BEIS Direct Air Capture and other Greenhouse Gas Removals Roundtables

September 2020

Summary Recommendations

We ran 5 events covering innovators, academics working on GGRs and related topics, and investors with an interest in GGRs. The events were well attended by individuals from 91 separate organisations and a significant volume of feedback was collected (see Annex A). Much of the feedback was with respect to the wider conditions for investment in GGRs in the UK in the long-term, and this has been passed on to the GGR policy team, who attended the round tables. With respect to the innovation competition, the following points came through most strongly:

1. Participants broadly agreed with BEIS proposals to **keep a broad scope of technologies** for Phase One as well as the **flexibility to support a pilot** from which they can learn in Phase Two
2. The **call scope must be made clear, with** technologies clearly defined and "an end-to-end GGR system" clearly defined.
3. Carbon capture and *use* should be in scope at this time to enable companies to progress GGR technologies.
4. The BEIS rationale for *the majority of innovation activity to be UK based* in this competition was accepted as valid and reasonable.
5. A **BEIS- facilitated mechanism to find investors and consortia partners** would be useful to ensure the best proposals are developed and submitted to the competition.
6. Many thought that the **benefits** arising from the application of BECCS technologies (i.e. the value of the products produced) should be part of the project criteria. This also applies to technologies where the end product is some for of useful material (e.g. biochar).
7. BEIS should provide a standard approach to Life-cycle assessment for use by all bidders applying to the competition.
8. There was no consensus of whether matched funding should be part of the scheme.
9. It is important to understand how the Programme relates to the UKRI SPF Greenhouse Gas Removal Programme, and run our competition in a way that avoids putting barriers in the way of those applying to both.

Detail

Scope

1. Participants were generally in favour of **keeping a broad scope of technologies** for Phase One as well as the flexibility to support a demo from which they can learn in Phase Two. Participants generally welcomed the inclusion of biochar, enhanced weathering and ocean removal technologies, although one participant wanted the competition to be restricted to DAC to maximise funding available. However, participants asked that **the scope be made clear and technologies be clearly defined** in the call documentation, also including which parts of an end-to-end GGR system are included (capture, transformation, storage, integrating technologies). There was a strong desire from DAC innovators that **carbon capture and utilisation** be in scope as an 'enabling step' for GGR technologies. Participants warned that it takes a lot of work to assemble a bid and companies may be put off if the scope is unclear or they think they are unlikely to be successful.

2. On a related note, academics repeatedly emphasised the **need to develop good definitions** for technologies for the programme as there is a lack of a common lexicon across the 'industry'. This will be useful both in defining the scope and maximising the quality of bids to reach BEIS' goals.

3. Many innovators wanted to see bids from **international companies allowed**, perhaps with a stipulation that the company must either operate in the UK or have a UK based team. Academics warned that IP must be carefully managed in this case.

Government's role in supporting GGR innovation

4. Many participants would like BEIS to facilitate connections between parts of the industry. Participants, especially DAC innovators, asked for:

    a. A **BEIS- facilitated mechanism to find investors and consortia partners** (particularly for finding match funding), partners in CCS hubs to act as a customer for their CO2, and to prevent stranded asset risk. Lack of existing industry means it is difficult to find good partners, who may be known to BEIS and bidding into a different programme.

    b. A **roadmap of the funding available from government** for GGR projects (there is a crowded funding landscape), especially for projects that fall on the border of the programme scope, and might be better suited to CCS or hydrogen competitions.

    c. **BEIS support for international collaborations**, perhaps exploring how GGR can be promoted through Mission innovation.

d. A **domestic strategic investment fund** for GGR pilots after the competition ends so GGR companies can set up in the UK.

Innovation Competition Criteria

5. Stakeholders repeatedly emphasised a need to evaluate the **costs and benefits of a technology beyond GHG removed** when selecting bids – both in terms of the additional value stream available to the technology (e.g. clean electricity- or hydrogen production as a by-product).

6. There was a strong desire from all groups for BEIS to provide **common metrics for Life-cycle Carbon Assessment (LCA).** It was suggested this could be informed by a methodology set out by an environmental consultancy and BEIS could give guidance for bidders to complete LCA information. Some noted that projects which provide excellent £/tCO2 removed may not be the frontrunners at scale; so a separate LCA will need to be carried out as projects grow rather than using linear scaling. Academics noted that full LCAs should also include land use and embodied emissions. Finally, it was stressed that LCAs aren't everything – and should be accompanied by comprehensive environmental impact assessments documenting non-CO2 effects.

7. There was a large variety of views on **match funding.** Some thought if developers could raise match funding it should be included as a *criteria* to judge bids against. Others thought it should be required for larger companies and those that have a viable business model; while smaller companies thought that it would freeze out ability to participate in the lack of a longer term funding model.

General programme design

8. Participants asked for clarity on the **risk appetite** of the programme. Would our programme focus on supporting a larger number of smaller, earlier stage projects or fewer larger projects? There were a variety of views on this, with some noting that if the project funded many small pilots it would risk replicating BBSRC's programme, and might be spread too thin with low funding levels for many projects, although it might be easier to gain social licence and mitigate risks of picking winners too early. Transparency on the likely number of projects that will be funded would be welcomed.

9. Small innovators would like **commercial support** for projects, perhaps in the form of incubation support.

10. Academics thought **9 months for the first phase** was not long enough to support early TRL projects. However, some early stage innovators flagged that this might actually slow down their trajectory.

11. Participants flagged the risk that **we could miss eventual winners** who are at a very low TRL today – particularly if their promise at small scale does not translate into promise at a larger scale. Many academics flagged the risk that many good projects might not get through to Phase Two because they are too early stage (as happened with the hydrogen supply competition), or that pilot plants might be developed which won't go anywhere. Innovators would like to see a route to participate in Phase Two if they haven't yet participated in phase 1 (perhaps with a pro-forma design study submitted). Participants asked that a joined-up approach to bringing projects to full scale deployment with policy would help with this.

12. Participants noted other models of innovation which have previously worked well in similar fields such as ETI, IKC, DARPA, IEEA. They emphasised the importance of linking up and explore imaginative ways to integrate with GGR SPF to lessen burden on those preparing bids for both programmes and maximise probability of reaching the goals of both programmes. One academic suggested requiring innovators to have an academic on their board.

13. All participants, particularly academics, emphasised the **need to engage citizens,** especially as the project grows. **Confidence in government** was a major theme emphasised – both amongst investors and the public. Small scale community projects and public education, as well as the programme having a 'Greta-like' champion, were proposed as solutions.

Long-term perspective & Policy relevant feedback

The following comments relate to development of any follow-on innovation activity starting in 2023 at the earliest (assuming the proposed SBRI competition runs until 2024/2025), and for deployment of GGR in the UK supported by policy incentives. These points do not directly impinge upon design of the SBRI competition but are of strategic importance in the medium-term.

14. Participants, especially academics, called for enhanced **governance around GGRs and a coherent strategy across government more broadly**. Some called for an 'Office of Carbon Removal' or a longer term GGR roadmap to indicate to investors and innovators the general direction of GGR policy and ensure GGR work is joined up across government and arms-length bodies such as UKRI.

15. In the views of participants, the main barrier to scale up of GGRs in the UK is the lack of an economically viable business model to support GGRs. Many participants noted it was difficult to secure agreements or find co-funding without a clear long-term business model, for which government incentives are needed. Some participants expressed a wish that this innovation programme would run over a longer period as they have longer-term innovation needs (e.g. EDF). Other barriers mentioned included public misconceptions about the place for GGRs e.g. through opposition to them by

seeing them as an alternative to emissions reduction rather than a support to reaching net zero; a current lack of CCS infrastructure in the UK; and the current lack of dedicated regulations to support removal, monitoring, and verification.