those for face-to-face processes of similar size and complexity.

The economic benefits of the dialogue are difficult to quantify at this stage but, given the scale of planned public investment in CCUS, the potential for local job creation if CCUS clusters go ahead, and the climate change costs avoided if CCUS projects are in operation over the next decade then the economic benefits will far outweigh the financial costs of the public dialogue.

## Lessons learnt about good practice for design and delivery of online public dialogues

The dialogue was a steep learning curve for core team and generated a number of lessons for future online or blended (mixed online and face-to-face) dialogues.

- **Weekday evening meetings worked well and both time slots (6-7.30 and 8-9.30pm) were equally well attended.** During the COVID context, participants seemed happy to attend seven short sessions within a four-week period. In more normal times, the complexity of the timetable and number of commitments might be more challenging. Furthermore, 90 minutes felt short



for deliberative sessions but could not have been extended within the back-to-back format of running all locations in a single evening. There would likely be budget implications for running longer sessions even if there were fewer sessions overall.

- **Online design can offer participants more choice in how they get involved** including small group synchronous deliberation (verbally, via the chat function and polls) and asynchronous deliberation (through homework tasks and online tools). Using an online platform (Recollective) added real value as a virtual repository for materials, a space for participants to undertake reflective tasks and for collecting evaluation feedback. Quieter participants were able to make considered contributions at their own pace.
- **Good tech support before and during sessions** was key to online meetings working smoothly and ensuring that the participants who were recruited were fully able to use all the digital tools.
- **Online stimulus materials cannot be expected to convey the same amount of information as would be possible in the room** via wall posters, carousels, handouts or practice exercises. Materials presented as PowerPoints need to be slimmed back and fully accessible when viewed on smaller screens. Pre-recorded films and short animations work well online as do scenarios which help participants think through the issues and take a wider societal view.
- **Homework tasks such as the slider and rating questions generated useful (but not statistically relevant) evidence about the participants' journeys.** This data helped provide context for the qualitative findings and more granular evidence about what underlay views in different locations and on specific technologies and would have been difficult to carry out face-to-face.
- **Capturing disagreement and agreement.** The use of outputs from small groups collated as homework prioritisation exercises and revisited in the final session which brought together participants from all locations worked really well to get a sense of overall priorities as these evolved. The resulting co-created a set of principles for the future deployment of CCUS was owned by the whole group.
- **Facilitation of online groups needs additional skills and effort** to create a sense of group cohesion and get participants in dialogue with each other rather than making statements through the facilitator. Efforts to create a friendly and informal environment on arrival, providing greater facilitator continuity across sessions, and greater encouragement for participants to keep their screens on, wherever possible, helps to establish a sense of group cohesion online.

- **The nature of online meetings allows lead facilitators less opportunity to read the room and less flexibility to adapt timings or re-prioritise questions.** Online sessions need to be even more carefully planned than face-to-face sessions, and probably need to be less ambitious and focus on fewer priorities in order to avoid the risk that some topics are not covered in sufficient depth.
- **Specialists played a useful role in answering questions in plenary and in revolving around small groups.** Their role could have been enhanced if specialists had played a greater role in presenting technical material in plenary and if sessions were structured to curate frequently asked questions (FAQs) from the small groups so they could be answered by specialists in plenary, giving all participants access to the same information. This would have required either longer sessions, an additional session or less material and information provided to participants.
- **A major benefit of online sessions is in allowing more specialists and observers from the commissioning body to take part and OG members to attend meetings.** The savings in time (a few hours compared to a full day and travel time) and associated travel costs encouraged many more individuals to take part. In theory, an online process also offers opportunities to bring in other specialists (including those with lived experience) at short notice, although for this dialogue the tight timetable and packed agendas did not leave much space for adapting once the workshops were underway.
- **Online dialogues generate even more data than typical face-to-face processes** both from a larger number of smaller breakout groups and individual reflections on an online platform. This needs to be recognised in the procurement process to allow more elapsed time for analysis and staff resource allocated to coding, analysis and reporting in order to do justice to the evidence and the messages which emerge. Building in opportunities for the commissioners and Sciencewise to understand the emerging findings and agree the structure and style of reporting could also help to save time in drafting the report.

# 1. Introduction

This draft report has been prepared by URSUS Consulting on an independent evaluation of a public dialogue to explore attitudes towards carbon capture, usage, and storage (CCUS). The dialogue was commissioned by the Department for Business, Energy and Industrial Strategy (BEIS), the government department responsible for energy policy in the UK, and co-funded by Sciencewise<sup>1</sup>, a programme led by UK Research and Innovation (UKRI) which helps to ensure that policy is informed by the views of the public.

## 1.1 Background Context

In 2019, the government announced its commitment to meeting net zero carbon emissions by 2050. This is a challenging target for decarbonising the UK economy, including the power system, industry, transport and building sectors. CCUS is being considered to reduce emissions from industrial process and electricity generation, and to remove carbon dioxide from the atmosphere through greenhouse gas removal technologies. The extent of offshore underground storage capability and the large number of industrial clusters give the UK the opportunity to develop CCUS at scale. Since 2017 the government has published a number of policy documents intended to encourage the development of CCUS, including:

- **The Clean Growth Strategy (2017)** which reaffirmed government commitment to CCUS.
- **Delivering Clean Growth (2018)** which set out the strategic plan for supporting UK CCUS cost reductions and the Clean Growth CCUS Deployment Pathway which shifted the focus to deployment and reviewing business models.
- **Re-use of Oil and Gas Assets for Carbon Capture Usage and Storage Projects (2019)**.
- **Business Models for CCUS (2019)** which set out emerging thoughts on business models.

The independent Climate Change Committee (CCC) 2019 report on net zero<sup>2</sup> stressed a role for Carbon Capture and Storage (CCS) technologies, describing it as “a *necessity not an*

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<sup>1</sup> Sciencewise is funded by UK Research and Innovation (UKRI). The Sciencewise programme aims to improve policy making involving science and technology by supporting the effective use of deliberative public dialogue across Government and the Research Councils. It provides a wide range of information, advice, guidance, and support services aimed at policy makers and the different stakeholders involved in science and technology policy making, including the public. Sciencewise also provides co-funding to Government departments and agencies to develop and commission public dialogue activities.

<sup>2</sup> Committee on Climate Change, May 2019, <https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf>

*option for reaching net-zero [greenhouse gas emissions] GHG emissions”* alongside a suite of other measures. CCUS was seen as having a role in contributing to decarbonising industry and some elements of the power generation sector, enabling production of hydrogen at scale, and providing a pathway towards development of some negative emissions technologies such as Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS). The CCC also envisaged that low-carbon hydrogen will play a role powering industry, peak power, shipping, heat in buildings and for HGVs. BEIS plans to contribute to the development of commercial CCUS cluster projects through the Industrial Decarbonisation Challenge (IDC)<sup>3</sup> of the Industrial Strategy Challenge Fund (ISCF) run by UKRI. BEIS will provide up to £170 million, matched by £261 million from industry, to invest in developing technologies such as carbon capture and storage and hydrogen fuel switching. The technologies will be deployed and scaled up within the UK’s largest industrial clusters, projects in the Humber, Northwest England, Teesside, Scotland and South Wales will all receive government support to deploy low-carbon technologies. During the course of the dialogue, the Prime Minister’s Ten Point Plan for a Green Industrial Revolution (November 2020)<sup>4</sup> further increased the funding available through the CCUS Infrastructure Fund committing £1 Bn in funding and setting the ambition to have at least two clusters up and running by the mid-2020s.

However, BEIS’s Public Attitude Tracker (PAT)<sup>5</sup> shows that public awareness of CCUS lags well behind policy. In the 2019 survey, the majority of respondents had never heard of it while about a quarter were somewhat aware of it, while less than a quarter knew either a bit or a lot about CCUS. Of those that knew of CCUS the majority (62%) were supportive, a third were neutral leaving a small minority (5%) were against CCUS. By March 2020, the findings remained similar. BEIS officials were therefore keen to understand what drove public attitudes towards CCUS, as it was thought that this could be crucial if CCUS technology is to be successfully deployed. BEIS officials were particularly keen to hear how people living near potential CCUS clusters might feel about CCUS as they learnt more about the technology.

BEIS therefore decided to commission a public dialogue to gain a greater understanding of public attitudes towards CCUS, particularly at the local level, as one element to help inform policy. The findings were also expected to be of interest to wider stakeholders and the proponents of the clusters as they start to engage with planners and local communities.

## 1.2 Dialogue Objectives

BEIS chose a deliberative methodology in order to be able to understand how people’s comprehension, aspirations and concerns for the technology develop as they learn more about it and how this varies between locations and applications. The dialogue was expected to

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<sup>3</sup> <https://www.ukri.org/our-work/our-main-funds/industrial-strategy-challenge-fund/clean-growth/industrial-decarbonisation-challenge/>

<sup>4</sup> <https://www.gov.uk/government/news/pm-outlines-his-ten-point-plan-for-a-green-industrial-revolution-for-250000-jobs>

<sup>5</sup> <https://www.gov.uk/government/collections/public-attitudes-tracking-survey#beis-public-attitudes-tracker-surveys>

include a reasonably large sample of the public but to generate data on what underlies opinions rather than the incidence of opinions.

The following six objectives were agreed:

1. To engage a diverse and inclusive group of the public in dialogue about the future use of CCUS technologies and applications, involving members of the public from areas where CCUS facilities are more likely to be developed (i.e. 'local') as well as areas less likely to be directly involved in CCUS deployment (i.e. 'non-local').
2. To explore participants' views on the role of CCUS in principle and its different applications, in helping to meet a net zero carbon emissions target.
3. To gain an understanding of participants' aspirations and concerns towards CCUS, and how these may differ in areas where CCUS may be developed vs. areas where development is unlikely.
4. To gain insight into the conditions participants would wish to be met if CCUS technologies and CO<sub>2</sub> transport and storage infrastructure are deployed in a local area and the benefits they would expect to accompany deployment.
5. To inform the development of principles to underpin the deployment of CCUS technologies and CO<sub>2</sub> transport and storage.
6. To develop an evidence base which can be used to inform and refine development and delivery of future CCUS policy, including Government decisions on how any rollout of CCUS is managed, and to inform best practice for CCUS project developers.

The initial brief included nineteen detailed research questions which sat under the six objectives for the dialogue.

## 1.3 Framing of the dialogue

The dialogue was originally planned as a face-to-face (F2F) process which would take place over two full-day workshops in each location on Saturdays a few weeks apart in March and April 2020. The project would have been completed in about 9 months. The initial proposal anticipated bringing together up to 96 people from four locations.

The first Oversight Group (OG) meeting and a literature review undertaken in late 2019 helped to shape the dialogue design in terms of the scope of issues to be covered and the choice of locations. The literature review reinforced the business case view that proximity to a potential CCUS project and the industrial heritage and landscape of that location could be key factors in determining the public's attitudes to the potential risks or opportunities associated with CCUS. The design therefore placed emphasis on choosing a good mix of locations likely to be affected by different CCUS clusters with three near proposed CCUS clusters, balanced by one 'control'

location in central England which was unlikely to be affected directly by CCUS. The CCUS clusters were in England, Scotland and Wales with the proposed control site in Nottingham. During discussions at the first Oversight Group (OG) meeting a choice was made to replace the CCUS cluster around the Humber with Teesside, to cover a different mix of industrial applications. BEIS also proposed adding a fifth location in Liverpool to cover the Merseyside CCUS cluster which would also cover blue and green hydrogen production. The rationale for the choice of the five locations is summarized in Box 1.1.

The OG and the literature review also helped to identify the range of topics which OG members felt would need to be covered to help participants understand the context and the specifics of what a CCUS project might look like in their area. BEIS, environmental NGOs and academics were keen that the dialogue should be set in the context of wider climate change policy before getting into detailed discussion of CCUS technologies. It was therefore agreed that the dialogue would be structured to introduce participants first to the policy context (the carbon cycle, climate change, the UK's net zero policy commitments and different ways of getting there) and then different elements of CCUS technologies which might create risks or opportunities (capture, transportation, utilisation and storage) and then the range of use applications of interest to BEIS and wider stakeholders (power generation, industry, hydrogen, BECCS and DACCs). Finally participants would explore what would and would not be acceptable in national or local development of CCUS by exploring real CCUS proposals as case studies.

At the point that the dialogue process had been fully designed and venues booked, the Covid-19 pandemic hit and by 23rd March a full national lockdown was in place. Varying levels of restriction remained in force across the five locations until Spring 2021. The dialogue was put on pause from March to late May 2020 while the commissioners took the decision - endorsed by the Oversight Group – to move the process online with workshops rescheduled for October and November 2020. This was one of the first public dialogues of its size to move wholly online and therefore faced a number of design and logistical challenges in learning what works well and what less so. During the redesign period, the core project teams in both BEIS and the independent contractors, Traverse, changed.

The anticipated challenges of moving online were the following:

- **To recruit and retain a diverse and inclusive mix of participants** reflective of the UK population while creating a sense of the five locations in online sessions.
- **Translating the original design into a compelling series of shorter online sessions** which would hold participant's interest in the face of uncertainties and additional pressures on them caused by the COVID-19 pandemic.
- **Giving participants space for real deliberation and a realistic sphere of influence** in recommending to the government how they would like to see CCUS rolled out nationally and locally, while understanding that the government is now committed to moving ahead with CCUS as part of its net zero strategy.

- **Giving participants sufficient, balanced information on the context, technologies and use cases without overwhelming them with detail.** The information needed to cover a huge breadth of topics in an accessible way at appropriate depth.
- **Presenting CCUS cluster case studies so that covered potential risks and impacts as well as the benefits** and while avoiding any confusion with ongoing planning or BEIS decision making processes.
- **Allowing all participants to hear a balance of views and interrogate a range of specialists**, including some of the organisations – such as non-governmental organisations – who might be less supportive of CCUS rather than just CCUS advocates.



### Box 1.1: Rationale for choice of locations

- **Aberdeen, Scotland** focused on the Acorn project St Fergus pathway with storage under depleted oil and gas fields off the Aberdeen coast. The case study for this area also included a hydrogen dimension of local transport and heating projects and so the OG felt it would be more relevant than the initial suggestion of Falkirk, near the carbon capture cluster at Grangemouth.
- **Port Talbot, Wales** South Wales Industry Cluster (SWIC) focused on CCUS applied to a heavy industry (the Tata steel works) and a mix of transportation methods including transportation of CO<sub>2</sub> by tanker to storage under the Irish sea.
- **Middlesbrough, Teesside** focused on the net zero Teesside proposals for decarbonisation of a heavy industry cluster and transportation by pipeline to storage under the North Sea. This replaced the original proposal of Scunthorpe on the Humber which would have included steel decarbonisation and BECCS project at Drax but was considered to be too similar to the Port Talbot cluster. Due to difficulties in recruiting during the lockdown, the Middlesbrough recruitment area covered the whole Northeast.
- **Liverpool, Northwest** focused on the HyNet project on the south of the Mersey as part of a project to initially produce hydrogen from fossil fuels (blue hydrogen) and then from renewables (green hydrogen) to replace diesel and petrol in the transport and natural gas in the domestic sectors.
- **Nottingham** was selected as a national 'control' area unlikely to ever be the site of a CCUS project and with a more diverse population than the UK average to counterbalance less diverse local areas such as Aberdeen and Port Talbot.

## 1.4 Layout of the report

- **Section 2** describes the methods for the dialogue delivery and the evaluation.
- **Section 3** describes impacts (to date and anticipated) of the dialogue on CCUS policy, practice and on participants themselves.
- **Section 4** assesses how far the dialogue has met its six objectives.
- **Section 5** describes how far the dialogue has met Sciencewise emerging best practice standards in delivery of online dialogues.
- **Section 6** assesses the governance and management arrangements for the project.



- **Section 7** compares the financial and in-kind costs and potential economic benefits of the dialogue; and
- **Section 8** summarises the findings and lessons learnt for BEIS and Sciencewise.

The list of Oversight Group members and specialists involved in the public dialogue and shown at **Annex A**.

Evaluation feedback from public participants is shown in **Annex B**.

## 2. Methodology

This section describes the organisation, management and governance of the dialogue (Sections 2.1 to 2.3), the methodology for the dialogue delivery (Section 2.4) and the methodology for the evaluation (Section 2.5).

### 2.1 Overview

The dialogue process was designed and delivered by Traverse, independent experts in public engagement, between October 2019 and September 2021. The process was steered by a large Oversight Group (OG) with representation from the commissioners (BEIS and Sciencewise), the devolved administrations (DAs), regulators (EA) and wider stakeholders including academics, NGOs, and CCUS industry. The framing and materials development were informed by a rapid literature review carried out by Traverse in 2019. During summer 2020, the dialogue was redesigned to be delivered online with each of the 112 participants expected to attend seven short sessions (90-minutes each using the Zoom platform) and carrying out homework tasks on an online platform (Recollective) over the course of October and early November. Some 20 specialists gave presentations or answered participants' questions. The final report was published in late July 2021 and the findings presented to BEIS policy makers (27th September) and wider stakeholders (28th September) via online 90-minute workshops (using the Teams platform).

### 2.2 Governance

BEIS convened an independent Oversight Group (OG) of 17 members including two co-chairs. The members included representatives from government departments and devolved administrations (Scottish Office and Welsh Government, Defra), planners and regulators (Environment Agency (EA), the Oil and Gas Authority (OGA) and the Health and Safety Executive (HSE)), CCUS industry associations, academics, the TUC and three environmental NGOs or think tanks (Worldwide Fund for Nature (WWF), Green Alliance and E3G). The expertise of the group spanned UK and international energy and climate policy, energy research and social science, environmental regulation, local economy and employment and public dialogue/science communication/media/public affairs. Several of the group, including the chairs, also had prior experience of steering Sciencewise public dialogues and qualitative research. The full membership list is shown at Annex A.

The OG was tasked with providing advice and oversight to ensure the deliberative dialogue plans and materials/information that participants received were accurate and reflected the range of debates around and perspectives on CCUS. OG members brought their expertise to ensuring that the dialogue was as accessible and far-reaching as possible and that the findings would be considered robust and credible.

## 2.3 Core management team

The core management team comprised a BEIS project director and project manager and a Traverse project director and manager, a Sciencewise dialogue expert adviser, a representative of UKRI and the independent evaluator. The Traverse team was supported by the lead dialogue designer and an independent academic who steered the literature research. The core team met regularly with weekly progress meetings during peak periods throughout the project. During mid-2020, largely due to the COVID-19 pandemic driven delays to the project and accompanying resourcing issues there was a turnover in the project manager in BEIS and the core team in Traverse.

## 2.4 Dialogue Methodology

### Rapid Evidence Review and stakeholder interviews

A Traverse director led a detailed evidence review of nearly 40 sources identified by BEIS, the OG and an expert adviser. The review covered the state of knowledge about CCUS technologies, benefits and impacts and what is known about public views and how they are formulated. The findings were discussed with OG members in conference calls and the emerging findings used to help frame the dialogue, further stakeholder interviews and design of stimulus materials. Initially a stakeholder workshop had been planned during late November/early December 2019 but, due to purdah for the national election, it was agreed that 15 interviews would be carried out instead. OG members requested further stakeholder involvement at the end of the process and so one of the planned policy briefing sessions was dedicated to sharing the results with external stakeholders (see Section 3).

### Process design and stimulus materials

The process and materials design phase started in early 2020, with a full set of materials developed with Traverse, reviewed for accuracy and for representation of a comprehensive range of views at a facilitated workshop by the OG (February OG2 meeting) and then piloted at two evening sessions in London (9th and 11th March 2020). After the decision to move online, the Traverse team redesigned the sessions into seven 90-minute online workshops to be delivered via an online video conferencing platform (Zoom). The OG again reviewed the materials at an online workshop (September, OG4) and the case study materials were reviewed by the CCUS cluster project proponents. Once their comments had been taken into account the materials were re-piloted online with a new set of 20 individuals who each attended one evening session (17th, 22nd and 23rd September 2020). Table 2.1 summarises the focus of each session, the materials presented and the specialist contributions.

The materials included a mix of PowerPoint presentations, short videos (BEIS, YouTube, Traverse short animations), case study CCUS cluster project descriptions and scenarios and

an interactive ‘slider’ tool which allowed participants to decide how they would achieve their preferred net zero pathway.

The dialogue delivery was split over four ‘weeks’ with a Thursday evening session focusing on sharing information followed by a Tuesday evening session focusing on small group deliberation. In order to cover all five locations, two sessions were organised back-to-back with participants from Liverpool, Nottingham and Port Talbot (up to 66 individuals) meeting at 6-7:30 pm and participants from Aberdeen and Teesside (up to 44 individuals) meeting at 8-9:30pm that same evening. Each weekly cycle looked at CCUS through a different lens:

- **Week 1** focused on climate change, the carbon cycle and net zero goals.
- **Week 2** focused on the elements of a CCUS project (capture, transport, utilisation and storage) and the key technologies.
- **Week 3** introduced specific CCUS cluster case studies and then explored the project stages (planning, construction, operation and decommissioning) of rolling out a CCUS project; and
- **Week 4** brought together all participants from all locations in a final session which focused on co-creating and finalising a set of criteria or ‘principles’ for ensuring that any roll out of CCUS would be acceptable at local and national levels.

The split of weekly sessions was designed to gradually build participants’ understanding of CCUS with a focus on hearing new information during sessions a) and discussing the issues within small groups (synchronous deliberation) during session c). Between the sessions participants had opportunities to reflect in their own time (asynchronous individual deliberation) and record their views on the Recollective platform. Many of the stimulus materials were based closely on materials developed for face-to-face but edited to make them more accessible for viewing on laptops, iPads and smart phones (a little less information, easier to read colour layouts). Materials were available for reviewing between sessions on an online sharing site (Recollective).

**Table 2.1: Design of the dialogues and focus of each session**

	Objectives addressed	Learning live on Zoom - sessions (a)	Deliberating Live on Zoom – sessions (c)	Individual Reflections on Recollective (b)
<b>Week 1: CCUS in the context of net zero</b> Thurs 1st Oct Tues 6th Oct	What are participants’ initial reactions to CCUS in the context of climate change and net zero?	Carbon cycle Historic carbon emissions Concept of net zero CCUS intro video	CCUS intro video (repeat) Review slider task together Develop questions about CCUS & jargon buster	My net zero Pathway (slider) Acceptability of CCUS - UK & local Understanding of CCUS
<b>Week 2: Overview of CCUS technology, aspirations,</b>	What are participants’ attitudes to the different applications and stages of CCUS?	Intro to carbon capture from energy and industry, storage, transport and use	Plenary Q+A Blue/green hydrogen, BECCS and DACCS Brainstorm benefits and concerns	Pros & cons of CCUS Participant questions ‘Criteria’ for deploying CCUS

<b>benefits, fears, concerns</b> Thurs 15th Oct Tues 20th Oct		Brainstorm benefits and concerns	Turn benefits and concerns into criteria for development	My net zero Pathway Reflections & have views changed
<b>Week 3: Development of CCUS projects</b> Thurs 29th Oct Tues 3rd Nov	How do participants view CCUS in the context of an infrastructure project in their area?	Specialist panel presents case studies: net zero Teesside; HyNet Liverpool, SWIC Port Talbot. Acorn Aberdeen Breakout discussion on implications for local areas	Discussion based on four stages of project lifecycle (plan, construction, operation, decommission) Scenarios with 4 different 'personae' to explore different viewpoints	Pros & cons of other case studies (Port Talbot, Liverpool, Aberdeen, Teesside) My net zero Pathway Acceptability of CCUS (UK, locally) Understanding of CCUS
<b>Week 4: CCUS policy and governance</b> Tues 10th Nov	In what policy context do participants see a role for CCUS?	Full group plenary Talking heads video on CCUS in context of net zero Breakouts mixed across locations, sharing experiences deliberating on: CCUS in the context of net zero; criteria for deployment of CCUS Closing remarks and next steps (BEIS)		What 3 words would you use to describe your views on CCUS? Week 4 feedback

### Box 2.1: Range of online stimulus materials

- **Talking heads videos** - Recorded videos with specialists including: BEIS, Committee on Climate Change (CCC), Carbon Capture and Storage Association (CCSA) and Worldwide Fund for Nature (WWF).
- **Mix of PowerPoint slides** covering the carbon cycle, historical emissions, an overview of CCUS; CCUS in the power sector, CCUS in heavy industry, green/blue hydrogen, BECCS and DACCS; CCUS case studies (Merseyside, Port Talbot, Aberdeen and Teesside) and description of the planning process for a project.
- **Animated videos – CCUS concept, BECCS and negative emissions** including carbon fixing trees/plants, direct air capture and BECCS and featuring a bath as a simple visualisation of CO<sub>2</sub> accumulation in the atmosphere.
- **Quizzes on Zoom poll during weeks 1 and 2** on climate change, the carbon cycle and parts of the CCUS process (storage).
- **Online videos to demonstrate simple scientific concepts** e.g., with a water bottle, baking powder and balloon to demonstrate CO<sub>2</sub> capture, and with different types of chocolate/biscuits as straws to demonstrate the concept of porosity.
- **Use of a simple Pathway 2050 slider on Recollective** to help participants to develop their own preferred pathway towards meeting the net zero emissions target through: renewable energy; planting trees and restoring wetlands; nuclear energy; behaviour change; energy efficiency; new technology; and CCUS. The tool included a simple description of the measures but no information on relative costs or technical feasibility. Participants used the slider after week one and again after week three.

- **Case studies of CCUS applications in different settings.** Factual and neutral descriptions of how CCUS would work, with some local economic context.
- **Role play based around four stages (planning, construction, operation and decommissioning) of a typical CCUS project** with four personae (local planners, citizens and businesses) intended to help participants assess the pros and cons and explore their expectations/principles around deployment at different points of a CCUS project.
- **A ‘Jargon Buster’** developed in response to about 30 terms identified by participants as needing definition, developed by Traverse and BEIS and posted on Recollective.
- **Links to articles** on recollective for participants to access to allow reading around the topic area and different perspectives.
- **Homework tasks** on Recollective allowing participants to record their personal views on the role of CCUS, their attitudes towards it as part of a national or local strategy, to identify any questions they still needed answering etc.

## Recruitment of Participants

For each of the five chosen locations 24 participants were recruited in the expectation that 21-22 would attend. Participants were recruited via a professional recruitment agency that used a mix of on-street (face to face) and digital recruitment methods (databases and networks) as dictated by local COVID-19 restrictions in place at the time. The recruitment brief specified a stratified sample to be broadly reflective of the local demographics (gender, age and ethnicity) and socio-economic group (SEG) for each location, but with deliberate over-recruitment of those from Black and minority ethnic populations in all locations and individuals from non-British white backgrounds in less diverse areas (such as Port Talbot and Aberdeen). Additional recruitment questions excluded individuals (or those with family members) directly employed in developing the CCUS industry or with recent experience of market research. Recruits were asked to be able to access online platforms via a desktop computer with a camera, laptop or tablet, with those who only had a smartphone not excluded but encouraged to borrow a larger screen if they could. A Traverse technical support team worked closely with participants before the first session to help everyone find their way around the features they would need to use (camera, microphone and chat function).

For each of the first three weeks participants met in a large plenary (three locations in an early evening session and two locations in a later session on the same evening) and then broke into small, facilitated groups with others from their location. Before joining they received a welcome pack with joining instructions and how to access online platforms. Participants were offered a staggered thankyou payment of up to £320 if they attended all workshops and completed all homework activities, designed to ensure no one would be excluded from taking part on

economic grounds. Those that missed sessions did not receive the £25 for that session or the bonus of £50 for attending all sessions.

## Recruitment of specialists

BEIS and Traverse worked closely to recruit a group of specialists drawn from the initial stakeholder interviews and specialists associated with the four CCUS cluster projects. The aim was to have at least one, and ideally more, specialists in each of the 13 online sessions. Some 20 specialists attended at least one session, and many attended both the early and late session on one evening. Specialists covered a range of topics – from climate change and net zero to specific CCUS technologies, safety and environmental protection and planning issues. The aim was to include specialists with expertise on the topics being discussed to partake in the workshops, not to represent a particular view on CCUS.

Three specialists were also recruited for a pre-recorded talking heads video sharing different perspectives on how CCUS might fit into delivering net zero. This was played to participants for the last workshop. Wherever possible, the team tried to recruit specialists who would reflect the diversity of the participants themselves and all specialists were briefed not to advocate for or against the technology. A full list of specialists who contributed is shown at Annex A.

## Data collection and analysis

Data was collected from all small group Zoom sessions (up to 16 breakout groups an evening over seven sessions) via video recording and individual notetakers assigned to each small group. Participants also provided their feedback in online Zoom polls (quizzes and evaluation questions in the workshops) and in homework tasks on Recollective. All the transcripts, polling and homework tasks were coded using Traverse's in-house "Magpie" software. The coding framework was gradually built by the Traverse team. Data generated from the My net zero slider tasks and questions on changing attitudes to national and local deployment of CCUS were used to generate infographics on participants' journeys and how their attitudes evolved.

## Outputs

The published outputs from the public dialogue process include:

- **The [dialogue report](#)**<sup>6</sup> and standalone executive summary published on BEIS webpage on 26th July 2021.
- **A PowerPoint slide deck** of findings for policymakers and CCUS stakeholder audiences.
- **Stimulus materials** including slide decks, films, case studies and scenarios.

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<sup>6</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005434/ccus-public-perceptions-traverse-report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005434/ccus-public-perceptions-traverse-report.pdf)



## 2.5 Evaluation methods

The evaluation took place between October 2019 and October 2021. The objectives were:

- To gather and present objective and robust evidence of the nature and quality of the impacts, achievements and activities of the project in order to come to conclusions; and
- To identify lessons from the project to support the design and delivery of future public dialogue projects.

Evaluation tasks were undertaken in three phases as follows:

- **Phase 1: Baseline Assessment.** Working alongside the delivery team to ensure that research framing and the overall process design reflected what was already known about public understanding and attitudes on CCUS and that the framing reflected the expectations of the commissioners and the OG. Questions about the face-to-face design were fed into the core team discussions in relation to workshop design, recruitment, and stimulus materials development during March 2020 and then again as the online design and materials took shape from June to September.
- **Phase 2: Interim assessment of design and delivery.** An evaluator observed all plenary and at least one small group in each of the five locations for each of the seven online sessions (i.e., 35 small groups). At the end of each we collected evaluation feedback from the participants either via a Zoom exit poll or as part of their homework on the online platform Recollective. Feedback completed in their own time was more comprehensive than that from Zoom polls. Evidence was collected from specialists and observers who took part via semi-structured telephone interviews after the events were completed. Findings were fed back to the core team after each round of events and shared with the OG as a short presentation.
- **Phase 3: Final assessment of the overall dialogue.** Summative evaluation of the dialogue was based on quantitative data collated during phases one and two and qualitative data collected during phase three. This included semi-structured interviews with 15 individuals who have been involved with the process (as core team members, members of the OG, specialists or observers) and comments made by internal BEIS and wider stakeholder attendees at dissemination events.

Data from the above sources is used throughout the report with anonymous quotes shown in blue italics. Statistics on participant feedback have in some cases been included but it should be noted that they are not statistically robust or reflective of the wider population and in most cases we have used the conventions of ‘most’, ‘many’, ‘some’ or ‘a few’ in the text.



## 3. Actual and potential impacts of the dialogue

This section assesses the impacts of the dialogue process on policy, practice and research, based on interviews with BEIS and selected OG members and stakeholders and discussions at internal and external stakeholder events. The following sections cover the impact on participants, the dissemination of the findings, impact on BEIS policy makers and CCUS project proponents and wider unanticipated impacts.

### 3.1 Overview

BEIS published the dialogue report in late July 2021. By mid-September, the report had been downloaded 759 times. The findings were presented by Traverse at two dissemination events for BEIS policymakers (27th September) and CCUS sector stakeholders (28th September) respectively. The BEIS policymaker event was attended by about 52 BEIS staff from a wide variety of climate, energy, and industry teams. The CCUS stakeholder event was attended by about 72 stakeholders, with particular interest from industry associations and companies involved directly or indirectly in developing CCUS projects. Participants at both sessions praised the clear, interesting, and detailed presentations made by the Traverse team. Both sessions generated thoughtful questions which helped to clarify the attendees' understanding and helped to stimulate thinking on next steps. The findings from the public dialogue appear to have already added value to previous understanding about how people think about CCUS and highlighted the need for meaningful engagement in developing local CCUS cluster projects. The dialogue report and presentation of findings were made available to BEIS policymakers and the findings will be considered and reflected in future CCUS policy, stakeholder engagement and communications. Those involved with prospective CCUS projects report that the findings are already proving helpful in shaping their public engagement.

### 3.2 Impact on participants

Recruitment questions showed that the sample of individuals was reflective of the UK population as a whole, with most participants knowing very little about CCUS at the outset. Over the course of the first three weeks, participants were exposed to a great deal of information. Their feedback to quizzes (during week 1 and 2 sessions) and evaluation questions suggested that most people were grasping the key issues and that almost all gained some understanding of the net zero context, CCUS technologies and how they might be applied by the end of the process.

Almost all participants reported that they enjoyed the process and valued the opportunity to take part. Half-way through the process, almost all reported that they felt very positive about

being involved and many commented on how much they were enjoying learning about CCUS. By the end of the week 3 workshops - before going into the final deliberations about principles for how CCUS might be developed – over 80% of participants felt confident that they understood a lot or quite a lot. Most felt confident that they were sufficiently well-informed to share opinions that policymakers would find useful. Typical views were: *“I am finding the sessions very interesting and I hope that our opinions will be taken on board and help to shape the future of CCUS implementation.”* and *“I am enjoying learning about the process of CCUS and I look forward to each session.”* I public participant.

Some participants also mentioned that they were feeling empowered to make their own contribution to net zero. *“Very much enjoying it! Learning so much and it’s challenging me already over what changes I can make moving forward to support reducing carbon.”* I public participant.

By the end of the process participants were almost unanimous in thinking that it is important that the public is engaged in policy decisions of this type and the majority of respondents felt confident that BEIS would take their opinions into account in deciding how CCUS is deployed as part of a net zero strategy. A typical view was that: *“As long as there is transparency and balanced opinion then I think public consultation is essential to allay any fears and reassure the public. Trying to do it without support would lead to more distrust and possible disruption from extreme factions which could cause more safety issues.”* I public participant.

However, a sizable minority (about 20% of respondents) were less convinced and a small handful were sceptical. Several of the latter group voiced the opinion that the government may be trying to understand the public’s objections in order to understand how to counter them, rather than being ready to listen to their concerns about taking CCUS forward at either a national or local level. This lack of trust in the government and ‘experts’ seemed to echo wider societal discussions about trust that were playing out in the context of the COVID-19 pandemic. *“Are they just listening to know the best way to counter and manipulate our negative reactions?”* I public participant. This small group of individuals also questioned whether they were receiving fully transparent information or whether it was skewed in favour of CCUS (see Section 5).

## 3.3 Dissemination

### Policy Briefing

BEIS hosted an internal policy briefing event online on 27th September attended by some 52 BEIS staff working across a range of teams. Traverse delivered a clear, detailed, and insightful presentation and participants asked questions on the process and findings for about 30 minutes. The presentation prompted questions about specific safety and environmental impact concerns that the participants associated with different locations and technologies and where participants had picked up specific concerns and imagery from (such as burning trees for BECCS and earthquake risks and fizzy seas from underground storage). Attendees said

they found the report, findings, and answers to questions very interesting, one noting that “*the report is really very useful and the presentation gave even more insights.*”

## CCUS sector stakeholders

BEIS hosted an CCUS stakeholder briefing on 28th September. This mirrored the BEIS policymaker briefing and was attended by about 72 stakeholders. They asked questions which were ably answered by the Traverse and BEIS core teams for 45 minutes. Attendees reported finding the event very useful. This event met the OG’s early request for greater stakeholder engagement in disseminating the results. The careful attention to planning and preparation by the BEIS and Traverse teams ensured that both briefing events ran smoothly.

## Ad hoc dissemination by stakeholders

BEIS also shared an update on the dialogue findings at the CCUS Council on 13th September and received verbal feedback from council members including senior company executives and regulators, who were reported to find public perceptions on CCUS of great interest. BEIS also took part in a panel alongside an engineer and NGO and presented the dialogue findings at CCSA’s online conference in October and again the findings prompted considerable interest amongst the CCS sector audience.

The dialogue findings have also been shared with an international audience through a presentation at an online international conference of the UK Carbon Capture and Storage Research Council (UKCCSRC) ‘Delivering on COP26: CCS across the world’ (September 2021).<sup>7</sup> The conference was attended by US, European, Asian and African stakeholders. An OG member presented the dialogue findings as ‘CCS public perceptions in the UK’ at the UK panel event while an OG Co-chair and one of the dialogue specialists also contributed to other sessions. The findings have been shared at UKCCSR’s website and were well received and drew some interesting questions.

Evaluation interviews with academics and non-governmental organisations (NGOs) represented on the OG suggest that they have also shared the report and findings more informally with colleagues and their wider networks both among CCUS cluster partners and through informal networks of NGOs and think tanks with an interest in CCUS (including Greenpeace, Aldersgate group, Bellona, Institute for Public Policy Research (IPPR), European Climate Foundation (ECF) and European and Climate Intelligence Unit (ECIU).

## 3.4 Impact on CCUS policy

In the lead up to the dialogue, and as the workshops were taking place, a number of government announcements added impetus to the CCUS roll out process. Recent developments during and after the public dialogue was being carried out are summarised in

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<sup>7</sup> <https://ukccsrc.ac.uk/beis-public-dialogue-research-report/>

Box 3.1 and included further commitments on targets for and investment to support implementation of CCUS, and a decision on which clusters were sequenced on 'Track 1' and will be considered for support to deploy in the mid-2020s.

While these strategy documents and sequencing decisions have not directly referenced this public dialogue, the dialogue findings will be helpful in contributing to further development of CCUS policy, and BEIS policymakers are considering how they will be taken into account alongside perspectives from other stakeholders.

For instance, the BEIS officials who attended the internal policy briefing cited the finding that participants expected a meaningful engagement process as a key takeaway from the dialogue. The government is not directing how CCUS cluster projects should run their stakeholder/ community engagement outside of existing requirements dictated by planning regimes (e.g., through the consultation process for planning consent), but it is intended that dialogue findings will provide useful insights to the CCUS cluster developers.

### Box 3.1: Developments in UK CCUS policy during and since the dialogue was completed

In the March 2020 Budget, the government committed to at least £800 million for a CCS Infrastructure Fund (CIF). By November 2020 the Government had committed to £1 billion for the CIF, with further details published in May 2021<sup>8</sup>. Also in November 2020, the Prime Minister published his Ten Point Plan for a Green Industrial Revolution which included targets for CCUS clusters and hydrogen and further details on investment to support roll out.

The recently published UK net zero Strategy: Build Back Better<sup>9</sup> (19th October 2021) envisages a role for gas CCS and hydrogen in meeting the target of decarbonising the power sector by 2035 and in contributing to industrial decarbonisation from the mid-2020s on. The strategy reports progress since the publication of the Ten Point Plan, while recognising that carbon capture will need to reach a capacity for capturing ~20-30 MtCO<sub>2</sub> per year by the early 2030s across the economy – more than double the target set out in the Ten Point Plan – and at least ~50 MtCO<sub>2</sub> by the mid-2030s.

In relation to industrial decarbonisation the net zero strategy aims to have two industrial CCUS clusters in place by the mid-2020s, and four by 2030 and that 6 MtCO<sub>2</sub> of industrial emissions will need to be captured a year by 2030. The Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme is now in place to fund new hydrogen and industrial carbon capture business models. Grant funding of £19.5 million for projects

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<sup>8</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/984001/ccs-infrastructure-fund-cif-design.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984001/ccs-infrastructure-fund-cif-design.pdf)

<sup>9</sup> <https://www.gov.uk/government/publications/design-of-the-carbon-capture-and-storage-ccs-infrastructure-fund>. The strategy has been submitted to the United Nations Framework Convention on Climate Change (UNFCCC) as the UK's second [Long-Term Low Greenhouse Gas Emission Development Strategy](#) under the Paris Agreement.

developing novel CCUS technology and processes that reduce the cost of deployment has also been announced.

On 19th October BEIS also published its Track 1<sup>10</sup> announcement for the cluster sequencing process, having completed the first phase of evaluation for the five prospective CCUS clusters submitted. HyNet and the East Coast Clusters have been confirmed as Track 1 clusters for the mid-2020s and will be taken forward into Track 1 negotiations. If these clusters represent value for money (VFM) for the consumer and the taxpayer then, subject to final decisions of Ministers, they will receive support under the government's CCUS Programme. The Scottish cluster has been placed on a reserve list in case other schemes do not proceed. The government has also published details of the design of funding mechanisms, including the business model for CO<sub>2</sub> transport and storage, industrial CCUS and power CCUS.

The 10 Point Plan also set out ambitions to develop blue and green hydrogen, described in more detail in the UK Hydrogen Strategy<sup>11</sup> (August 2021) and through the cluster sequencing process expects to award contracts for CCUS-enabled hydrogen from 2023, and trials for using hydrogen for transport and heating projects.

BEIS officials also reported during the policymaker briefing that they had taken away lessons on the need to clearly communicate how CCUS fits with Paris Alignment, the UK's net zero ambitions and other carbon reduction pathways. Policymakers also recognised the need for a robust stakeholder engagement process. At the end of the briefing for CCUS sector stakeholders BEIS extended an invitation to all interested stakeholders to talk directly to BEIS.

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<sup>10</sup> <https://questions-statements.parliament.uk/written-statements/detail/2021-10-19/hcws325>

<sup>11</sup> <https://www.gov.uk/government/publications/uk-hydrogen-strategy>

### Box 3.2: Policy maker reflections on the findings may affect CCUS policy

- *What was clear to me through the presentations and report was the importance of public participation.”* | BEIS dissemination workshop participant
- *“Really grateful that something like this is running – haven’t seen public dialogue like this elsewhere in government but seems very valuable.”* | BEIS public dialogue workshop observer
- *“Impressed how fascinating the presentation was – didn’t expect to get more than from reading the report but it highlighted some really interesting insights on how we think about stakeholder engagement and communications.”* | BEIS dissemination workshop participant
- *“We won’t make decisions on timing or location of the first clusters on the basis of public dialogue alone but it gives some interesting pointers about the need to understand what cluster projects have done on public engagement and the type of information they are providing.”* | BEIS public dialogue observer
- *” I did take away [from observing public workshops] the importance of the money element and costs to the taxpayer”* | BEIS public dialogue workshop observer

## 3.5 Impact on CCUS projects

The aim of the external stakeholder briefing event was to ensure that all key stakeholders were aware of the work. It was not designed to convey specific messages or guidance on how CCUS cluster projects should take the findings into account. The event attracted a great deal of interest from the CCUS sector: 155 stakeholders registered on Eventbrite and 72 attended on the day. About two thirds of attendees were from the CCUS sector including industry consortia (Oil and Gas Climate Initiative (OGCI), Carbon Capture and Storage Association (CCSA), Global CCS Institute, Scottish CCS and NECCUS (an alliance of industry, government and experts on CCUS in northeast Scotland), and about 40 representatives from associated companies including oil and gas, heavy industry, CCUS developers and engineering, environmental and planning consultancies. The remaining one third of attendees included government representatives (BEIS and Scottish Government), regulators (EA, HSE and Ofgem), academics (from nine universities) and a Trade Union (Prospect). One NGO (Green Alliance) attended but a number of others that they had invited registered but were not able to attend on the day.

Representatives from a range of companies involved in developing cluster projects took part (including Shell, ENI, BP, Drax, British Steel, ConocoPhillips and P66, Progressive Energy, Harbour Energy (Chrysaor), ExxonMobil and Total). About 20% of attendees from industry (and some academics) took the opportunity to ask questions on the dialogue and its findings, ably answered by Traverse and the BEIS core teams. Questions ranged from how locations



and recruits had been chosen, to how the dialogue was framed in the context of net zero and the detail of information on specific technologies that participants received. Project proponents were particularly interested in who participants considered to be trusted voices in sharing project information and what additional knowledge they sought out during the process. They were also interested in how the report authors categorised participants according to their attitudes to risk and were particularly interested to understand what underlay the views of the minority group of CCUS sceptics and how their views had evolved over the course of the dialogue. As with the internal BEIS stakeholder workshop, there was an interest in how far participants' safety concerns were related to general concerns around an unfamiliar technology, to specific potential risks of CCUS, and to a perception that carbon storage risks would be similar to fracking.

Feedback from evaluation interviews suggested that developers who had taken part in the dialogue workshops as specialists really valued the unique opportunity to hear directly from the public outside a formal engagement and planning process. One had been slightly surprised by the hostility directed at developers from some individuals. However, this had conveyed an important lesson about how project developers will need to take time for meaningful engagement to establish their trustworthiness with local communities. These specialists and participants in dissemination workshops appeared to understand that public engagement with local communities will need to be open and provide transparent information on the topics of greatest importance to participants, namely safety, environmental impacts, costs, and local economic benefits. While this type of engagement was considered easier in face-to-face meetings, specialists who took part in the dialogue sessions were also heartened to have learnt that it could also work online, if necessary.

The project proponents and other companies at the external stakeholder event also found it useful to think about how to present the context around CCUS clusters and specifically the UK's net zero ambitions. They accepted that participants would be interested in more information about costs of CCUS relative to other carbon reduction options and relative to the costs of doing nothing. *“Difficult to understand the rationale for CCUS without understanding the sheer scale of the net zero challenge and the magnitude of what cluster projects might contribute: people wanted numbers – both tonnes of CO<sub>2</sub> and costs so that they could compare CCUS to other potential net zero pathways.”* | Workshop specialist contributor.

At the CCUS council meeting, the agenda item where BEIS updated participants on the dialogue findings generated plenty of interest and several participants fed back how pleased they were to see the public dialogue report published and how timely and useful they were finding it.

### 3.6 Wider impacts

BEIS may carry out further public dialogues on specific types of CCUS in future. The core team report that, having been so closely involved in a complex online dialogue process, they

would have the confidence and the capacity within BEIS to run such projects in future with an independent delivery contractor.

### Box 3.3: Stakeholder views on how the findings are likely to impact on CCUS projects

- *“The Traverse report was very informative and we have used the analysis and outcomes directly in our cluster communications and public engagement plan.”* | Project proponent, via email
- *“Thank you to the BEIS and Traverse teams – a very interesting and useful study for developers. We have already integrated these [findings] into our ongoing engagement plans.”* | Project developer, external stakeholder workshop
- *“Really interesting process generating insights that will inform the design of our own engagement processes during 2021.”* | Project proponent specialist contributor
- *“Hugely enjoyed [public dialogue workshop] and valued the opportunity to talk to the public about things we take for granted when just talking to government and stakeholders, especially in the last 9 months when it has been very difficult to talk to the public at large.”* | Project proponent specialist contributor
- *“Interesting to observe the breadth of understanding – even though all had the same intro to CCUS, those with a technical background understood a great deal and those without still had some major misconceptions (pipeline across Wales to East Anglia, CO2 pipeline like sewage pipe with CO2 just bubbling up...)”* | Project proponent specialist contributor
- *“How might project developers incorporate information and opinions of independent bodies like the WWF in their public engagement?”* | Project developer, external stakeholder workshop

According to an evaluation interview with an OG member the findings from the research - particularly the ‘principles’ or ‘criteria’ for taking CCUS forward, are being used to inform at least one element of the research programme of the newly established UK Industrial Decarbonisation Research and Innovation Centre (IDRIC)<sup>12</sup>. The findings will certainly inform the research on “Protective space and social license to operate industrial decarbonization” led by Professor Gough at Manchester (an OG member). The OG co-chairs also identified opportunities for BEIS to present the dialogue findings to a wider IDRIC group which may create opportunities to inform other research around CCUS clusters (such as on strands led by Professor Pigeon, Cardiff University (OG Co-Chair) on industrial decarbonisation and strands being led by other researchers (such as on net zero and sense of place).

<sup>12</sup> <https://idric.org/>



There are already some signs of international interest in the findings. The CCUS sector stakeholder attracted a few international organisations including the Global Carbon Capture and Storage Institute (Global CCSI), the German governmental green funding organisation Zukunft Umwelt Gesellschaft (ZUG) and international oil and gas companies involved in the UK CCUS cluster projects. BEIS may also share the findings in multilateral fora such as the North Sea Basin Task Force in due course.

The BEIS CCUS International team are also working with the Research Council of Norway (RCN), as the UK lead for the Accelerating CCS Technologies (ACT)<sup>13</sup> programme which has so far only involved limited public engagement. A BEIS officer shared the public dialogue report with UK project partners funded out of the second ACT Call (ACT2). One project (NEWEST-CCUS) shared it more widely with its European research partners and consortium, noting that the report “*concerns the UK but there are certainly aspects that are fundamental to all of us, across Europe - we should all dive into this report.*” This suggests the findings may become influential during the Third Call (ACT3) where focus on public engagement is becoming increasingly important, and included in a number of the ACT3 projects Work Packages and Dissemination plans. The lessons learnt from this process and the greater understanding of participants views on CCUS as they learn more are likely to help shape BEIS’ input to how this might be done effectively.

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<sup>13</sup> <http://www.act-ccs.eu/> brings together 13 countries interested in piloting CCUS technologies, from Canada to India.

## 4. Assessment of how far the dialogue has met its objectives

This section assesses how the dialogue has met its overall objectives (section 4.1) and individual objectives (section 4.2). It draws on the evaluators independent assessment of how effectively the dialogue objectives have been addressed through the design and the findings captured, analysed, and presented in the final report and interviews with policymakers and selected oversight group members.

### 4.1 Overall achievement of objectives

The project objectives were both broad and deep in their ambition and would have been challenging for a face-to-face process and were even more so as the dialogue moved online at a stage when very few other dialogue processes had done so. In these challenging circumstances the dialogue successfully met all six objectives.

The team successfully engaged a diverse and inclusive sample of the public to explore attitudes towards CCUS in general and for different use cases in industry and the energy sector covering all of BEIS and CCC interest areas (Objective 1). Adding a fifth location ensured that blue and green hydrogen production was also covered.

The design – working with participants in small groups organised around the five locations for the first three weeks, supplemented with individual opportunities for individual deliberation as homework - generated a breadth and depth of findings that met Objectives 2, 3 and 4. The findings added to what was already known about public attitudes to CCUS by adding a layer of understanding on different CCUS applications and local CCUS cluster projects. The richness of evidence captured allowed analysis of the similarities and differences in attitudes between different areas. The use of an online platform (Recollective) for individual reflections in their own time allowed deeper analysis of the thinking within small groups and of individuals.

The process produced a useful set of ‘principles’ (objective 5) co-produced by participants over a number of weeks culminating in a ‘national’ session attended by all participants from all five areas. This would not have been financially or logistically possible if the dialogue had not moved online. Evaluation interviewees agreed that the overall findings chimed with the existing literature and findings from the Climate Assembly but provided more nuanced understanding of the differences between locations, and what underlay them. From policy maker, practitioner and academic viewpoints this really added value to the existing body of evidence (objective 6).

## 4.2 Achievement of specific objectives

### Objective 1: Engage a diverse and inclusive group from a relevant mix of 'local' and non-local locations

This objective was fully met. An effective recruitment process led to a good mix of participants broadly reflective of the individual locations including four pilot CCUS project areas (Liverpool, North-East (for Teesside), Port Talbot and Aberdeen) and a national control area (Nottingham). The choice of locations covered five of the six prospective CCUS clusters. Some OG members and stakeholders reported afterwards that they would have liked to see the Humber, the largest CCUS cluster, also covered since it would have given more context to discussions around BECCS.

The overall cohort broadly reflected the gender, age and ethnic diversity of the UK population. Over-recruitment of individuals from Black and ethnic minority and non-British backgrounds meant that these groups were well represented. Care taken in running pre-event tech sessions meant that we were unable to detect any signs of digital exclusion amongst those who actually took part, including amongst a sizeable group of older participants. Many participants appreciated the opportunity to get involved in what they recognised as an important process: the staggered thankyou payments and timing of online sessions on weekday evenings helped to contribute to a high retention rate with 89% of participants attending all seven sessions. This was a considerable achievement over so many sessions and in the context of a pandemic. Many participants reported being pleased to have the opportunity to meet with other people, even virtually, during local lockdowns. During the sessions participants were introduced to the dialogue core objectives (2, 3, 4 and 5 below) and made aware of the government commitments to take CCUS forwards. Evaluation feedback via a Zoom poll at the end of the first session confirmed that participants across all locations almost unanimously understood the objectives as presented.

### Objective 2. To explore participants' views on the role of CCUS in principle and its different applications, in helping to meet a net zero carbon emission target

This objective was well met and covered a broad range of applications including heavy industry, energy (power generation, BECCS and green and blue hydrogen) and DACCS, as agreed with the Oversight Group. The objective was not to convince all participants to become pro-CCUS but rather to understand how their views changed as they heard and explored CCUS issues through discussion with each other and specialists. The structure of the sessions built through the policy context to how CCUS worked and different applications. Due to the breadth of issues covered and amount of information to be absorbed in 90-minute sessions, some CCUS applications were discussed in more depth than others but there were enough groups that covered each subject for the analysis to have some evidence to draw on.

The online design with a mix of synchronous deliberations (with groups all discussing the issues at the same time) and asynchronous (individuals reflecting on the issues in their own

time) provided opportunities to track both how individuals and small groups' thinking evolved. An online tool (My net zero Pathway slider first introduced after week 1, discussed in small groups during week 2 and then revisited after week 3) was a useful contributor to building this picture and produced quantitative but not statistically relevant data which provided a useful context for qualitative analysis. The findings resonated with the latest [BEIS PAT survey](#) (March 2021) and partially reflected the outcomes of the Climate UK Assembly<sup>14</sup> which had discussed [BECCS and DACCS](#) alongside other carbon reduction measures as a solution for decarbonising the energy sector.

#### Box 4.1: Views of BEIS, OG members and specialists on how the dialogue met its objectives

*"I would wish to endorse the main findings of the dialogue, which triangulate very well with what the UK and international social science literature tells us about public views on CCS and other related decarbonisation proposals."* I OG member.

*"My takeaway was that people were more open to the concept of CCUS after having learnt so much about it. But probably wouldn't be if they hadn't."* I BEIS Observer.

*"My group all seemed very positive that something needs to be done but still questioning how CCUS will work."* I BEIS Observer

*"Findings seem broadly in line with what other stakeholders are saying – just transition."* I BEIS observer

*"A few had obviously done their own research about the history of CCUS and questioning how it will work this time."* I BEIS Observer

*"There was an interesting breadth of views."* I BEIS Observer

*"Comparing what I heard with CCA attitudes and concerns seem to be broadly similar but in more depth."* I BEIS Observer

*"No real surprises that H&S, costs and whether this is the best way to tackle climate change were still issues."* I BEIS Observer

*"Interesting to hear in my group that all quite positive – not haunted by the technology or lack of trust in who would develop it."* I BEIS Observer

*"Not a surprise that those areas with the most industrial heritage seemed more positive about CCUS. Others not negative but more sceptical about whether we really need CCUS."* I BEIS Observer

<sup>14</sup> A large public dialogue involving 108 participants who met face-to-face and online over six weekends during Spring of 2020 and covered CCUS alongside other mitigation measures such as renewables and afforestation

*“One participant had obviously understood from earlier sessions the importance of CCUS in decarbonising industry which would otherwise have to close down and had done research of her own – she was very confident to challenge others questioning whether this was the best way to tackle climate change.” | BEIS Observer*

### Objective 3: To gain an understanding of participants’ aspirations and concerns towards CCUS in different locations

Objective 3 was intended to explore whether participants views about CCUS might vary according to whether they were likely to be directly affected and included discussion not just of the carbon capture sites but also the pipeline and storage sites, as had been suggested by the OG. The organisation of participants into small groups from a single location for the first six sessions made it possible for them to explore the pros and cons of CCUS with this geographic setting in mind. The interplay in design between small group and individual reflection tasks generated a great deal of data which could be compared and contrasted between locations. For instance, collating lists of pros and cons in small groups and getting participants to prioritise these individually helped demonstrate that some concerns and aspirations were widely shared, while others were more geographically specific. BEIS and stakeholders were interested to hear differences between Aberdeen, Teesside and Nottingham – where most participants became increasingly positive about CCUS through the process, and Liverpool and Port Talbot, where a small minority became increasingly negative about CCUS the more they heard from specialists and talked to each other. The findings were able to draw lessons on the importance of landscape and industrial legacy and past experiences with government and large companies in shaping attitudes in different locations. Both BEIS and OG members reported that this adds to the existing literature and to the findings of Climate UK Assembly.

### Objective 4: To gain insight into the conditions to be met and benefits they would like to see from local CCUS projects

This objective was well met through examining a set of CCUS case studies based on clusters which are currently being developed. The information presented was consistent and presented in a format to explore both potential benefits and risks. Most participants reported that they were helpful in thinking through what a CCUS project might look like in their area and there was no apparent confusion with any ongoing planning processes. Discussions about the stages in the life cycle of a CCUS project were helpful in focusing in on the key issues and were the stimulus for exploring what conditions participants would want to see in place to minimise any negative impacts and maximise potential benefits. As with objective 3 the mix of small group transcripts and individual tasks completed on Recollective together generated rich data for making comparisons between locations. Some differences in views began to emerge between different areas, partly reflecting the nature of the projects and who was presenting them, but also reinforcing views that participants had formed about different CCUS applications. BEIS policy makers, OG members and stakeholders all found the analysis of what underlay differences in local views a really valuable contribution to existing knowledge.

*“The strength of the current work is that it locates the dialogue in the industrial cluster locations, something which is far less common in our existing knowledge-base.”* I OG member and *“Importance of local buy-in and that public views not one blob but vary nationally, regionally, locally.”* I BEIS observer.

Noting some frustration amongst quite a number of participants about not getting satisfying answers to their questions on costs (absolute and relative) and how these compared to other carbon reduction measures and who would pay, several CCUS cluster specialists took the lesson that they would need to address the cost issues (and the costs of not achieving net zero) more overtly in their future public engagement.

**Objective 5: To inform the development of principles to underpin the deployment of CCUS technologies and CO<sub>2</sub> transport and storage.**

This objective was intended to help understand the underlying ‘principles’ for how people would like to see CCUS deployed and whether these were generic or strongly influenced by the local context of industrial heritage, socio-economic conditions and local landscapes. The dialogue design was carefully structured to deliver this objective and started participants thinking about principles from week 2, pulled together by the Traverse team into an initial framework and then building towards a co-created set of principles which were refined by participants from all five locations working together in a final session. One BEIS observer commented on how well-framed the concept had been so that participants understood. *“If the PM were announcing a new policy on CCUS, what would you want to make sure it took into account: a very smart way of framing principles, which people didn’t otherwise understand.”* I BEIS Observer.

The resulting principles cover both national and local ‘must haves’ if CCUS is to be deployed. Co-creation across such a large group would have been a challenge in a face-to-face setting, but this online stepwise approach worked really well to build a shared set of principles across all groups, while understanding some of the nuances in emphasis between locations. These principles figure prominently in the structure and presentation of the final report and findings. They resonated well with both policy makers, CCUS sector stakeholders and OG members.

**Objective 6: To develop an evidence base which can be used to inform and refine CCUS policy and best practice for CCUS project developers.**

As noted in Section 3 the evidence base is already starting to be considered by BEIS in CCUS policy development, stakeholder engagement and communications. It is also starting to inform how CCUS project developers engage with local communities. As in many public dialogues, by the end the majority of participants felt strongly that the public should be educated to a similar standard about CCUS as they had been themselves in order to understand the technology and why its use is important for reaching net zero. Participants felt that this would help build much-needed trust around the technology. This finding could influence BEIS’s future stakeholder engagement and comms strategy



## 5. How delivery met Sciencewise best practice principles

This section assesses how far this dialogue has met good practice standards. The assessment draws on the following evidence from detailed review of the dialogue design against the Sciencewise Quality Framework and guiding principles and observation of 13 dialogue sessions (including plenaries and some 32 small group discussions covering all five locations) against an agreed protocol and quantitative data collected in participant feedback surveys on Zoom or Recollective from each of the dialogue sessions. It also reflects feedback from interviews from specialists and observers at the workshop sessions.

Most of the detailed analysis is shown in Annex B.

### 5.1 Overall delivery of best practice

Table 5.1 summarises our overall assessment of how the delivery met Sciencewise best practice principles. The following paragraphs describe the many lessons learnt through the dialogue process on what works well and what less so in designing and delivering an online public dialogue of this scale and complexity.

### 5.2 Lessons on works well and what less in online design and delivery

**Timetable and retention of participants. The scheduling of 10.5 hours of dialogue over seven weeknight sessions over four weeks was ambitious but worked extremely well in terms of attendance and retention while COVID restrictions were in place.** Weekday evening meetings at both 6-7.30 and 8-9.30pm were equally well attended. The structure of the incentive payments (which included a bonus for attending all sessions) and the participants' interest in the topic (see the many positive comments in the Annex B feedback) and lack of other distractions during COVID all helped to contribute to the high retention rate. In more normal times, it might be difficult to get the same level of commitment from either public participants or specialists for so many weeknight sessions.

**The length of sessions (90-minutes) was too short where they attempted to share new information and have small group deliberation.** At the point of moving online very little was known about the ideal length for online sessions, how long people could concentrate and how much information they could absorb. The decision to schedule 90-minute sessions back-to-back on a single night was taken for budgetary and resourcing reasons. We observed that 90-minutes was about right for sessions just designed to provide information but too short for sessions which tried to share new information and have small group deliberative discussions



about what they had heard. Time for discussion sometimes ran out before all exercises or prompt questions had been explored in depth. In the early weeks this did not affect the quality of findings but from the second half of week 2 a few CCUS applications of interest to BEIS did not get discussed by all groups, although enough groups did cover them to ensure that there was sufficient evidence for reporting and any gaps could be filled by individual homework reflections on Recollective. A lesson from other dialogues is that participants are happy to take part in longer sessions, even at weekends. For future online dialogues it would be useful to include at least a few slightly longer sessions (two or two and a half hours) which would allow more time for deliberative small group discussions. However, this would mean that not all sessions could run back-to-back on a weeknight and this would be more costly to resource.

**The scope of the dialogue was very wide and required a lot of stimulus information but some of it was more technical than required.** The scope of the dialogue was ambitious and at the stage the dialogue moved online there was limited knowledge of how much information participants could absorb. The discontinuity in the original teams involved in the design and testing of materials may have contributed to a feeling that everything that had been planned for the face-to-face sessions needed to be translated to online and this meant sharing new information in all the first six sessions, including those that had been planned mainly as small group deliberations. Some of this material could have worked better as either pre or post session homework. For instance, practical exercises with balloons and chocolate bars (which had worked well in the face-to-face pilots) worked less well as videos. Some participants did enjoy these exercises and some remembered them weeks later, but they cut into available discussion time.

Most participants were able to absorb most of the material (and were happy to fill any gaps by reviewing materials in their own time) but our observations were that there was technical than people needed in order to surface the key issues and discuss their views. The volume of material contributed to a significant minority feeling overwhelmed, and testing their understanding through online quizzes may have added to a feeling that sessions were seminars or classes rather than deliberative discussions in the first few weeks. A decision to narrow the breadth of the issues covered would have impacted the achievement of the objectives, but the technical details could have been slimmed back or provided for review as homework. This would have freed up more time for group discussions during the second weekly sessions (c).

**Creating a warm and inclusive atmosphere in online groups needs additional efforts to create a sense of cohesion and ensure that all voices are heard and that participants are in dialogue with each other, not just through the facilitator.** It would have been helpful to create an expectation that all participants should have their videos on – while recognising that for inclusion reasons it is not possible to insist if people are more comfortable with the cameras off - so that limited opportunities for eye contact and reading body language were not lost. For future dialogues it would be useful to consider whether the benefits of video recording all small group discussions (with the implied permission for those that do not want to be filmed to turn

their camera off), outweigh the benefits of simple audio recordings when it comes to transcribing and capturing participants' inputs. In order to prevent a few individuals dominating in a few small groups (in Liverpool and Port Talbot) it might have been helpful to mix up the small groups within each location or allocate them to the most experienced facilitators.

**The need to create shared expectations for how the Zoom chat can be used.** Participants were able to contribute their views through a variety of means including via the chat function. During the small groups this proved a valuable way for quieter participants or those with internet problems to contribute. During the week 3 session c) some participants used the chat function to make comments on specialists presenting or answering questions in plenary. Some of the comments were expressed in a way that came across as hostile compared to how people tend to express themselves verbally face-to-face in the room or out aloud on Zoom. While this only related to a very small number (4-5) individuals and may have benefits in allowing them to express their opinions more honestly than they might otherwise have done so, the experience felt quite uncomfortable for the specialists on the receiving end. The lead facilitator was skilful in rephrasing questions in a more neutral way and reminding participants to be respectful. A lesson for future dialogues is that it would be helpful to work out the ground rules with participants so that the chat function can be a useful channel for making their voices heard but supports the principle of treating all participants – including specialists – with respect.

**Asking facilitators to present technical information to their small groups is not the best use of their role or skills.** At this early stage of testing what works online the delivery contractors chose to involve a large pool of small group facilitators to present much of the technical information to their small groups including on the key elements of CCUS, the different CCUS applications and case studies on CCUS clusters. This was expected to widen the variety in online delivery methods. However, facilitators had a difficult dual role in presenting technical information at the beginning each small group session, and then trying to create a space for real dialogue amongst participants. The blurring of lines between roles did not make best use of facilitators skills and made it difficult to pace the sessions with the result that some small groups ran out of discussion time. As a result not all groups managed to cover all of the dialogue questions equally, although enough did for the findings not to be unduly affected. For future online dialogues it would be more effective to separate out the information sharing tasks. Technical material would be better presented by specialists (either live on the Zoom or on pre-recorded film) or by a well-briefed lead facilitator who has been closely involved in designing the stimulus materials.

**Specialists played a useful role but could have been used to fuller effect.** During weeks 1 and 2 specialists played a useful role in answering questions in plenary and in revolving around small groups to answer questions. Their role did not extend to presenting stimulus materials. Due to last minute COVID-19-related cancellations specialists were not always available to each small group and they either had to wait for until a specialist was available or for questions to be addressed in the next session. Most participants accepted this and felt that

specialists played an important role answering questions and were grateful for the discussions they were able to have with specialists. However, a few participants became sceptical of the input provided by experts. This is a dynamic that was also playing out in societal discussions around scientific advice more generally during the pandemic. In some cases, even where specialists gave what seemed to be factual answers to safety concern questions they were perceived to be defending CCUS. *“When specialists have been questioned and asked to provide explanations, they have been presented as one-sided at times.”* I public participant, week 3

For future online dialogues it would be useful to build in a process for collating participants' questions in their small groups and putting the most frequently asked questions to specialists in plenary. This would make best use of the specialists who are available and ensure that all participants heard the same answers. It would also ensure that facilitators did not fall into the role of answering questions when no specialist was available.

**Case study scenarios worked well but the role of the CCUS project specialists was difficult and perhaps set them up to be seen as very pro-CCUS.** Most participants found the case studies a useful way to explore what a project would look like on the ground. The materials and working through the different project stages of a CCUS project helped participants think through what the issues and opportunities might be in a specific area and wider societal views. This scenario approach helped them to think about wider societal issues and their underlying principles that should govern the roll out of CCUS at national or local level. CCUS cluster specialists were briefed by the Traverse team not to advocate strongly for their projects and were just given a 5-minute session to present their case study: they were then assigned to answer questions in small groups looking at case studies from other areas. Nevertheless, some participants reported in evaluation feedback that they were very pro-CCUS. *“Talks from industry experts made me more sceptical because they were very one-sided and made me more questioning of the whole process.”* I public participant, week 4

Views on these specialists and the projects they presented may have coloured the views about specific projects, but overall they helped participants express the emerging principles and particularly the need for proof that CCUS is safe, that long terms impacts will be monitored by an independent body and that the costs and selection of project developers will be transparent.

**Introducing alternative voices during the process.** The design team had taken the decision not to introduce a range of opinions (rather than factual content) on CCUS until the final session when they felt participants would have formed their own opinions about CCUS. Three specialists contributed via a pre-filmed talking heads video. The selection of a pro CCUS (the CCSA), a more neutral organisation (Climate Change Commission) and one more sceptical of the role CCUS needs to play (WWF) was intended to give a spectrum of opinions. Participants enjoyed hearing from CCC and particularly from WWF, whom they considered to be a trusted neutral voice. Our analysis suggests hearing alternative voices at this stage of the project did not change the views of the majority but may have influenced those in the middle including

both the groups who described themselves as broadly positive but with some remaining concerns or broadly negative with remaining concerns.

**Many participants would have liked to hear alternative opinions earlier in the process.**




Ideally some participants would have liked to hear from those with lived experience (e.g., communities living near Norwegian CCUS clusters) or from NGOs known not to support CCUS. This would have been both logistically and financially possible online. *“I would’ve like to see opinions from parties on both sides; those who support/work within CCUS and those who oppose/are working with a sector that offers an alternative to CCUS.”* I public participant. However, the tight timetable and short sessions left little flexibility for bringing in new voices at the last minute. Instead BEIS provided links to other sources of information on Recollective and the OG co-chair reported on NGO views in a Q+A session. For future online dialogues it would be helpful to build in more time flexibility in both the overall timetable and the agendas for individual sessions so that the team can adapt designs once the process is underway and needs become clearer.

**Recollective proved a really useful tool for collecting individual thoughts, running repeat exercises and collecting evaluation data.** Participants really appreciated the platform as a chance to review materials, catch up if they needed to or review more in-depth materials in their own time. Online tools such as the My net zero Pathway slider and repeated questions on attitudes to national and local deployment of CCUS also generated useful contextual data for understanding differences in thinking on specific technologies, between locations. The individual reflections captured on the Recollective platform generated a depth of individual reflection material that was useful in supplementing areas covered more superficially in some small group discussions and exploring how access to specialists or additional information impacted on the participant journey. Effective use of an online platform therefore added real value to the dialogue and was particularly useful for this dialogue where understanding the similarities and differences in views between different locations was a central to the meeting the objectives. The use of Recollective did, however, add an unexpected volume of material for analysis and this had not previously been factored into the time or resources needed during the reporting stages. Using Recollective or similar online platforms should be considered as a useful element of future online or blended dialogue processes. This may require additional financial resources for subscriptions and staff time to manage the site and analyse the evidence.

**Bringing all participants from all five locations together for a final workshop was efficient, effective and inclusive and added real value to the process.** By the final, seventh, session participants were pleased to be able to meet individuals from other locations and were confident to represent the views from their own location. The session benefited from not having to cover any new technical information. This allowed facilitators to concentrate on the task of enabling all participants to contribute to the co-creation of ‘principles’. Participants were also happy to challenge each other’s opinions and. As a result discussions were livelier, with people building on each other’s points rather than directing all discussion through the facilitator. The findings that emerged reflected the opinions of the whole cohort and therefore

were more reflective of the UK population than if only a selection of participants had been able to participate, as often happens with a conventional face-to-face dialogue process. Meeting online made this possible both logistically and financially. The success of this final meeting suggests that future face-to-face or blended dialogues should consider whether there is value in running on final online convened workshop.

Table 5.1: Overall assessment against Sciencewise best practice principles

Principles		Assessment
<b>Focus on addressing agreed dialogue objectives</b>		<p>Participants were clear on the objectives and sessions were well structured to ensure that the core four were met.</p>
<b>Appropriate numbers and types of participants involved</b>		<p>On street and snowballing recruitment process delivered the expected diverse and inclusive mix of participants broadly reflective of the UK population. Slight under-representation of men and individuals from Black and minority ethnic backgrounds in Nottingham, where several recruits dropped out before or after the first session and over-representation of older people (&gt;60 age group) in Port Talbot.</p> <p>The group was also typical of the UK population in terms of a low starting knowledge of CCUS and observers reported that they seemed to represent a diversity of views on CCUS.</p> <p>The design, staged incentive payments and general interest in the topic contributed to high retention rates (89% attended all sessions) and conscientious engagement with homework (86% completed all tasks).</p>
<b>Respect for public participants</b>		<p>Attention to recruitment and tech support ensured that a diverse group were able to take part and pre-workshop training in how to use Zoom and Recollective ensured that all participants had the skills and equipment to do so.</p>

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		<p>We observed that facilitators treated all participants with respect: almost all participants agreed. Facilitators worked hard to create a warm atmosphere conducive to dialogue and made efforts to involve all individuals, including quieter/less involved individuals.</p> <p>By the end of week 1, almost all participants (100 of 105 respondents) agreed they were able to contribute their views and be heard.</p> <p>The large pool of facilitators (more than 20) required to cover all five locations in back-to-back sessions and it was not possible to provide complete continuity across small groups between all sessions. This lack of continuity and the choice of many participants to keep their cameras off (we observed up to half in some small groups) may have contributed to some groups taking several weeks to gel.</p> <p>By the later sessions most groups had gelled well and almost all participants agreed that they were able to make their voices heard. BEIS observers felt that the conversations were fruitful, the atmosphere was comfortable and that participants were able to contribute. “I was really taken by the atmosphere in the small group [Aberdeen] very easy and comfortable, felt that everyone was at ease.”</p> <p>“Really fruitful conversations. All very pleasant and polite to each other despite all having quite different views, from very positive in Aberdeen to more sceptical in Port Talbot and Liverpool.”</p> <p>“Participants seemed very comfortable, had a good rapport, said they were enjoying sessions and seemed to know each other quite well”</p>
<p><b>Fair and balanced dialogue</b></p>	<p>✓ ✓</p>	<p>Stimulus information was rigorously reviewed by the OG and core team who considered it accurate and consistent. After the first session the majority of participants (of 97 respondents) agreed that</p>



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		<p>information they had received was clear and easy to understand and a similar number felt that the Q+A sessions with specialists were helpful in providing balanced answers to their questions</p> <p>However, some participants questioned whether specialists generally presented a wide enough range of views and whether the CCUS cluster case study specialists (who presented 5-minute overviews) were impartial. Several described them as “salesmen”.</p> <p>Many participants asked for more information on safety, environmental impacts and costs. BEIS and specialists made best efforts to address this with links to additional sources posted on Recollective and the OG co-chair briefed to answer outstanding questions in a Q+A session during session 3c).</p> <p>A lack of available information on costs or even fairly neutral responses on safety concerns led a few participants to describe specialist responses as vague, evasive or dismissive of potential risks. One participant who described themselves as quite positive about CCUS commented “One thing I feel it’s all positive, no one is saying any of the negatives about it and I’m sure there must be some.” In contrast another participant reported “I had a bit of one-on-one time with a subject specialist who made himself available to answer some questions which has reassured me regarding how I will be affected by a carbon capture unit being installed in the local steel manufacturing industry”.</p>
<p><b>Sufficient time and space for deliberative discussions</b></p>	<p>✔✔</p>	<p>Total online time was sufficient overall – and the majority of participants reported that the amount of time felt about right - but we observed that individual 90-minute sessions felt too short when facilitators were both trying to both convey new information and generate small group discussions.</p> <p>The early evening and later sessions both covered the same material (except for session 3c where the earlier group covered 3 and later group covered 2 case studies) but earlier sessions felt more rushed and sometimes timed out before covering all the material (e.g. industrial CCUS applications) or case studies in equal depth. This did not affect the overall findings as the analysis</p>

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		<p>was able to also draw on participants' individual homework reflections on Recollective. "Time seemed to go very quickly at one point just getting into the nitty gritty when the breakout group ended." I BEIS Observer.</p> <p>Later evening groups felt less rushed, partly due to smaller overall number and groups and partly because facilitators had learnt lessons about pacing the sessions and prioritising prompt questions or because there was less material.</p>
<p><b>Sufficient but sometimes too much information to inform discussions</b></p>	<p>✔ ✔</p>	<p>Animated videos and short talking-heads videos worked well online. Demonstration videos (such as a chocolate demonstration of porosity concepts) stayed with some participants but cut into valuable discussion time and might have worked better as homework.</p> <p>Materials which would have worked as wall posters or carousels f2f (where people could take in as much detail as suited them) were translated into PowerPoints that included more technical detail than participants needed to surface the issues.</p> <p>The approach in the early sessions presented a lot of information and tested participant's understanding through quizzes. Although this was not the intention, the approach created a 'deficit model' feel (that participants needed a detailed understanding of the unfamiliar technology in order to develop their own views on it).</p> <p>A substantial minority found this overwhelming and in their feedback talked about 'lessons,' 'classes' and 'seminars'. Several worried that important information was going over their heads or that they needed to catch up offline. "... a lot of the information we are given is quite hard to digest making my immediate feedback in the breakout groups tricky, as I need time to digest it all. I feel that there are a lot more folk included in the public dialogue who have a better understanding of it than myself and this makes my contribution feel limited." And "I'll have to do more work on my own to understand the technologies.'</p>

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		<p>But most participants coped with the breadth and depth of what they were learning and took the opportunity of gaps between sessions to look at additional resources (jargon buster and links to other sources) on Recollective or to do their own research. An observer felt this was a real benefit of sequencing of online sessions. The majority of participants reported that Recollective platform was a useful way of reviewing what had been covered and catching up on anything they felt they had missed. “I was pleasantly surprised by the level of knowledge of participants [by week 4} and their ability to talk freely and confidently on what is a very technical subject. Overall, I found it very interesting experience from an observer point of view.” I BEIS dialogue observer.</p>
<p><b>Quality facilitation but a challenging dual role</b></p>	<p>✔✔</p>	<p>We observed some very good facilitation and the majority of participants agreed that it was professional, independent and effective.</p> <p>However, the dual role of sharing technical information and creating the conditions for lively discussion around a set of prompt questions and this sometimes led to discussions timing out.</p> <p>During the initial small group discussions most of the discussion tended to be through the facilitator who called on individuals (many of them with their cameras off) in turn. During the later conversation became more natural with shared dialogue helping to explore the issues. After week 2, almost all participants agreed that working in small groups had helped them to explore their thinking about CCUS technologies. For the later sessions BEIS observers noted that “Relationships between facilitators and their large and small groups seemed easy, open and comfortable.” and “Not all the discussion was through the facilitators – they did pick up on what each other said and have a real conversation.”</p> <p>The facilitator: participant ratio (1:6-7 for the first six sessions and 1:8 for the final session) allowed all those who wished to do so to contribute. Group sizes for the final session felt too big for the length of the session, but this was a trade-off in getting a good mix of participants across the five locations.</p>

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<p><b>Learning from practice but limited scope for adaptation</b></p>	<p>✓ ✓</p>	<p>The overall design incorporated helpful learning about best practice moving online and included online sessions to pilot materials, but discontinuity in the core delivery team, the fact that the lead designer was not closely involved and tight timetables between back-to-back sessions limited the opportunities for incorporating learning between sessions or to bring in new/alternative perspectives during the process. However, the OG chair did step in to address outstanding questions and respond to questions about the balance of materials during week 3.</p>
<p><b>Recording the dialogue</b></p>	<p>✓ ✓ ✓</p>	<p>Transcripts (video recordings) and simultaneous notetakers generated a huge breadth and depth of material. Notetakers played a key role in one plenary feedback session but the ease of online recording meant this role was not really needed for all sessions.</p> <p>More individuals turned off their cameras than we have observed in other online processes and this may have been due to the choice of video rather than audio recording.</p>
<p><b>Capturing agreement, disagreement and uncertainty</b></p>	<p>✓ ✓</p>	<p>The wide choice of routes for feed in views (verbally, via the chat function, polls and individual homework) effectively captured agreement and disagreement between individuals, geographic groups and the whole cohort. This was particularly important in allowing cross comparisons between locations.</p> <p>Sharing the outcomes of small group discussions via a virtual whiteboard (Mural) which fed into plenary and homework tasks and then material for later sessions was a really effective design element for co-creating 'principles' for the roll out of CCUS. This effectively replicated a flipchart prioritisation exercise or show of hands that facilitators might have used in a face-to-face meeting. It worked well to help co-create a set of 'principles' which everyone recognised and felt some sense of ownership of by the end of the final session.</p> <p>In a few small groups a dynamic where a small number of more confident individuals – who tended to be those who had done their own research between sessions – tended to dominate discussions.</p>

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		This sometimes had an observable ripple effect within a small group with quieter individuals tending to agree with them, although they also took the chance to record their own views in some detail on Recollective. “Facilitator made real efforts to involve everyone. But gender dynamic with discussion dominated by 3 men, and women mainly just agreeing with what they said.” I Observer.
<b>Analysis of dialogue results</b>	✓ ✓	The volume of material generated via the mix of methods was far greater than for a face-to-face dialogue. The timeframe for coding and analysis was too tight to utilise it fully in the first drafts which lacked sufficient analysis, although the results were used to full effect in later drafts. The OG co-chairs suggest that future Sciencewise invitations to tender need to make it very clear what level of analysis and reporting will be expected so that contractors can propose realistic budgets and timeframes.
<b>Clear and coherent reporting of results with clear links between data and conclusions</b>	✓ ✓	First drafts lacked a clear narrative or detailed analysis, but the final draft and PowerPoint were of very high quality and used the evidence well to illustrate findings and provide useful insights. Lack of an agreed process for collating and moderating feedback from BEIS, Sciencewise, UKRI, the evaluator and the OG made the amendment process complicated and time-consuming.
<b>Participant involvement in reporting the dialogue results</b>	✗	Design of sessions (90 mins) and size of groups was not conducive to providing feedback from small groups to plenary sessions.
<b>Sharing the dialogue results and final reports with those involved</b>	✓ ✓	Emerging findings such as the ‘principles’ were shared with participants for them to be refined over several sessions. A number of participants expressed an interest in seeing the final report. The link to the full report and executive summary was shared immediately after publication.

## 6. Governance and project management

This section describes the effectiveness and efficiency of the governance and project management arrangements in terms of the how well the OG and project management and support arrangements have worked.

### 6.1 Overview

A large and broadly representative OG brought together representatives of government, regulators, the CCUS industry, academics and a few NGOs who consider themselves open to the option of using CCUS in some settings. Despite the teams' best efforts, it proved difficult to engage those known to be more opposed to CCUS (although their views were brought into the process via interviews conducted by an OG Co-chair). It remained difficult to involve these voices as specialists in the dialogue workshops. During the initial stages, almost all OG members contributed actively to the framing, choice of locations and review of stimulus materials. As the dialogue moved online and the timeline was extended, about half remained closely involved – contributing as specialists and attending final dissemination events - but some became less engaged. Members from the Devolved Administrations are interested in hearing from BEIS on next steps once these have been finalised.

The project management split of roles and responsibilities between delivery contractors and commissioners was typical of a Sciencewise project. Both teams experienced changes in key staff during the COVID pandemic. Inevitably this caused some continuity issues for a project which already faced a steep learning curve in moving the process online, analysing the considerable evidence collected from the online process and drafting a high-profile final report. The final drafting process involved many iterations and some project slippage. However, the final report and presentation pack were of very high quality with an overall narrative and granularity about specific technologies and locations which allowed a smooth internal sign-off process within BEIS.

### 6.2 Oversight Group

The oversight group was relatively large (17 including the two co-chairs) with good representation from government, industry, academics, a Trade Union, and the Climate Change Committee. However, despite the considerable efforts of BEIS, Traverse and Sciencewise, it proved difficult to interest more dissenting voices in formally being part of the process. Of the half dozen national environmental NGOs and think tanks approached, three – Worldwide Fund for Nature (WWF), Green Alliance and E3G – chose to take part. Other NGOs who were approached did not wish to be on the OG. For BEIS, the academics and NGOs that took part, a key concern was to ensure that the dialogue would be presenting a nuanced view and in the wider context of net zero ambitions rather than advocating for CCUS. The views of the NGOs who chose not to take part in the OG were captured in the design through early stakeholder

interviews carried out by the OG co-chair and Traverse. The co-chair reported back to the second OG meeting and other members of the OG interviewed for the evaluation really appreciated hearing these views and felt it helped in the overall framing. However, as noted in section 6, it would have been good to have been able to draw on more sceptical voices as specialists in the room. At the early stages the lack of representation from planning experts was also considered a gap, but this was filled through the expertise of the Environment Agency representative (who also contributed as a specialist in this area during week 3 sessions).

The OG was very effectively co-chaired and efficiently coordinated and supported by the BEIS team. Initially convened for 9 months and three meetings, this was extended as the process moved online and the reporting phase was extended and five meetings took place. Almost all OG members attended the first two meetings either in person or via phone. Most took the opportunity to review the stimulus materials in detail and those interviewed for the evaluation appreciated the efforts made by Traverse to run interactive workshops to review the materials. All those interviewed felt that they had been able to shape the overall framing of the project and that their comments had been taken into account to ensure that the materials were accurate, consistent, and balanced. Several interviewees felt they had been able to contribute to the clarity of the materials and avoiding a polarised for or against CCUS approach.



### Box 6.1: Oversight Group involvement in framing the dialogue process and ensuring accuracy and balance

- **The first OG meeting (face to face 14th November 2019)** considered the objectives, approach and framing of the dialogue. As noted in Section 1, the OG members were able to have a real influence on the choice and number of locations, the breadth of technologies considered and the definition of a 'local' area to include pipelines and storage sites. The OG members also made useful inputs to the literature review and how to fill gaps via conference calls with the Traverse team on 10th and 14th January 2020.
- **The second OG meeting (12th February 2020 half day face-to-face facilitated workshop)** offered members a hands-on and meaningful opportunity to review and test out stimulus materials and proposed discussion topics appreciated by those who were able to take part in person. Attendees made many helpful comments and felt that the facilitators had taken them on board and materials were much improved as a result before being piloted with public participants.
- **At the third OG meeting (online on 6th August 2020)** the OG was informed of BEIS and Sciencewise decision to relaunch online and discussed the implications for the design, materials and participant recruitment. This proved a useful moment to rekindle enthusiasm amongst the members who attended and to secure commitments to take part in the online workshops as specialists. Four members contributed as specialists via pre-recorded videos shown in weeks 1 and 4 or as specialists on safety and risk and planning for CCUS cluster project roll out.
- **At the fourth OG meeting (120 minutes online on 10th September)** the OG again reviewed the online stimulus materials for balance and effectiveness in small, facilitated breakout groups. The detailed comments made to framing the case studies were particularly helpful to the core team.
- **At the fifth OG meeting (online 24th November)** to talk through initial findings and what the OG would want to see covered in the report (views on specific CCUS applications and by different locations), participants' starting knowledge, how views changed over time and why some became more negative, the concerns they had (on safety, costs and BECCS) and why, and the types of information (and messengers they heard it from) impacted views.

Four OG members contributed as specialists either via pre-recorded video (WWF and CCSA) or in person during the dialogue workshops. The BEIS secretariat managed to maintain momentum with the core group to the fifth and final OG meeting at the end of 2020, but as the drafting process extended into Spring and then Summer 2021 only the co-chairs were involved in reviewing drafts. By the end of the project, a number of individuals had moved jobs or had less time available. Nevertheless, more than half the original OG members signed up to attend the final CCUS stakeholder dissemination event and six attended on the day. As noted in Section 3, several of the academic OG members have already been involved in disseminating

the findings and using them to inform their research. Representatives from the Devolved Administrations will be kept updated by BEIS on next steps.

### Box 6.2: Views of OG members on the value of taking part

*“Our OG group went through a thorough and well-balanced advice, external challenge and appraisal process to help Traverse and the Department balance and frame the information and procedures used, such that participants could get to grips with the technical issues and debates involved. “*

*“The discussions at the first OG were really good and we were able to frame it in the net zero context and roll back from industry tendency to concentrate on the opportunities of CCUS.”*

*“Thought the report was really good and really enjoyed the dissemination workshop.”*

*“The team handled shifting online really well, a big learning curve and not an easy task – useful to see that you can do social research online and that some people find it easier to participate.”*

*“BEIS were very welcoming – a good relationship. Found it really valuable to take part.”*

## 6.3 Project Management

The allocation of design, delivery and drafting tasks between commissioners and contractors was fairly typical for a Sciencewise co-funded dialogue. The contractors were responsible for carrying out a literature review, interviewing stakeholders, developing the dialogue design and stimulus materials, recruiting participants and specialists, drafting the final report, and presenting findings to policy and stakeholder groups.

The BEIS team were responsible for convening and supporting the OG, liaising with or making first contact with stakeholders around the CCUS cluster projects, reviewing stimulus materials, contributing to a jargon buster, putting together a set of references for further reading and collating questions that could be answered by specialists. They also led a number of rounds of reviewing the final report, collating, and moderating comments from other team members and reviewing the policy briefing slides. The BEIS team organised the final dissemination events in order to allow these to reach wider stakeholder audiences. The BEIS team spent longer than expected on some of these tasks, including identifying stakeholders and specialists and reviewing many iterations of the stimulus materials, draft dialogue report and slide deck for disseminating findings.

The COVID pandemic required a rethink of the project delivery at the same moment as a turnover in staff in both Traverse core team (change in project director and project manager) and BEIS (project manager). By this point the team had a full face-to-face design and suite of

stimulus materials to draw on but the churn of personnel inevitably caused some continuity issues. The incoming teams faced a steep learning curve in getting up to speed with the content and making a large complex public dialogue work online. Traverse were able to draw on their experience of running smaller online dialogues during early lockdown and apply the lessons learnt to the logistics of recruitment, addressing digital exclusion, convening Zoom meetings and hosting an online sharing platform. However, the loss of knowledge about how and why materials had been designed in the way they had to reflect the literature review, BEIS and OG objectives made the pivot to online more challenging.

The role played by the Sciencewise team and the Traverse dialogue design lead - both with long experience of public dialogue and climate change issues – proved really important in providing continuity and their inputs on both how to meet best practice standards and on content were very much appreciated by the BEIS team. The evaluator also stepped into a more proactive role than usual in commenting on process design, stimulus materials, and draft reports and presentations. This may have led to some confusion about the evaluator role and have contributed to the contractor's workload in dealing with feedback from many directions.

There was a further setback when the Traverse dialogue design lead also moved on at the end of 2020, leaving the task of drafting a high-profile and complex report to a team with limited experience of preparing public dialogue, as opposed to social research reports. Based on the lessons learnt (section 5) the agreed timetable for reporting once the dialogue went online proved unrealistic in practice, due to the large unforeseen volumes of data generated through the online process which needed to be coded and analysed. Ideally the contractors would have highlighted this issue to the commissioners at an earlier stage and asked whether there was scope to relax the deadline to allow enough time for analysis and reporting. The first drafts of a demonstration chapter and the overall report did not really put the citizen voice at the heart of reporting and lacked a clear narrative, robust analysis or the granularity of findings to meet the dialogue questions. This draft and the next few iterations resulted in many comments from the commissioners and the evaluator and subsequent versions became more muddled. The decision by Traverse to bring in an experienced editor and the offer by BEIS to relax the deadline allowed time for the data from transcripts and Recollective to be revisited and better reflected in the findings and narrative. The resulting analysis was described by the OG co-chairs as meeting academic quality standards.

The final draft was of very high quality, well-written and designed. It met the commissioners' quality standards for social research and did full justice to the process and participants' contributions. The quality of the final draft contributed to the relative ease and speed with which the BEIS team was able to take the report through the internal ministerial sign-off process. The clear narrative also enabled Traverse to prepare an excellent slide pack summarising the findings which stakeholders reported findings very interesting, clear and insightful. Feedback from the commissioners and stakeholders suggest that – despite the slippage - the report is still timely, adds value to what was previously known about the public's views on CCUS and as noted in Section 3, the findings are already being considered alongside perspectives from other stakeholders.

## 6.4 Lessons learnt

- The size of the OG enabled most interests to be included and for the team to benefit from helpful advice in the early part of the process when framing, accuracy and balance were really important.
- Although it proved difficult to involve those with opposing views inside the governance of the project, there would still have been value in involving them as specialists in workshops as participants were keen to understand these views. As a compromise their views were presented by the OG chair during week 3.
- OG members remained fully engaged for the expected length of the project but a few fell off once the timetable slipped. An additional (fifth) short meeting provided an overview of the emerging findings and helped identify the issues that OG members wanted to see covered in detail so helped to structure the report. The long intervening gap (8 months) between this meeting and final publication of the report meant that some of the momentum in disseminating findings was lost, although the BEIS team was able to generate interest in the final CCUS sector stakeholder event which half the OG members signed up to attend.
- An online dialogue of this size and complexity generates a huge amount of material. This requires realistic agreed timescales and sufficient staff time allocated for coding, analysis and drafting stages. It is important that future online dialogue business cases and procurement processes specify the level of analysis and style of reporting expected and allow sufficient time and resource for carrying out the analysis, and if there is a risk of project slippage this is raised at the earliest point possible.
- It would also be helpful for processes to build in a stage for the commissioners to work with the drafting team to review the coding and emerging findings and to keep the structure of the report under review.

## 7. Costs and benefits

### 7.1 Financial costs

The original cash budget for both the public dialogue delivery and evaluation at start of project was a combined £226,876.25 plus VAT. This was split 40:60 between BEIS and UKRI with BEIS also committing £40,000 of time in-kind (bringing the total financial and in-kind split to 50:50). The initial budget would have delivered a process involving up to 96 public participants in four locations over two full weekend days. There was then an agreed uplift to the delivery contract – split 50:50 by BEIS and UKRI - to include a fifth location (Liverpool to cover the Merseyside CCUS cluster) and increase in the total number of participants. This took the total combined budget to £246,874.25 plus VAT just before the pandemic (taking the actual cash contribution split to 42:58).

Once the decision was made to move online there were some savings from recovered venue costs and planned staff travel and subsistence, but these were more than offset by platform costs (licence for Recollective) for staff time for creating the online space for participants; redesigning the process and amending stimulus materials; preparing short talking heads films as stimulus materials; adding facilitators to achieve ratios of 1:6-7 participants; providing technical support before, during and after workshop, and an increased thankyou payment to incentives participants to attend all seven sessions<sup>15</sup>. A further uplift of £28,195.75 plus VAT was therefore agreed to cover both the dialogue delivery and evaluation budgets. The total financial budget for the online dialogue was therefore £275,070 plus VAT of which BEIS paid £118,629.03 plus VAT and UKRI paid £156,440.97 plus VAT. Again the uplifts were divided 50:50 so the coverall ratio for the cash contributions crept nearer to equal.

The additional slippage beyond January 2021 was on the basis of a no cost extension. The additional time spent by team members in redrafting and review and regular team meetings meant that both the contractor and evaluation team put in considerably more time in-kind than budgeted for.

### 7.2 In-kind contributions

The major in-kind costs were the time spent by the BEIS project management team and Sciencewise teams over and above their planned contributions and the time invested by OG members throughout the 20-month process and specialists and BEIS observers who took part in individual public dialogue workshops.

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<sup>15</sup> Incentives were weighted to encourage participation in all sessions, including the video calls and online platform activities. Workshops were incentivised at £25 per session, including a £50 bonus for attending every session. Those participants who completed all homework activities received an additional £75 whilst those who did not complete all activities but who completed at least one received £37.50. In addition, participants received £20 for attending a tech-check session.

## BEIS team

The business plan anticipated the BEIS investment in core management team would be £40,000 for the tasks and timing agreed during commissioning in mid-2019. The extension of more than a year to September 2021 means that in practice the team probably put in half as much time again. Based on a conservative estimate the time for the project manager and other team members to attend regular meetings and reviewing report drafts at one additional day a week over a year suggests an additional cost of about £24k (based on an opportunity cost of £500/day).

The large number of short online sessions and number of small groups in each created many opportunities for BEIS staff to take part as observers without disturbing the participants. In total some 26 BEIS staff attended at least 30 workshop sessions as observers: this was equivalent to about six days (or a further £3K) in staff time. The opportunity for so many individuals to participate without incurring the time, travel and subsistence costs normally associated with attending a meeting in Aberdeen, Liverpool, Port Talbot, or Teesside was a considerable benefit and meant that many of the BEIS staff working on net zero and CCUS issues got a flavour of what the public think about CCUS and what a public dialogue can deliver. Almost all those interviewed enjoyed the experience and took away insights that will be useful to their work.

## Oversight Group

Almost all OG members attended the first two face-to-face meetings (equivalent on average to a full day of meetings plus travel time) and then on average spent a further day reviewing materials, being filmed or taking part as a specialist, attending online OG meetings or attending the final dissemination event. Overall this was equivalent to at least 28 days of professional time input. Again based on an opportunity cost of £500/day this would be equivalent to £14k of in-kind contribution. The OG members interviewed for the evaluation considered this investment commensurate with what they had got out of the process. Several noted that holding the meetings online had been very time efficient.

## Specialists

The project involved a large number of individual specialists who each contributed an average of at least half a day in previewing stimulus materials, being filmed for talking heads videos or attending 90-minute workshops, pre-briefings or answering questions raised by participants between sessions. Conservative efforts of their time inputs would be 10-12 days in total equivalent to £5-6K at an opportunity cost of £500/day. Had the process not been online it would not have been possible to recruit as many specialists and, even if they had been based in the locality of the projects, the time inputs for travel and being involved beyond their 90-minute sessions would have been considerably greater.

Total in-kind contributions for BEIS, the OG and specialists are estimated at about £45-46k (over and beyond the original £40k committed by BEIS as its in-kind commitment) equivalent to another 15% on top of the initial project budget. However, once the online savings in travel



time and expenses for BEIS, OG and specialists were taken into account this is less than for most conventional face-to-face dialogues and a real benefit of an online process.

## 7.3 Economic benefits of the dialogue

Government has announced an intention to invest up to £1 billion in supporting CCUS and the ambition to have CCUS in a minimum of two clusters by the mid-2020s, with another two in place by 2030 at the latest, and an ambition to capture at least 20–30 MtCO<sub>2</sub>/year by 2030. [Multiple clusters](#) are already at different stages of working to develop proposals, find funding and start the public engagement and spatial planning processes. At least three of the clusters (in Northeast and Northwest England and Scotland) have started to undertake some public engagement activities.

However, little is still known about the absolute costs of the individual cluster projects, or the relative cost effectiveness of CCUS compared to other net zero pathway approaches (i.e., the abatement cost curves) or how much of the overall cost will be borne by the taxpayer and how much will be contributed by the partners including the polluters (i.e., power sector or industry partners). The dialogue successfully highlighted the general principles for how the participants would like to see CCUS rolled out. These included that it should be affordable; that the procurement process should be transparent; and that there should be substantial benefits to the hosting communities in terms of safeguarding or creating new jobs and business opportunities. These findings resonated with industry stakeholders. “We need to find a meaningful way to talk about costs of CCUS in the context of other investments and costs of doing nothing. I recognise it’s a frustration [for public participants] but there is not yet an agreed way to approach this.” I CCUS project specialist.

CCUS cluster projects that go ahead will quickly start to deliver construction jobs and start to attract green investment contributing to the building back better and levelling up agendas in the cluster areas. For instance, according to its project website [HyNet](#)<sup>16</sup> is expected to support up to 6,000 permanent jobs at its peak and contribute £17 billion to the local economy by 2050. If developers take on board the findings of the dialogue and consult meaningfully with local communities about how to maximise local benefits and provide the necessary training, these jobs could be opportunities for local people.

## 7.4 Lessons learnt

- The COVID pandemic required an extension to the budget as the dialogue shifted from face-to-face to online. Part of this reflected costs already incurred in the planning stages. But even if no costs had already been incurred the potential savings in venue, catering, travel and subsistence costs for face-to-face meetings would have been offset by additional contractor staff time required for pre-planning, facilitator ratios, filming of stimulus materials, tech support and use of online sharing platforms. The huge amount

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<sup>16</sup> <https://hynet.co.uk/>



of data generated from online processes also requires more time to process and for reporting. It is likely that future online or blended (mixed face-to-face and online) processes will require at least the same budgets as face-to-face dialogues.

- Given the elapsed time during the drafting process the delivery teams, BEIS, Sciencewise and the OG members also put in more time in-kind than planned for.
- A clear benefit of moving online was in enabling more specialists, OG members and BEIS observers to take part in the workshops than would have been logistically or financially possible face-to-face. The reduced time commitments and travel costs made this possible. Likewise, it enabled all participants from the five locations to come together in a final workshop: this added real value to the principles which emerged.

## 8. Conclusions, Lessons and Recommendations

### 8.1 Conclusions

This was a large complex public dialogue with over 100 public participants, five locations, 20 specialists and 13 online public workshops sessions. The subject matter covered the net zero policy context and the technical options for using CCUS technologies in general and in four prospective CCUS clusters around the country. Even as a face-to-face process, the dialogue would have been contentious due to concerns amongst the public about CCUS as highlighted by the Climate Assembly UK.

The dialogue was made more complicated by the delays caused by the COVID-19 pandemic and turnover in the core teams of both the delivery contractors and the commissioners at the point the dialogue moved online. After some slippage during the drafting process the final dialogue report and executive summary were of high quality and published with a foreword by the BEIS Minister. The dialogue objectives were well met. The findings gave BEIS and wider stakeholders the deeper understanding that they needed of public attitudes to CCUS as part of a net zero strategy and specifically a better understanding of the views of those located near to prospective CCUS clusters. These were explored in contrast to the views of individuals that live far from prospective CCUS clusters. The dialogue process generated a useful set of 'criteria' or principles that encompass the participants' aspirations and concerns for the capture, transportation, and storage of carbon, and how they would like to see these applied to any future CCUS projects. The findings are already being considered by BEIS in ongoing policy development and proving useful to CCUS sector stakeholders.

### 8.2 Lessons learnt and recommendations for future online dialogues

The dialogue was a steep learning curve for core team and generated a number of lessons for future online or blended dialogues.

- **Weekday evening meetings worked well** and both time slots (6-7.30 and 8-9.30pm) were equally well attended. During the COVID context, participants seemed happy to attend seven short sessions within a four-week period. In more normal times, the complexity of the timetable and number of commitments might be more challenging. Furthermore, 90 minutes felt short for deliberative sessions but could not have been extended within the back-to-back format of running all locations in a single evening. There would likely be budget implications for running longer sessions even if there were fewer sessions overall.

- **Online design can offer participants more choice** in how they get involved including small group synchronous deliberation (verbally, via the chat function and polls) and asynchronous deliberation (through homework tasks and online tools). Using an online platform (Recollective) added real value as a virtual repository for materials, a space for participants to undertake reflective tasks and for collecting evaluation feedback. Quieter participants were able to make considered contributions at their own pace.
- **Good tech support** before and during sessions was key to online meetings working smoothly and ensuring that the participants who were recruited were fully able to use all the digital tools.
- **Online stimulus materials** cannot be expected to convey the same amount of information as would be possible in the room via wall posters, carousels, handouts or practice exercises. Materials presented as PowerPoints need to be slimmed back and fully accessible when viewed on smaller screens. Pre-recorded films and short animations work well online as do scenarios which help participants think through the issues and take a wider societal view. Making materials available for review on Recollective after the sessions was helpful to many participants. Given the volume of materials covered, some participants would also have valued the opportunity to review them in advance.
- **Homework tasks** such as the slider and rating questions generated useful (but not statistically relevant) evidence about the participants' journeys. This data helped provide context for the qualitative findings and more granular evidence about what underlay views in different locations and on specific technologies. This level of detail would have been difficult to collect from a face-to-face dialogue where people tend to put less effort into reporting back on homework tasks.
- **The design included some exercises** which had been designed to be fun and interactive from the face-to-face design. Practical exercises with balloons and chocolate bars had worked well in the face-to-face pilots but less so as videos during the 90-minute live sessions where they cut into discussion time. Some participants did enjoy these videos, and some remembered them weeks later. However, they would probably worked better either as a warm-up exercise in longer (2-2.5 hour) sessions, or for viewing as a homework task.
- **Capturing disagreement and agreement.** The use of outputs from small groups collated as homework prioritisation exercises and revisited in the final session which brought together participants from all locations worked really well to get a sense of overall priorities as these evolved. The resulting co-created a set of principles for the future deployment of CCUS was owned by the whole group and has been one of the most valued outputs from the dialogue.
- **Facilitation of online groups** needs additional skills and effort to create a sense of group cohesion and get participants in dialogue with each other rather than making statements through the facilitator. It took several weeks to build a sense of cohesion in the small groups. Less emphasis on asking facilitators to present technical information in small groups, and greater effort to create a friendly and informal environment on

arrival, provide greater continuity across sessions, and greater encouragement for participants to keep their screens on, wherever possible, could have helped.

- **The nature of online meetings** allows lead facilitators less opportunity to read the room and less flexibility to adapt timings or re-prioritise questions. Online sessions need to be even more carefully planned than face-to-face sessions, and probably need to be less ambitious and focus on fewer priorities in order to avoid the risk that some topics are not covered in sufficient depth.
- **Specialists played a useful role** in answering questions in plenary and in revolving around small groups. Their role could have been enhanced if they had been given more time to present the technical material in plenary and if sessions were structured to curate frequently asked questions (FAQs) from the small groups so they could be answered by specialists in plenary, giving all participants access to the same information. This would have required either longer sessions, an additional session or less material and information provided to participants.
- **A major benefit of online sessions is in allowing more specialists and observers** from the commissioning body to take part and OG members to attend meetings. The savings in time (a few hours compared to a full day and travel time) and associated travel costs encouraged many more individuals to take part. In theory, an online process also offers opportunities to bring in other specialists (including those with lived experience) at short notice, although for this dialogue the tight timetable and packed agendas did not leave much space for adapting once the workshops were underway. A downside for specialists is that they have less sight of the whole process and participants' journeys. This could be addressed by providing fuller briefing on the overall design and what participants have already heard so they understand how their inputs feed in.
- **Online dialogues** generate even more data than typical face-to-face processes both from a larger number of smaller breakout groups and individual reflections on an online platform. This needs to be recognised in the procurement process which needs to make clear the level of analysis and reporting style required and allow more elapsed time for analysis and contractor resource for coding, analysis and reporting in order to do justice to the evidence and the messages which emerge. Building in opportunities for the commissioners and Sciencewise to understand the emerging findings and agree the structure and style of reporting could also help to save time in drafting the report.
- **Good online or blended public dialogues** are unlikely to be less costly than face-to-face processes. The additional time for pre-planning, tech support, higher facilitator: participant ratios during meetings and the additional time needed to analyse the data and reporting the findings are likely to at least offset cost savings for venues, travel, and subsistence. However, in-kind contributions to cover time and travel costs of the OG, specialists and commissioner staff and are likely to be lower than for face-to-face processes.

# Annex A: Oversight Group membership and specialist contributors to the dialogues

## Oversight Group Members

Professor Nick Pidgeon (Co-Chair) *	University of Cardiff
Dr David Reiner (Co-Chair)	University of Cambridge
Matt Taylor	BEIS
Will Lochhead	BEIS
Dr Clair Gough	The University of Manchester
Annabel Hamid	Scottish Government
Margo MacIver	Scottish Government
Kate Hearnden	Welsh Government
Shirley Matheson*	World Wildlife Fund
Chris Littlecott	E3G
Roz Bulleid	Green Alliance
Liz Parkes	Environment Agency
Alastair Welch	DEFRA
Kristina Dahlstrom	Oil & Gas Authority
Lawrence Donaldson	Health & Safety Executive
Luke Warren*	Carbon Capture & Storage Association
Ian Macdonald	Shell/Oil and Gas Climate Initiative (OGCI)
James Smith	CCUS Council
Sue Ferns or Nick Kardahji	Prospect
Tom Glyn-Jones*	Environment Agency

\*Participated as specialists in events or in pre-recorded films

**Specialist contributors (in person and by video) to the public dialogue workshops**

Name	Organisation	Topic
Mike Hemsley	Committee on Climate Change	Net zero
Dr Aaron Goater	Committee on Climate Change	Decarbonisation
Chris Stark	Committee for Climate Change	Climate change and net zero
Indira Mann	Scottish CCS	Delivering communications for the SCCS research partnership
Professor Martin Blunt	Imperial College London	Petroleum engineering
Dr Samuel Krevor	Imperial College London	Multiphase flow and reactive transport properties of CO <sub>2</sub> and water in reservoir rock materials.
Professor Stuart Hazeldene	The University of Edinburgh	Carbon Capture and Storage
Dr Susana Garcia Lopez	Heriot-Watt University	Injection of CO <sub>2</sub> -SO <sub>2</sub> mixtures in geological formations for CO <sub>2</sub> storage.
Dr Julia Race	Strathclyde University	Pipeline and marine transport of carbon dioxide for CCS.
Dr William Joyce	Innovate UK	Industrial decarbonisation
Professor Peter Taylor	University of Leeds	Sustainable energy systems
Dr Hannah Chalmers	The University of Edinburgh	Energy storage and carbon capture.
Professor Nick Pidgeon	University of Cardiff. Co-Chair of the Oversight Group.	Risk assessment, perception, and communication. Public engagement with risk and technology and valuation of ecosystem services.
Tom Glyn-Jones	Environment Agency	Environmental planning
Kirsty Lynch	Pale Blue Dot case study (Aberdeen)	Communications Director

Chris Williams	Industry Wales case study (Port Talbot)	Head of Industrial Decarbonisation
Colin McGill	BP case study (Teesside)	Project director, net zero Teesside
David Parkin	Progressive Energy case study (HyNet)	Director
Luke Warren	Carbon Capture and Storage Association	CCS policy and CCS regulations – talking head film
Shirley Matheson	WWF UK (member of OG)	Climate change – talking heads film



## Annex B: Public Participant sample and evaluation feedback

	Ethnicity			Age			Socio Economic grades			
	White British	Black & minority ethnic	White non-British	18-30	30-60	>60	AB	C1	C2	DE
National average	80.5%	4.4%	4.4%	20.6%	50.8%	27.6%	15.9%	30.5%	20.1%	33.6%
Total sample	64.86 %	18.9%	7.2%	29.7%	47.7%	22.5%	21.6%	36.9%	18.1%	23.4%

### Average numbers attending all sessions, by characteristics

	Total recruited	Male	Female	Black & Ethnic minority or non-British (based on observation)	Age	Average responses to evaluation questions
Liverpool	24	12	10	>20%	As expected	22
Nottingham	24	8	12	Lower than expected	As expected	19
Port Talbot	24	10	11	>20%	As expected	18
Teesside	24	12	11	>25%	As expected	18
Aberdeen	23	13	11	>35%	As expected	21
Total		55	55	25%		98

## Evaluation feedback from public participants

### Week session 1st Oct 1a) (Zoom Poll)

Q1	I understand the purpose of this dialogue and how the findings will be used by BEIS	strongly agree	tend to agree	neither	tend to disagree	strongly disagree	don't know
	All locations (98)	60.2%	36.7%	3.1%			
		59	36	3			
	Liverpool (22)	12	8	2			
	Nottingham (19)	15	4				
	Port Talbot (18)	7	10	1			
	Middlesbrough (18)	8	10				
	Aberdeen (21)	17	4				
Q2	The information provided today was clear and easy to understand	strongly agree	tend to agree	neither	tend to disagree	strongly disagree	don't know
	All locations (97)	59.7%	37.1%	1.1%	2.1%		
		58	36	1	2		
	Liverpool (21)	8	12		1		
	Nottingham (19)	14	4	1			
	Port Talbot (18)	11	7				

	Middlesbrough (18)	12	6				
	Aberdeen (21)	13	7		1		
Q3	Q+A sessions with specialists were helpful in providing balanced answers to our questions	strongly agree	tend to agree	neither	tend to disagree	strongly disagree	don't know
	All locations (98)	60.2%	36.7%	3.1%			
		59	36	3			
	Liverpool (22)	12	8	2			
	Nottingham (19)	15	4				
	Port Talbot (18)	7	10	1			
	Middlesbrough (18)	8	10				
	Aberdeen (21)	17	4				
Q4	Was there anything that made you feel that couldn't take part fully in today's session? If so please tell us in chat so that we can help sort this out before next time. (98)				Yes	No	
					9.2%	90.8%	
					9	89	

**Week 1 session 1c) 6th Oct (Questions on Recollective)**

Q1	I found completing the slider task between sessions a useful way of thinking about net zero and CCUS issues in more depth (105)	strongly agree 35.2% 37	tend to agree 61.0% 64	neither 2.9% 3	tend to disagree 0.9% 1	strongly disagree	don't know
Q2	Working in small groups helped me to explore my thinking about these technologies (105)	strongly agree 49.5% 52	tend to agree 40% 42	Neither 8.6% 9	tend to disagree	strongly disagree 0.9% 1	don't know 0.9% 1
Q3	I felt able to contribute my views and be heard (105)	strongly agree 61.9% 65	tend to agree 33.3% 35	Neither 2.9% 3	tend to disagree	strongly disagree 0.9% 1	don't know 0.9% 1
Q4	The amount of time available for these discussions feels.... (105)	too long 5.7% 6	too short 3.8% 4	about right 87.6% 92	don't know 2.9% 3		

**Round 2 Session 2c) 20th Oct questions on Recollective (47 of 109)**

Q1	I am finding the Recollective site a useful way of reviewing what we covered in the Zoom sessions and catching up on anything I missed	Strongly agree 53.2% 25	Tend to agree 38.3% 18	Neither agree nor disagree 6.4% 3	Tend to disagree 2.1% 1	Strongly disagree	Don't know
Q2	The facilitation has been professional, independent, and effective	Strongly agree 61.7% 29	Tend to agree 31.9% 15	Neither agree nor disagree 6.4% 3	Tend to disagree	Strongly disagree	Don't know

Q3 How are you feeling about being part of this public dialogue process...?

I am enjoying it and learning too.

I am really enjoying taking part and hearing what advancements in technology are taking place.

Really great. I just hope any small input I make may help you see a perspective from some of the average public's point of view on this issue. So interesting and I am learning slowly as I go along.

I'm finding it very interesting. I did not know anything about it before I got involved in this.

Always good to hear different points of view, and to have questions answered by experts. I have enjoyed learning.

Sound. Although this week seemed to cover what was covered before slightly? Maybe it was to gauge how we felt after the learning material was rolled out and if this changed the perception of the subjects.

It is very interesting and I'm enjoying learning about something I'd had no clue about before.

I enjoy the dialogue and hearing the different points of view from the others in the group. Sometimes I learn quite a bit from just listening. It's getting easier to grasp the concept of what CCUS is all about but seeing it is believing it when it happens.

It's been an eye opener and very educative on carbon capture, I had heard a little about it, but this public dialogue has really put me in the know.

I am finding the sessions very interesting and I hope that our opinions will be taken on board and help to shape the future of CCUS implementation.... I am enjoying learning about the process of CCUS and I look forward to each session."

"Very much enjoying it! Learning so much and it's challenging me already over what changes I can make moving forward to support reducing carbon."

"I have found it very interesting and informative. I value the chance to understand better and learn about what is going on in our country and how we are aiming to address the big issue of climate change. It is vitally important to bring the public along with you and most importantly it should begin in early education so that the future generations are very well informed and understand these issues.

It's great to hear other peoples' ideas about this topic in an organized manner.

I am finding it interesting and provoking me into researching more about the subject.

I like being a part of something that's important to the environment.

It's quite interesting, funny some people remain silent.....Some folk really interesting.

Welcome the fact that I can listen and learn from other members of the group and also put in my views when needed.

I'm happy to be a part of it as I am learning new things every week

I'm enjoying the whole thing. I'm learning about all of this!

I have enjoyed it.

It's very informative and it's definitely expanding my knowledge further on both climate change/CCUS and processes. I also like how there are experts dotted about to ask them questions

I think it provides ample opportunity for voicing of concerns, also provides a platform for the pros and cons to be explained

A minority of participants were initially struggling with the content:

I did find BECCS and DACCS I think it was called went too fast for me. I have not quite grasped that yet. Think it was about Hydrogen ...

".... a lot of the information we are given is quite hard to digest making my immediate feedback in the breakout groups tricky, as I need time to digest it all. I feel that there are a lot more folk included in the public dialogue who have a better understanding of it than myself and this makes my contribution feel limited."

"It's getting easier to grasp the concept of what CCUS is all about"

"I think it's important that I do more research in time for the next session as today has admittedly had me slightly confused." (Chat)

"Found this breakout hard to follow" (in session)

"Going over my heads. very complex, don't feel I understand enough to answer the questions (PT and Liverpool small groups)

Some questioned whether they are getting both sides of the argument:

“One thing I feel it’s all positive, no one is saying any of the negatives about it and I’m sure there must be some.”

It is very informative although quite biased in favour of CCUS.

“We’d like the other side of the argument,” “it sounds like propaganda”, “It seems ridiculous” and “makes no sense”

Some found the structure slightly repetitive

“... this week seemed to cover what was covered before slightly?”

“The whole research could quite easily be condensed down - as the same points pros and cons seem to come up all the time. The answers received from the "experts" are poor.”

Several pleased that the public is being involved in making these decisions

“I just hope any small input I have may help you see a perspective from some of the average public's point of view on this issue. So interesting and I am learning slowly as I go along.”

“I feel encouraged that people have given the general public a platform to explain what the process is about and how it's done.”

“I am finding the sessions very interesting and I hope that our opinions will be taken on board and help to shape the future of CCUS implementation.”

“People in the UK need educating on this as it is so important moving forward that we understand the impacts of carbon and the future consequences. This can help influence people for change.”

“It’s a good feeling knowing I am helping shape the future of CCUS. Very positive!”

“It makes a change to be listened to as part of the public debate.”

“I am enjoying the process of using Public Dialogue as it gives me a way to provide Traverse and BEIS feedback on the sessions and ask questions that can be prepared for. It is also a good platform that allows me to look over the previous PP presentations and can interact with other members of the group outside of the sessions.”



**Round 3 Session 3a) 29th Oct (questions on Zoom)**

Q1	I have found the jargon buster on Recollective explaining technical terms... (73)	Very useful 16.4% 12	Quite useful 63% 46	Not very useful 5.5% 4	Not at all useful	I was unaware of it 15.1% 11	
Q2	Working through the case studies has helped me think about how CCUS could contribute to the UK's net zero goals (73)	Strongly agree 27.4% 20	Tend to agree 53.4% 39	Neither agree nor disagree 15.1% 11	Tend to disagree 4.1% 3	Strongly disagree	Don't know
Q3	Being able to question a panel of specialists has helped answer our questions in a balanced way (73)	Strongly agree 38.4% 28	Tend to agree 38.4% 28	Neither agree nor disagree 13.7% 10	Tend to disagree 5.5% 4	Strongly disagree 1.3% 1	Don't know 2.7% 2

Q4 Do you have any other questions you would like to see answered about CCUS in future sessions?

Safety

How potential leaks of CO2 affect the environment

Still unsure how safe and efficient the process will be

The unknowing of the safety

Carbonic acid??

Transportation of CO2 inland

Costs

Still feel we don' have enough info on costs of putting this in place

The cost of it and safety

Still concerned about cost and safety

Who foots the bill?

Costs and who will pay in the end.

Think costs are the biggest thing (Covid has had a huge impact on Country's finances...

Training costs – who's paying

Effectiveness

Time taken to implement it.

Unsure about how and why not using renewables to power collection of carbon?

Why not use the power of the sea to produce more renewable energy when we live on an island?

Environment

Impact on wildlife

sea life

Imports

If Scotland has a large potential of large quantities of CO2 storage, is it possible that England will transport theirs to Scottish sites to meet CO2 requirements?

Not sure about importing and making UK the dumping ground for CO2 from elsewhere

Balance of info provided

Negatives?

Why isn't there any specialists who are opposed to CCUS on the panel?

Where/what will it apply to?

How much? When? Where? Safety?

Does CCUS business model incorporate carbon trading?

Will CCUS be mandatory for all industry?

Questions indicating that some people are worried they don't fully understand

I think you have explained it and I then have to let it sink in and understand it

How is CO2 actually captured

I feel still have a lot left to learn

Still a lot to learn

The case studies are not so clear to me. I need a good explanation.

Sharing opinions on CCUS

I think I have begun to understand it and that we have to act fast but I would not want to push forward with it in too great amounts just to reach targets at expense of something going wrong

Government cannot make a case for it when it is allowing carbon sinks to be destroyed. CCUS can't hope to achieve the goal we need it to achieve in a safe long-term way. It is complicated with no guarantees of a desirable outcome.

### Round 3 Session 3c) 3rd Nov (Questions on Recollective)

Q1	The discussion about the stages of a CCUS project has helped me think through how CCUS should or shouldn't be used in the UK (97)	Strongly agree 44.3% 43	Tend to agree 47.4% 46	Neither agree nor disagree 5.2% 5	Tend to disagree 2.1% 2	Strongly disagree	Don't know 1%
Q2	I think this online dialogue has allowed me to understand the issues and contribute informed opinions about how CCUS should be used in the future (97)	Strongly agree 44.3% 43	Tend to agree 45.5% 44	Neither agree nor disagree 8.2% 8	Tend to disagree 1 1	Strongly disagree 1	Don't know
Q2	How, if at all, have your feelings to CCUS changed	More negative	Not changed	More positive but still with	Become more positive	Not changed, have been	

since last week? (97)	some major concerns		positive from the outset	
2	14	18	26	37

Not changed still negative or become more negative

I have become less enthusiastic about it the more I learn of how CCUS operates and what its downsides are. There are a good number of technical journal articles in the public domain advising not to rely on it as a negative emissions technology and not to subsidise it.

Even more against idea now as it unravels that the UK is being considered a dumping ground for carbon capture.

I still feel that CCUS is a very risky enterprise and requires much detailed consideration. Given the UK's carbon emissions I feel first and foremost much more attention should be given to reducing the creation of transmissions by facilitating a transition away from high CO2 emitting industries and behavioural change.

I have gained more knowledge and engagement in the discussions with fellow group members and the experts have not only informed me more about CCUS and its application but also how other members of the community feel towards it. Good to get a feel of people's priorities about the implementation of the technology in our area.

Not really no, I am still very doubtful.

They have not changed in anyway. I am still very much against the whole thing.

No because they didn't know the answers to the questions

My feelings are more or less the same. I am still concerned about the cost, safety, and the environment. Hopefully public opinion will be considered carefully before decisions are made

I still don't think CCUS is the answer.

Not really changed - still cautious due to safety concerns.

I do not feel I, nor others in my breakout session, have a clear understanding. When specialists have been questioned and asked to provide explanations, they have been presented as one-sided and at times, in language sensical to them as the professionals with clear understanding, but not to the latter

No, my feelings haven't changed at all. I think the direction this is heading in towards hydrogen is not good.

I'm not convinced the amount of money being spent on an experiment is worth it

No, we need to move away from fossil fuel consumption if we are to keep up with the rest of the world, this works in the short term for removing atmospheric carbon but is no way a replacement for developing and changing to renewable energy

My feelings towards it have not really changed, but my understanding is greater.

Those who became more positive but still with some major concerns

I feel that something has to be done, we cannot go on as we are, but I am still not convinced CCUS is the way to go. Surely there are cheaper greener options available and I would hope all options would be investigated before embarking on expensive methods

I have learned a lot more about CCUS, but I still think it will always come down to the cost v the actual effectiveness of it. People would be more willing to pay higher fuel bills etc if they could actually see a big improvement in the environment, but I do think this will take many years to be seen and people will not be happy with higher costs.

No, they are still the same but after the reflection I understand the process more and how residents will be able to view plans and have a consultation about it

7% Been grateful to take part in this very Fun research project, thanks

No change to my feelings

Thought coming to the end of project more solid statements should be made

I still have my fear and doubts, even though I believe it's a great idea

I am happy that they thought of sampling peoples' opinions before embarking on the project

No not really. I like the concept, but Port Talbot is in a bad geographical position.

I have enjoyed taking part. Thank you

No, I still don't know everything.

I'm a little warmer to it but my concerns about safety (percentages etc. would be great re risk) remain, also about the cost of it all. Have decisions been made about awards of

contracts, can that be shown to be ethical? The current state of the award of contracts and wastage of money makes me nervous/wary.

Over the whole period I have warmed to the good that should come from the exercise. I now understand the benefits at large industrial plants but what do we do about transport emissions and my gas burning central heating boiler? Will gas boilers be made illegal in a few years?

It has been suggested that this is the only option to increase the chances of meeting net zero. Therefore, my opinion has changed, but more so because there is no other option

I would've like to see opinions from parties on both sides; those who support/work within CCUS and those who oppose/are working with a sector that offers an alternative to CCUS

I feel storage in permeable rocks is a stop gap in our CO<sub>2</sub> crisis as I read horror stories of melting ice caps, but I think a lot of CO<sub>2</sub> will be created making large amounts of steel piping plus, maybe, concrete. I'm hoping government plans for CCUS won't limit funding for, e.g., Compressed air for being used for industry.

I see the positives but I do fear that there's been an attempt to sell it to us with predominantly only the benefits detailed

Yes, Because I am confused is it all about the CCUS as a business or about making money?

I feel the experience has given me insight to the carbon capture issues and I have learned a great deal about its operation and how it will consult us in the future

I feel like I have a better understanding of how CCUS would be implemented and the timescale that it would take. I do have new concerns about the economic ramifications once CCUS is removed and in stewardship stage.

Was a very interesting and informative experience. I am glad I have participated

Yes, it seems like a smaller process than I originally thought. I still wonder if other more cost- effective systems should be used first

I think that CCUS may be the quickest way to remove CO<sub>2</sub> at this moment in time but more should be done with solar and wind, the planting of trees should bring back the natural way to remove CO<sub>2</sub>

I think we must be guided by the scientists

I feel like I wasn't too sure on it at the start, because although I heard it on the news etc. I didn't have a lot of knowledge on this, and when I started joining the classes online 1st didn't know the reason or the positives ... I can see a huge positive and impact this will

have on the environment as well as gaining more jobs etc, and a slight part of me worries about the what if?

I feel that the whole process was explained very well and in detail

Those who started positive but still have some concerns

I have changed my mind quite a bit and think it is definitely a way forward to improving the planet but I still have questions and I don't fully understand how we can control global warming if countries like the US do not contribute to the action and commit to net zero. Are we trying to stop a gap which is impossible to do? So, I still feel that most of the other options are vitally important

Yes, after knowing that CCUS can be done by using renewable energy. However, I still believe that CCUS should not be the only solution to carbon capture.

Yes, and that's because I'm getting more confident about the whole CCUS processes and its benefits; should it be rolled out in the UK.

Can see a need for it as long as it is as effective as it theoretically appears to be

I feel much more positive about CCUS and understand that it will be very beneficial in helping to reduce our CO2 emissions so my feeling has changed to be for CCUS

Greater knowledge has been gained from the online sessions. Something needs to be completed to assist in becoming net zero.

I think the Recollective has been presented very well with the majority of questions being answered

Yes, I think they're doing a good job on awareness getting lay people involved by doing this survey and educating us on the pros and cons.

From not knowing about CCUS to where we are now, I would be more than happy for CCUS to be carried out in my local area. The positives outweigh the negatives and will lead to a better country and a better world.

Yes. More understanding of CCUS implementation.

Yes, my feeling about CCSU has changed from negative to positive after the seminar. I have been educated more on the advantages and disadvantages. Now I believe and think that the advantages are more beneficial.

Yes, understanding about the role of CO2 and the environment more.



I am more warm towards CCUS and think it is great with what they are wanting to do for us all.

I am even more convinced that we have to get on with it as there isn't long left to complete the project

I believe most bases have been covered on what my concerns were prior to this session

Experts have been reassuring with any safety concerns and has changed my perception on risk.

I feel like I've learnt more about CCUS and how it can be implemented, this has allowed me to see more of the benefits of its use compared to other net zero options.

A little, identifying the stakeholders in this process better helped me understand the potential negative and positive impacts of implementing CCUS

My feelings have changed slightly as I begin to understand it more. It is something that needs to be addressed sooner rather than later.

Yea the more I learn the more positives I see and the benefits this could have in achieving net zero

Yes, my initial fears and scepticism have changed positively. I am now clear about its safety, economic benefits (in terms of new jobs, keeping many existing oil and gas jobs, forex earning opportunities and - not the least - clean and healthy environment), knowledge and skills enhancement, and social benefits.

Yes... it was reassuring that the sea life wouldn't be affected

Yes- I think there is quite solid knowledge about it so it might be beneficial and worth trying.

Yes, it might have changed a little as we go on and I learn more about it.

As I learn more about CCUS I have changed my opinion from very negative to a more positive attitude

At the beginning I wasn't completely sure on the idea, but after going through the lessons my feelings have changed. I guess information is key here.

Those who started positive and remained so, with few concerns

No change

My feelings haven't changed since last week but overall, my feelings are positive. I think it's a factor that should be utilised on reaching net zero, however, I do have concerns on the timescales and the cost

Not really. Last session appeared to go over what we already had done previously. Evident that there were some strong feelings against CCUS from candidates though.

No, I feel the same as last week, although knowing that the 'area' or size of the infrastructure would be smaller than I originally thought (apparently the size of an Olympic swimming pool) I think it will not disrupt any local area by what I understand.

Very similar view to last week.

Remaining the same

No, they have stayed roughly the same

Still a lot to learn so no changes to the feelings I have at the moment.

They haven't changed, I still think it's a good idea

No [change], I am still comfortable with CCUS

I'm happy to hear that there will be plenty of consultation of the public before it is all implemented to ensure full understanding. My feelings about it being an important thing to implement have not changed.

Not necessarily. I still believe that this is a beneficial project which, alongside other similar projects, can help Scotland reach zero net targets and tackle climate change. I still believe that a robust independent risk assessment needs to be completed and shared with the public. As this is a new technology, I believe that there will be risks we did not account for, but these need to be minimised; sharing the risk assessment with the public shows that the government is transparent in its approach and that substantial work had been done to ensure the safety of this project.

Feelings have not really changed. I like the company and their project as it will help the environment!

I still believe CCUS is viable as part of a much wider effort to tackle climate change.

Not really, no. I still do believe that CCUS should be employed - more as a necessity due to Climate Change and to reach the net zero carbon emissions by 2050, and that the potential risks/ambiguities alongside the process of how, what, where, when and why should be educated to the public.

No, I'm still in favour for it if the bigger nations with a higher output of CO2 come on board. Also, I'm still curious of where the money to fund these projects will come from.

My feeling hasn't changed. I still like the idea but think more needs to go into using renewable energy.

No still feel the same. Feel that it is essential & should be used, however, in combination with other methods

I think that it might be a positive thing and we should give it a try

They haven't, since I have found out about it, I have been positive towards it

They haven't changed, although it's probably made me realise how important it is to educate local areas. I have learnt extensively over the past few weeks the benefits of CCUS and I feel that engaging and educating local areas affected is essential before CCUS projects get underway.

Not much, I am still very positive about CCUS.

This is the best option as a backup to solar and wind

My feelings towards CCUS haven't changed as it is still a process that is necessary to combat climate change and to reach the Net-Zero target set by the Government

No because I feel like CCUS is relatively safe and could be useful cost-wise if old, working pipes are re used like in the Scotland case study.

I believe CCUS is an opportunity to reduce CO2 emissions and stop climate change. It has both opportunities and risks, but I believe it is the right direction

No, my feelings have not changed at all, we have a duty as a nation of the world to tackle climate change.

No everything is understood

My views haven't changed, I feel CCUS is a good thing.

I feel it is good to have a plan about carbon usage.

Selfishly the job opportunity for the area I live in and a cleaner environment and the possibility of using. Existing land sites

My feelings remain positive because I believe this project when implemented will go a long way in emitting CO2 from the environment.

I really do think it is the right way to go it will be a big help in getting net zero

Not really, I had a bit of one-on-one time with a subject specialist who made himself available to answer some questions which has reassured me regarding how I will be affected by a carbon capture unit being installed in the local steel manufacturing industry.

Not really, I thought it was a great idea

Not really.

Q3	Based on what you know at this moment in time, how would you rate your understanding of CCUS? (89)	I don't understand it at all 2.2% 2	I understand a little bit but wouldn't be able to explain it to a friend 14.6% 13	I understand enough about it to explain it to a friend 55.1% 49	I have a very good understanding of it 28.1% 25	Don't know -	
Q4	Do you think that CCUS has a role to play in the UK	Yes 78.7% 70	No 5.6% 5	Not sure 15.7% 14			
Q5	I feel that BEIS will take our opinions into account in deciding how CCUS is deployed as part of a net zero strategy (84)	Strongly agree 28.6% 24	Tend to agree 48.8% 41	Neither agree nor disagree 15.5% 13	Tend to disagree 2.4% 2	Strongly disagree 2.4% 2	Don't know 2.4% 2

**Round 4: Tues 10th (Questions on Zoom exit poll)**

Q1	I think it is important that the public is engaged in policy decisions of this type (88)	Strongly agree 79.8% 67	Tend to agree 19% 20	Neither agree nor disagree 1.2% 1	Tend to disagree	Strongly disagree	Don't know
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Q2	Overall, I am satisfied with having taken part (84)	Strongly agree	Tend to agree	Neither agree nor disagree	Tend to disagree	Strongly disagree	Don't know
		75%	23.8%	1.2%			
		63	20	1			

Q3 Anything else you'd like to add?

"Pleased to have taken part."

"This was a well-organised open discussion."

"It was a very interesting and enlightening project."

"I found the sessions very informative and interesting."

"Been grateful to take part in this very fun research project, thanks."

"I have enjoyed taking part. Thank you."

"I feel the experience has given me insight to the carbon capture issues and I have learned a great deal about its operation and how it will consult us in the future."

"Was a very interesting and informative experience. I am glad I have participated."

"Thank you for this great opportunity. I will miss it, really enjoyed it thank you."

"Was very informative sessions and I have learned a lot. It was great having the experts on hand to answer our questions and well done to the facilitators who kept us on track."

"Thankyou."

"Taking part in this research has been very informative about the different CCUS processes and their effectiveness along with enabling us to learn about how they can be implemented into the UK sectors to allow the Government to reach their 2050 net zero target."

"I have really enjoyed these meetings. And I'm pleased with the knowledge that I have learnt about carbon capture and am already sharing this knowledge. I am looking forward to Teesside being part of this."

"I have really enjoyed taking part in this research and hope that all our thoughts and opinions will be considered when the schemes start to be put in place."

“Well presented by Traverse.”

“I feel that the whole process was explained very well and in detail.”

“Having the opportunity to take part – started negative and became very positive – other people should be educated too ...”

“Facilitators were very friendly, and this has been really informative. Thankyou.”

Hopeful that public opinion will be considered

“As long as there is transparency and balanced opinion then I think public consultation is essential to allay any fears and reassure the public. Trying to do it without support would lead to more distrust and possible disruption from extreme factions which could cause more safety issues.”

“Hopefully, public opinion will be considered carefully before decisions are made.”

“I am happy that they thought of sampling peoples’ opinions before embarking on the project.”

“I think we must be guided by the scientists.”

“I know that BEIS have commissioned this dialogue and want to understand public opinion. I don’t remember if they said they would take it into account when planning how to deploy.”

“I think that knowing situations before they actually take place help a lot so people can get a better understanding. I have really enjoyed the sessions.”

Final reflections on the process

“In zoom sessions there was little discussion from the experts about the carbon footprint of the CCUS process itself.”

“I would’ve liked to see opinions from parties on both sides; those who support/work within CCUS and those who oppose/are working with a sector that offers an alternative to CCUS.”

Final opinions on CCUS:

“I still feel that CCUS is a very risky enterprise and requires much detailed consideration. Given the UK’s carbon emissions, first and foremost I feel much more attention should be given to reducing the creation of these transmissions by facilitating a transition away from high CO2 emitting industries. Behavioural changes are a necessity and, in many

cases, not hard to make – merely a case of avoiding energy wastage ...prefer to see efforts to transition away from high emitting products than removal of CO2 at industrial sites.”

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