

<b>SPF Greenhouse Gas Removal Demonstrators - Directorate Hub</b>	
<b>Closing date</b>	Outline: 19 November 2019 Full bid (invited): 6 May 2020
<b>Funding available</b>	£6.1 m
<b>Funding mode/stream</b>	Strategic Priorities Fund (UKRI)
<b>NERC Core or UKRI/Collective Fund</b>	UKRI Collective Funds: Strategic Priorities Fund
<b>Project duration</b>	4.5 years (54 months)
<b>Funding partners</b>	UKRI delivery partners: NERC, BBSRC, ESRC, EPSRC, AHRC, Innovate UK
<b>Start date requirements</b>	1 February 2021
<b>Call aims and objectives</b>	<p>The Directorate Hub will provide an overarching coordination role across the suite of inter-disciplinary Programme activities, with specific focus on economic, social, cultural, risk perception and communication, ethical, legal and governance issues. The Hub will have a strong research function, working with the Demonstrators to provide underpinning research; provide capacity building and co-ordination across the Programme.</p> <p>The Hub will also actively engage with business communities, supporting innovation in Greenhouse Gas Removal Demonstrators (GGR) Demonstrator techniques and their progression to readiness for market, ensuring economically and sustainability viable options to develop the cases for GGR Feasibility Studies, supported latterly in the Programme by Innovate UK.</p> <p>Specific Hub objectives:</p> <ol style="list-style-type: none"> <li>1) Co-ordination across the Programme (linking to the Demonstrators and Feasibility Studies)</li> <li>2) Connecting to other relevant research programmes nationally &amp; internationally</li> <li>3) Conduct cross-cutting research relating to GGR</li> <li>4) Commissioning of small grants through a flexible fund</li> </ol>
<b>Eligibility criteria</b>	<p>UKRI eligibility criteria apply and in addition Public Sector Research Establishments (PSREs) with 10 or more researchers (as allowed under SPF) can apply.</p> <p>PIs on <b>no more than two</b> proposals in this call &amp; <b>may</b> be named as PI and/or Co-I on both this and the GGR Demonstrator call (although only named on one funded proposal).</p>
<b>Call specific requirements</b>	Detailed in AO below
<b>Contact</b>	<p>NERC: Joe Taylor <a href="mailto:joseph.taylor@nerc.ukri.org">joseph.taylor@nerc.ukri.org</a>            AHRC: Tim Pank <a href="mailto:tim.pank@ahrc.ukri.org">tim.pank@ahrc.ukri.org</a>            BBSRC: Roderick Westrop <a href="mailto:Roderick.Westrop@BBSRC.ukri.org">Roderick.Westrop@BBSRC.ukri.org</a>            EPSRC: Gerard Davies <a href="mailto:Gerard.Davies@epsrc.ukri.org">Gerard.Davies@epsrc.ukri.org</a>            ESRC: Lynette Preston <a href="mailto:environmentandenergy@esrc.ukri.org">environmentandenergy@esrc.ukri.org</a>            Innovate UK: Harsh Pershad <a href="mailto:Harsh.Pershad@Innovateuk.ukri.org">Harsh.Pershad@Innovateuk.ukri.org</a></p>

## Strategic Priorities Fund: Greenhouse Gas Removal Demonstrators - Directorate Hub

### Announcement of Opportunity

Activity	Date
Announcement of Opportunity issued	September 2019
Community meeting (non-mandatory)	16 October 2019
Outline deadline	19 November 2019 (4pm)
Outline Interest	January 2020
Full proposals invited	February 2020
Full Proposals deadline	6 May 2020 (4pm)
Assessment of full proposals	September 2020
Decision announced	October 2020
Directorate Hub award begins	1 February 2021
Cross-Programme kick-off meeting	May 2021

## 1. Summary

### 1.1 Greenhouse Gas Removal Demonstrators Programme

This call is part of the interdisciplinary £31.5 million Strategic Priority Fund (SPF) Wave 2 Greenhouse Gas Removal Programme (referred to as the Programme). The Programme is a UK Research and Innovation (UKRI) initiative involving the Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Economic and Social Research Council (ESRC), Engineering and Physical Sciences Research Council (EPSRC), Natural Environment Research Council (NERC), and Innovate UK.

The Programme will assess sustainable routes for large-scale removal of greenhouse gases from the atmosphere, allowing the UK to take a major step towards achieving net-zero emissions, and placing the UK in a leading position to benefit from the £400 billion future global market in greenhouse gas removal.

The Programme will support up to five individual GGR Demonstrators as well as a central Directorate Hub. The Demonstrators will explore the effectiveness, economic, social, cultural and environmental impacts and risks of large-scale methods of GGR.

The Directorate Hub will provide an overarching coordination role across the suite of interdisciplinary programme activities, with specific focus on environmental, economic, social, cultural, ethical, legal and governance issues. The Hub will have a strong research function, working with the Demonstrators to provide underpinning research; provide capacity building and co-ordination across the Programme.

The Hub will also actively engage with business communities, supporting innovation in GGR Demonstrator techniques and their progression to readiness for market, ensuring

economically, socially and environmentally viable options to develop the cases for GGR Feasibility Studies, supported latterly in the Programme by Innovate UK.

Information on the GGR Demonstrators call has also been published. **Applicants are advised to read both calls in order to understand the full scope of the Programme.** Investigators may only be named as PI or Co-I on either a GGR Demonstrator or the GGR Directorate Hub.

This Programme brings together five Research Councils and Innovate UK to tackle an immediate problem in a challenging interdisciplinary space. It builds on investments made by the Research Councils, either individually or in partnership, but in an area where the urgent challenge of coordination across a wide range of disciplines has not yet been possible at the scale needed.

## *1.2 Directorate Hub*

**This call is for applicants for the Directorate Hub.** The full amount available to bid for is £6.1m (80% fEC). In the first instance, £4.9m will be awarded to the successful Hub application, with the remainder to be allocated subject to the retained budget held by UKRI - as detailed throughout this document.

The GGR Directorate Hub will be commissioned by NERC and the GGR Demonstrators will be commissioned by BBSRC, both on behalf of UKRI partners AHRC, BBSRC, ESRC, EPSRC, NERC and Innovate UK. The two calls will be run concurrently.

UKRI expects that through the life of the Programme the Directorate Hub will show world leading vision and leadership to establish options for a balanced suite of GGR options that could provide a successful GGR solution for the UK

The Directorate Hub should have a start date of no later than 1 February 2021 and will have the duration of 4.5 years (54 months) to cover the full duration of the Programme.

## **2. Background**

### *2.1 Programme Introduction*

There is overwhelming scientific evidence that the human release of greenhouse gases is changing the Earth's climate. In 2015, governments from around the world met to agree a framework that would minimise the negative consequences of climate change.

The Paris Agreement sets a goal to limit global average temperature increase to 'well below 2°C above preindustrial levels', and to 'pursue efforts' to limit it to 1.5°C

The role of rapid emissions reduction in meeting this target is widely understood. But it is increasingly clear that reducing emissions is not enough – we must also actively remove greenhouse gases from the atmosphere.

New technologies have emerged that show promise in removing CO<sub>2</sub> from the atmosphere but these are not well understood and mostly unproven at large scale.

## 2.2 Strategic Priorities Fund

The Strategic Priorities Fund (SPF) has been set up to build upon the vision of a ‘common research fund’ set out in Sir Paul Nurse’s [independent review](#) of the Research Councils. The fund will drive an increase in high-quality multi- and interdisciplinary research and innovation, ensure that UKRI’s investment links up effectively with Government departments’ research priorities and opportunities, and ensure that the system is able to respond to strategic priorities and opportunities. This Programme is funded under Wave 2 of the Strategic Priorities Fund.

## 2.3 Programme Background

Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems.

The 2015 Paris Agreement sets a goal to limit global average temperature increase to ‘*well below 2°C above preindustrial levels*’, and to ‘*pursue efforts*’ to limit it to 1.5°C. Dramatic reductions in emissions will not be sufficient to meet these temperature goals, nor achieve net-zero emissions in mid-century as required to control climate change. The recent Intergovernmental Panel on Climate Change 1.5°C [report](#) re-confirmed that greenhouse gas removal (GGR) is therefore required at scale this century.

Two reports were released on GGR in the autumn of 2018; one by The UK’s Royal Society and Royal Academy of Engineering<sup>1</sup> (commissioned by BEIS) and another by the US National Academies of Sciences, Engineering and Medicine<sup>2</sup>. Both identified a diverse portfolio of GGR technologies at very different stages of readiness. No single GGR method can provide the scale of GGR required to meet the Paris Agreement, and a portfolio of approaches is needed. This requires research to address the potential and limitations of

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<sup>1</sup> Royal Society & Royal Academy of Engineering (2018) *Greenhouse Gas Removal*. <https://royalsociety.org/greenhouse-gas-removal>

<sup>2</sup> National Academies of Sciences, Engineering, and Medicine. 2018. *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda*. Washington, DC: The National Academies Press. doi: <https://org/10.17226/25259>

these technologies, including methods that still require development and testing at a demonstration level.

The existing [Greenhouse Gas Removal from the Atmosphere](#) strategic research Programme (co-supported by, NERC, EPSRC, ESRC and BEIS) provides a strong knowledge base on potential options for removing carbon dioxide and other greenhouse gases, giving attention to environmental, technical, economic, governance and wider societal aspects. However, it does not incorporate the scale to include pilot testing. This specific gap has now been identified in the recent Academy reports.

The implementation of sustainable GGR solutions is broader than the technical development of different methods. GGR methods differ widely in terms of their potential costs, impacts, environmental and social risks, co-benefits and trade-offs. Further research is required to understand the range of implications of each GGR solution - holistic assessments of their feasibility and acceptability; how they can be designed to take into account novel business operating models; and appropriate governance that takes into account ethics, potential risks and public perceptions; and appropriate governance to ensure both ethical and proportionate operations. Support is then required to help progress the technologies to readiness, to develop appropriate incentives for scaling up, and to strengthen links to a range of business sectors.

## 2.4 Programme approach

Through this Programme up to five GGR demonstrator facilities will be established and run over 4.5 years to test and pilot a suite of GGR methods at scale. The demonstrators will include research on comprehensive life cycle analysis, including the full carbon budget, economics and financing, co-benefits and trade-offs, social and cultural implications, and environmental impacts as well as limitations of specific approaches to large-scale GGR for their specific method (further detailed in *3.1 Programme Objectives*).

Findings will be integrated by a Directorate Hub which will co-ordinate the activities across the Programme and link to relevant national and international research.

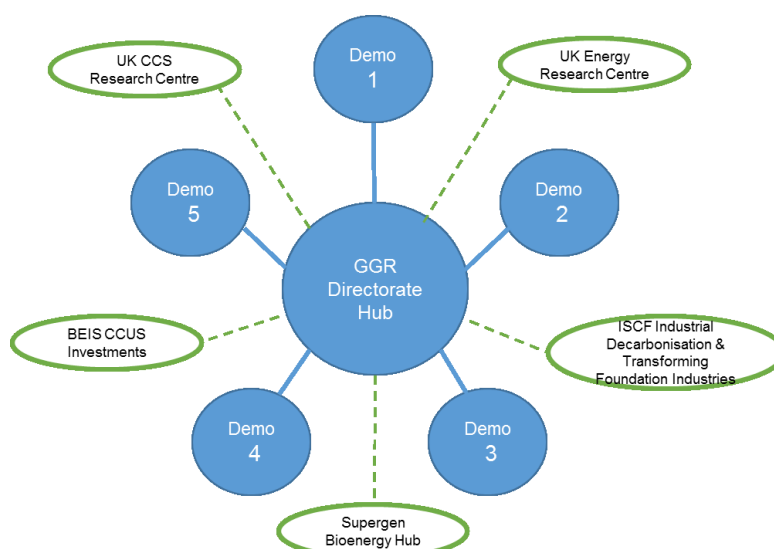


Figure 1: Structure of Greenhouse Gas Removal Demonstrators concept, with 5 demonstrators (Demo) co-ordinated by a Directorate Hub, which also links to existing relevant UK research and innovation projects.

In addition, the Hub will have four particular objectives in order to achieve the Programme aim of establishing options for a balanced suite of GGR technologies that could provide a successful and sustainable GGR solution focussing on the UK (acknowledging activities undertaken in other nations on an international scale). These are:

- a) Co-ordination across the Programme (leading to future Feasibility Studies), to actively engage with business communities, supporting innovation in GGR Demonstrator techniques and their progression to readiness for market, ensuring they are considered adequately sustainable and economically practical.
- b) Connecting to other relevant research programmes nationally & internationally: To work to bring together the activities of the demonstrators and the hub to help ensure a cohesive Programme which addresses the stated aims and objectives.
- c) Conduct cross-cutting research on the diverse cross-cutting issues relating to GGR: environmental, economic, social, cultural, risk perception and communication, ethical, legal and governance
- d) Commissioning of small grants through a flexible fund

The success of GGR solutions will rely on understanding of their full implications for different groups across society, economic viability and assessment of how they can be best governed. This needs to be considered at scales from the individual to community, national and international, and across generations. It also needs to account for the full range of perspectives that need to inform decisions about the adoption of these solutions, including from cultural, societal, economic and corporate to environmental and technical perspectives.

### 3. Scope

#### 3.1 Programme objectives

The objectives of this Programme are:

- 1) **Development of a suite of GGR technologies at demonstrator scale - £22.5m (led by BBSRC):** The Programme will establish up to 5 demonstrators, of a size and duration that will allow the potential for large-scale emissions removal to be assessed. The demonstrators will include research on comprehensive life cycle analysis, including the full carbon budget, economics and financing, co-benefits and trade-offs, social and cultural implications, and environmental implications. Demonstrators could include, but are not limited to
  - Direct Air Carbon Capture and Storage (DACCS),

- Enhanced Terrestrial Weathering
  - Bioenergy with Carbon Capture and Storage (BECCS)
  - Biochar
  - Large Scale Afforestation
- 2) **Development of successful GGR solutions – understanding economics, governance, society and ethics (Directorate Hub) - £6.1m (led by NERC):** The Hub will undertake and commission research, working with and across the demonstrators and the broader research community on:
- how the social, cultural, behavioural, and economic contexts of GGR solutions can inform effective scale-up of the technologies;
  - ethical, sustainable, economic and legal implications of proceeding with GGR solutions nationally and internationally;
  - appropriate monitoring, verification, governance, and regulation;
  - perceptions of risks and options for addressing them, including the role of communication and engagement;
  - business models, financing options and incentives for technological interventions;
  - public engagement and participation in decision-making about GGRs.
- 3) **Sustainable GGR solutions – supporting technologies to readiness: The Hub, in conjunction with Feasibility studies - £1.5m (led by Innovate UK in year three of the Programme: 2022-23).**
- Moving from the Demonstrators to implementation will require identification of commercially viable and scalable business-led innovations, which can be developed for national and international markets. This will be delivered by:
- supporting existing and new incubators and interdisciplinary networks across relevant research and business communities;
  - support for UK business-focussed conferences on GGR to support innovator and early adopters involved in GGR e.g. big businesses trying to be “net zero”, carbon accountancy firms, and trade associations working together;
  - competitions, which will be delivered by Innovate UK, to support Feasibility Studies or Collaborative R&D projects for business-led BECCS projects, and/or internationally-relevant GGR technologies;
  - collaboration with stakeholders to co-create evidence and outputs that meet users’ needs.

This Programme will complement, but not duplicate, existing investments by the Research Councils and BEIS in carbon capture, utilisation and storage. It is envisaged that research from the Programme would underpin both the Government’s [Clean Growth Strategy](#) and support several relevant Industrial Strategy Challenge Fund ([ISCF](#)) programmes.

The Directorate Hub and Demonstrators will commit to working collaboratively, and to identify and exploit potential opportunities to work with other existing UKRI investments, where appropriate, to maximise impact. A plan for investment engagement should be included in the application. Other investments include but are not limited to

- Present UKRI [Greenhouse Gas Removal from the Atmosphere programme](#)
- Strategic Priorities Fund [Landscape Decisions: Towards a new framework for using land assets](#)
- Strategic Priorities Fund [Clean Air: Analysis & Solutions](#)
- [Valuing Nature](#)
- Centre for Climate Change and Social Transformations ([CAST](#))
- Centre for Climate Change Economics and Policy ([CCCEP](#))
- Centre for the Evaluation of Complexity Across the Nexus ([CECAN](#))
- [Supergen](#)
- [UK Energy Research Centre](#)

### 3.2 Directorate Hub scope

The Directorate Hub will co-ordinate the activities (and research) across the Programme, linking to relevant national and international activities and directly conduct GGR research. It will also commission research outside of the Hub to address the cross-cutting issues relating to GGR: environmental, economic, social, cultural, risk perception and communication, ethical, legal and governance, towards establishing a GGR solution for the UK.

The Hub will work closely with each demonstrator, coordinating engagement through Innovate UK links to engage with relevant business communities, supporting development and innovation in GGR technologies and their progression to readiness for market.

The Hub will work closely with Innovate UK to commission feasibility studies in Year 3 to promote establishing options for a balanced suite of GGR technologies that could provide a successful GGR solution for the UK. This will be achieved through the development of Feasibility Studies that support the commercialisation of GGR technologies, through a mix of technology development and industry work on enabling measures (see section 3.1 *Programme scope* for further details).

To enable delivery across this scope, the Directorate Hub will undertake four core activities:

- a) Co-ordination across the Programme (linking to the Demonstrators and Feasibility Studies)**
- b) Connecting to other relevant research programmes nationally & internationally**
- c) Conduct cross-cutting research relating to GGR**
- d) Commissioning of small grants through a flexible fund**

Full details of these activities are found in *Directorate Hub requirements (Section 3.3)*.

### 3.3 Directorate Hub requirements

Working with the demonstrators, the Hub will coordinate activity to establish options for a balanced suite of GGR technologies that could provide a successful GGR solution for the UK.



The Hub, as well as providing a forum to bring all relevant actors together (including social science, arts and humanities and natural and physical science researchers and other relevant stakeholders and communities), should;

- seed-fund small projects;
- map current research activity across the full spectrum of disciplines and approaches, identifying gaps and engaging with stakeholders;
- run thematic workshops and rapid response reviews, building interdisciplinary capacity.

Collaboration with stakeholders will be key in order to co-create evidence and outputs that meet users' needs and addresses wider community concerns. This could include briefing papers, thematic reports, community workshops, co-produced creative activities such as short films, 'rapid response' evidence, informational events, exhibitions, and data visualisation.

Applicants are encouraged to be innovative in the kinds of user engagement, communications and knowledge exchange/impact generation activities they plan to undertake as part of the Hub activities.

Because of the interdisciplinary nature of the Programme, it is expected that the Hub will comprise the expertise required from across the constituent UKRI partners (AHRC, BBSRC, EPSRC, ESRC, NERC and Innovate UK) in order to fully meet objectives 2 and 3 of the Programme set out in *3.1 Programme Scope*. In addition to successfully fulfilling the four core hub activities identified in *3.4 Directorate Hub Activities*.

As well as academic representation funded through the Hub award, it is encouraged to collaborate with a range of non-academic representative partnerships (who are not eligible for UKRI funding). These may include stakeholders from a range of business and industry, third sector, NGOs and government departments. Other groups to engage may be from wider consumer groups, policy organisations and regulatory bodies. The application should articulate how they intend to include a diverse membership for the Hub and justify its management structure.

The Directorate Hub will be responsible for identifying, undertaking and commissioning research and will be required to have a clear plan for this spend to ensure that the funding profile is met.

### *3.4 Directorate Hub activities*

The core Directorate Hub activities are recognised to be interlinking and complimentary in nature. Actions may be relevant and delivered across multiple Hub activities. The core Hub activities are:

## a) Co-ordination and engagement across the Programme

The Hub will take a leadership role in the management and co-ordination of the interdisciplinary range of research activities and overarching objectives on behalf of the GGR Demonstrator Programme, ensuring alignment across the Programme to;

- Co-ordinate reporting to the Steering Committee and Programme Board
- promote knowledge exchange across the Programme and to all relevant communities;
- ensure linkages to stakeholders and the wider non-academic community
- ensure linkages to governmental policy requirements;
- ensure linkages to international efforts;
- raise the profile of the Programme in all relevant communities;
- co-ordinate monitoring and evaluation activities on behalf of the Programme;
- provide data management and reporting;
- co-ordinate the Demonstrator mid-term review in order to provide advice and recommendations to the Programme Board regarding demonstrator success.

Applicants are encouraged to be innovative in the kinds of user engagement, communications and knowledge exchange/impact generation activities they plan to undertake. The hub will be required to:

- develop an effective communication and engagement strategy that involves stakeholders throughout the Programme
- engage the GGR demonstrators, including stakeholders, through conferences, seminars, workshops, bulletins, position papers, co-produced creative activities such as short films, exhibitions, blogs and data visualisation activities and other innovative activities
- actively engage with business communities, supporting innovation in GGR Demonstrator techniques and their progression to readiness for market, ensuring they are considered adequately sustainable and economically practical. In turn leading to recommendations for the future Programme Feasibility Studies.
- adapt, tailor, and make accessible, its outputs to appropriate audiences across society, but with particular reference to the needs of policy and business audiences.
- provide a robust social media presence including a Programme website.

Applicants should set out clearly who they see as the hub's stakeholders, and how they aim to engage and work closely with these stakeholders beyond the academic community. In their Pathways to Impact document, applicants should present their plans for developing an impact strategy, promoting knowledge exchange, public engagement and effective communication with key stakeholders. Following the launch of the Hub, these plans would then be developed further into a full communication framework. The Hub is expected to coordinate their approach to linking their stakeholder engagement plans with the Demonstrators plans for stakeholder engagement as a matter of priority, with a focus on exploring opportunities to co-ordinate similar activities.

## **b) Connecting to other relevant research programmes nationally & internationally**

As part of its cross-programme co-ordination leadership role, the Hub will ensure that the research undertaken by the demonstrators is accessible and addresses the challenges relevant to policy makers. The Hub will be required to have a thorough understanding of the broad interdisciplinary GGR research landscape from the humanities and social sciences to engineering and the sciences; to identify key opportunities for collaboration and synergy with other national and international activities; and be able to represent the Programme in both research and policy fora.

It is expected that the Directorate Hub will work closely with the GGR Demonstrator grants as well as other relevant UKRI programmes, and national/international investments. Consideration of similar work being undertaken across wider communities, and building upon this work should be made to create a full picture of GGR research and limit duplication. Several examples of other UKRI investments are found in *3.1 Programme Objectives*.

## **c) Conduct cross-cutting research relating to GGR**

The Hub will directly undertake GGR research. Specifically, working with and across the demonstrators and the broader interdisciplinary research community to fill research gaps and broaden existing activities, addressing:

- how the social, cultural, behavioural, and economic contexts of GGR solutions can inform effective scale-up of the technologies;
- ethical and legal implications of proceeding with GGR solutions nationally and internationally;
- appropriate monitoring, verification, governance, and regulation;
- perceptions of risks and options for addressing them;
- business models, financing options and incentives for technological interventions;
- public engagement and participation in decision-making about GGRs.

It is recognised that the GGR demonstrators will be undertaking research in these areas specific to their GGR approach. The Hub should seek to support research into issues that cut across the demonstrators, and which individual demonstrators alone are not able to undertake. This should both draw together the research of the individual Demonstrators and include new research in order to provide a comprehensive understanding of the requirements of any future suite of GGR approaches for the UK.

The Hub will be expected to work with the Demonstrators to identify such research gaps, to conduct or commission research (through flexible funds delivered outside of the Hub see activity 4) as needed, and to feed findings to the Demonstrators as appropriate.

## d) Commission small grants through a flexible fund

The Directorate Hub should include a substantial flexible fund of between £1m and £1.5m, which the Hub can use to support work which addresses research and/or engagement needs identified during the Programme.

As the Programme progresses it is anticipated that gaps in research or stakeholder engagement will be identified by the Hub, the demonstrators, or other stakeholders. This funding will allow the Hub to respond flexibly to address these needs as they are identified, in order to allow the Programme to achieve its objectives.

These activities are expected to include the funding of small research and innovation projects, but could also include running seminars, lectures, expert working groups, placements or exchanges, sandpits, skills training sessions or other innovative activities. It is expected that the Directorate Hub-funded small grant activities will provide an opportunity for applications from researchers outside of the successful GGR demonstrator grants to participate, thereby drawing more researchers into the community. Activities focussed on early career researchers and wider capacity building including for stakeholders are welcome.

The Directorate Hub is an opportunity to pump prime further research and collaborations while also providing an opportunity for leveraging other funding. The flexible funding is offered at 80% fEC and should be proportionate and appropriate to the reach of the Hub. Co-creation of flexible fund topic areas with the stakeholder community is encouraged.

Funding for individual projects commissioned through this strand should not exceed £150K (80% fEC). Any projects below £50K (80% fEC) can be coordinated and funded directly by the Hub. This will be administered via a transparent process agreed by the Programme Board (through the Hub application) and managed by the Hub. Any projects above this must be commissioned by the Hub through open, peer-reviewed calls that are referred to the UKRI through the Programme Board – who will support dissemination - before they are issued. In both cases, the Hub will be responsible for running the commissioning and awarding. UKRI will provide more information to the successful Hub applicant. UKRI will withhold the funds allocated in the proposal for the flexible fund, to be released as commissioned by the Hub. Although the Hub application should account for and justify this cost in their proposal. In commissioning activities, the Directorate Hub is expected to engage with UKRI for guidance on best practice.

Members of the core Directorate Hub leadership team (PI's, Co-I and any named Researcher) **will not** be permitted to apply for funding through such open calls.

Applications for the Directorate Hub call should articulate their aims and strategy for implementation of the flexible fund in their Case for Support attachment. The outline should include appropriate frameworks for process and governance and assessment criteria for the distribution of the flexible funds.

Please note only overheads can be provided for placements within academia; salary and overheads may be covered for placements outside of academia.

## 4. Programme requirements

### 4.1 GGR Directorate Hub funding

The GGR Directorate Hub will provide a maximum of £6.1 million (at 80% fEC) for 4.5 years (54 months) for the duration of the Programme. In the first instance, £4.9m will be awarded to the successful Hub application, with the remainder to be allocated subject to the retained budget held by UKRI.

Applicants will need to consider the most suitable split of funding between the key Hub activities. It is anticipated that the Hub may need to consider flex in budgets/allocations to meet the future demands and priorities of the Programme.

A guide to the ranges in each key activity is provided below;

- Co-ordination and engagement across the Programme: £1.4m - £1.8m
- Connecting to other relevant research programmes nationally & internationally: £0.9m - £1.4m
- Conduct cross-cutting research relating to GGR: £1.8m - £2.5m
- Commission small grants through a flexible fund: £1m - £1.5m

UKRI will hold £50k from the Programme budget to set-up a Programme kick-off meeting, to be held within 3 months of the Programme starting (~May 2021 - date tbc). Hub applications should cost this event into their co-ordination and engagement activities.

Due to the required timeliness of this activity, initial logistics and budget for a kick-off meeting will be managed by UKRI. It is expected that this will be an initial priority activity for the Hub, and as such will have a key role in running the meeting and developing outputs. The meeting will be attended by up to 4 representatives from each Demonstrator, as well as key Hub staff in addition to any relevant invited stakeholders. Each Demonstrator will provide individual travel and subsistence costs.

The Hub will act as the key point of contact for national/international activities, co-ordinating and liaising on behalf of the Programme. UKRI will directly contribute £50k on behalf of the Programme (deducted from the total budget) to participate in [JPI Climate](#) activities. An additional £100k will be retained by UKRI for participation in further international engagement activities, to be requested by the Hub through the Programme Board, following Hub counsel from the Steering Committee. The Hub application should include this in their cost justification.

### 4.2 Hub expectations

UKRI expects that through the life of the Programme the Directorate Hub will show world leading vision and leadership to establish options for a balanced suite of GGR options that could provide a successful GGR solution for the UK. This will involve, but is not limited to;

- Providing a scientifically coherent programme of research aimed at driving forward innovations in GGR solutions and the development and application of novel research methods, data sources, and practical application.

- Making significant contributions to understanding of environmental, economic, social and behavioural, political, cultural, ethical, governance, risk perception and issues across the breadth of the Programme
- Involve potential users of research, and take advantage of international collaborative and/or comparative opportunities.
- Support active career development programmes aimed at building research capacity.
- Commit to working collaboratively with the demonstrators in the Programme as well to identify and exploit potential opportunities to work with other existing UKRI investments, where appropriate, to maximise impact.

## 4.3 Capacity building

UKRI expect details of capacity building in your proposal, with evidence that the Hub has a strong commitment to support the development of researchers at all stages of their career.

The capacity-building element of proposals should include, but not be limited to, early career stage researchers, policymakers and practitioners, local communities and businesses. Consideration to maximise and leverage opportunities across the Programme is welcomed. To maximise capacity-building activities, the successful applicant may liaise with other core UKRI research investments as detailed in *3.1 Programme Objectives*.

## 4.4 Knowledge Exchange and Impact

Knowledge exchange (KE) is vital to ensure that interdisciplinary research has wide benefits for society, and should be an integral part of any research. All applicants must consider how they will or might achieve impact outside the scientific community and how best to build links and contacts with potential beneficiaries and users of the research at the earliest possible stages of research design and development, and to work towards co-production of knowledge with research users where appropriate. In addition to knowledge exchange and impact strategies that focus on particular user groups or specific named beneficiary organisations, we strongly encourage public engagement activities which bring together researchers and the wider public. This should be submitted with their application as a [Pathways to Impact](#) statement, with associated delivery costs where relevant. Pathways to Impact activities do not have to be cost-incurring; it is not a requirement to include funded activities. Any funds required to carry out any proposed, outcome-driven activities identified within the Pathways to Impact must be fully justified within the Justification of Resources statement.

The Pathways to Impact will identify those who may benefit from or make use of the research, how they might benefit or make use of the research, and methods for disseminating data, knowledge and skills in the most effective and appropriate manner.

An acceptable Pathways to Impact is a condition of funding. Grants will not be allowed to start unless unacceptable Pathways to Impact are enhanced to an acceptable level within one month of notification of the panel outcome.

The Hub may also be required to engage with Programme-wide KE activities, with an expectation to work with all demonstrators to maximise impact.

## *4.5 Data Management*

The [UKRI Data Policy](#) must be adhered to, and an [outline data management plan](#) produced as part of proposal development. Details of the [NERC Data Centres](#) and [ESRC UK Data Service](#) are found in the imbedded links. UKRI will pay the data centre directly on behalf of the Programme for archival and curation services, but applicants should ensure they request sufficient resource to cover preparation of data for archiving by the research team. Additional data costs may need to be included within the flexible funding allocation as activities are commissioned.

## *4.6 Ethics*

Applicants must ensure that the proposed research will be carried out to a high ethical standard and must clearly state how any potential ethical and health and safety issues. Including how those related to data access and security have been considered and will be addressed, ensuring that all necessary ethical approval is in place and all risks are minimised before the project commences.

ESRC has further information available <https://esrc.ukri.org/funding/guidance-for-applicants/research-ethics/>

## *4.7 UKRI Facilities*

Prior to submitting a proposal, applicants wishing to use a UKRI facility must contact the facility to seek agreement that they could provide the service required.

Applicants wishing to use most UKRI facilities will need to submit a mandatory 'technical assessment' with their proposal.

A list of [NERC](#), [BBSRC](#) and [EPSRC](#) facilities can be found at the imbedded links. The costs for the service or facility (excluding HPC costs) must be included within the Directly Incurred Other Costs section of the Je-S form and within the facilities section of the Je-S form. Applicants wishing to utilise the NERC/EPSRC supercomputing facilities ARCHER should use the following [link](#) to find out how to apply.

If additional use of facilities are required, as the Programme develops, they will need to be applied to and funded appropriately, and will be subject to availability.

## *4.8 Programme management*

The Directorate Hub will be required to appoint a management board to monitor progress and provide the co-ordination function between all of the SPF GGR demonstrator

investments, ensuring coherence across the activities of the Programme and the broader national and international research community. Working with the demonstrators, the Hub will coordinate activity to establish options for a balanced suite of GGR technologies that could provide a successful GGR solution for the UK (and in other nations).

At the outline stage, applicants should include details of Hub project management, partnerships and collaboration within their Case for Support. At full bid stage, this will be incorporated within a Management Plan document.

The Hub will be advised by the Steering Committee, and will report to the Programme Board (on behalf of GGR demonstrators and feasibility studies), which will be responsible for any programme decisions taken. The Steering Committee will be set up by UKRI through liaison with the Hub. The Hub submission should include a proposed Hub governance structure, including information about how the structure is appropriate and will best link to programme activities management structures.

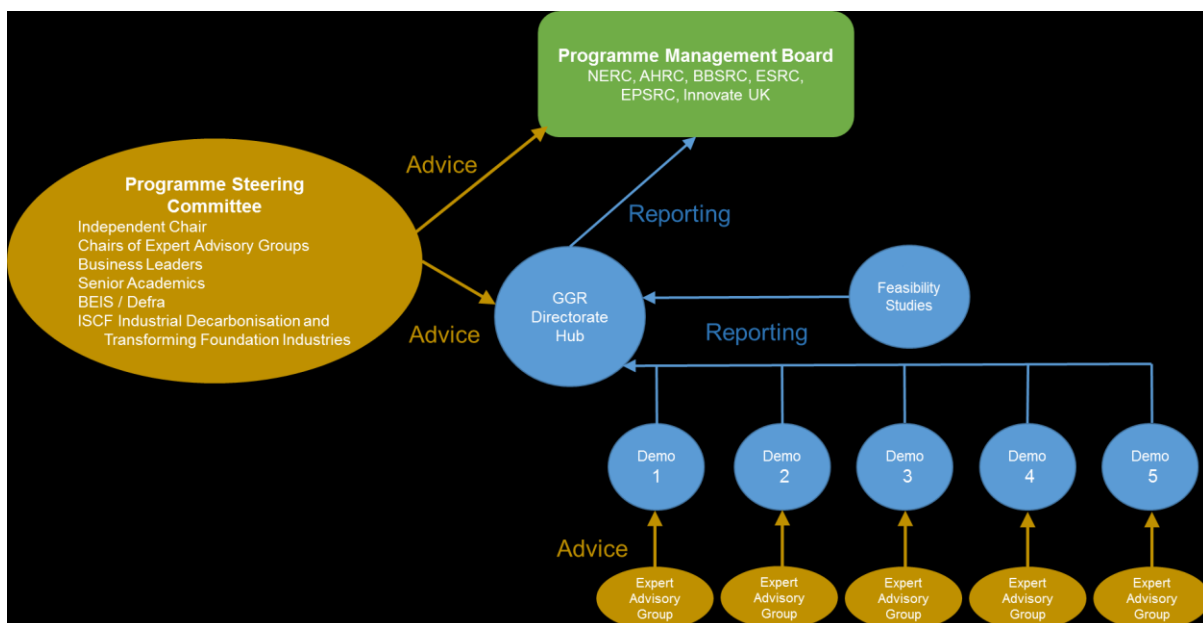


Figure 2. SPF GGR Governance and Programme Management

#### 4.9 Reporting requirements & Programme review

The Directorate Hub will be required to co-ordinate reporting from its own activities (including those commissioned under the flexible fund), each of the Demonstrators, and latterly the Feasibility Studies, to the Programme Board. The Hub Management Board, involving representation from each of the Demonstrator (see 4.5 Programme management) will be responsible for co-ordinating this. A Programme-wide monitoring and evaluation framework should be developed in line with UKRI policies by the Hub management board. BBSRC will co-ordinate a Programme-wide extranet site to support this activity.



As with all UKRI grant holders, there will be a requirement for the Programme to report through the UKRI reporting system ResearchFish. This is required annually and continues for up to five years post grant end. UKRI may also require funded projects to respond to specific and other ad hoc queries for information as required. Each component of the Programme (i.e. Hub, including commissioned work, and Demonstrators) will be responsible for this separately.

A mid-term review of the Demonstrators will be undertaken after 2.5 years. It is anticipated that the Hub will co-ordinate this activity, incorporating evidence and commentary with consultation from UKRI. The primary purpose for this review is to identify if a demonstrator technology still has the potential for large-scale GGR removal.

## 5. Application process

### 5.1 How to apply

#### 5.1.1 Outline proposal

*Closing date 4pm on 19 November 2019*

The outline proposal stage will be used to identify projects that will be invited to submit a full proposal. The outline proposals will be assessed by an expert panel. A sift of proposals will be made on the basis of the likely fit of proposals to requirements of the call. The panel will provide brief feedback to applicants summarising why their proposal was successful / unsuccessful. No further feedback will be available.

One outline proposal submission is required for each proposed project; this should be submitted by the lead Principal Investigator and cover all consortium components.

Outline proposals must be submitted using the Research Councils' Joint Electronic Submission system (Je-S). For all proposals please select

- Council: NERC
- Proposal Type: Standard Proposal
- Scheme: Outline Bids
- Call: GGR Directorate Hub Outline

The GGR Directorate Hub Outline call will close on Je-S at **4pm GMT on 19 November 2019** and it will not be possible to submit to the call after this time. Applicants should leave enough time for their proposal to pass through their organisation's Je-S submission route before this date. Any proposal that is incomplete, or does not meet the eligibility criteria of this call for proposals, will be office rejected and will not be considered.

The outline proposal form should include the expected Co-Investigators and their Research Organisations. It is anticipated that researchers from across a range of disciplines should participate in the Directorate.

For all proposals the Principal Investigator must submit a completed Je-S Outline proforma together with a Case for Support. All documents should be completed in single-spaced

typescript of minimum font size 11 point Arial font or other sans serif typeface of equivalent size to Arial 11, with margins of at least 2 cm. Please note that Arial narrow and Calibri are not allowable font types as they are smaller and any proposal which has used either of these font types within their submission will be rejected. References and footnotes must also be presented in minimum font size 11 point and should be in the same font type as the rest of the document. Headers and footers should not be used for references or information relating to the scientific case. Applicants referring to websites should note that referees may choose not to use them.

Applicants should ensure that their proposal conforms to all eligibility and submission rules, otherwise their proposal may be rejected without peer review. More details on NERC's submission rules can be found in the [NERC research grant and fellowships handbook](#) and in the [submission rules](#) on the NERC website.

The Case for Support should not exceed **8 sides of A4** and should include short track record of the PI and lead Co-I's (no more than 2 sides) and a summary of how the applicants seek to achieve the GGR Directorate Hub objectives and requirements (6 sides).

It is the responsibility of applicants to undertake sufficient planning at the outline proposal stage to determine that the full costs of application (including any facility costs) can be accommodated within the fixed financial limits of the scheme. The Resources indicated at the outline proposal stage are considered as estimates only and may be amended in a subsequent full proposal, within the financial limits of the scheme. No CVs or project partner letters should be submitted at the outline proposal stage.

**Applicants should be informed in January 2020** if they are to be invited to proceed to the full proposal stage.

## *5.1.2 Full Proposals*

*Closing Date: 4pm on 6 May 2020*

Full proposal must be submitted using the Research Councils' Joint Electronic Submission system (Je-S). Applicants should select

- Council: NERC
- Proposal Type: Standard Proposal
- Scheme: Directed
- Call: GGR Directorate Hub full bid.

The Directorate Hub call will close on Je-S at **4pm GMT on 6 May 2020** and it will not be possible to submit to the call after this time. Applicants should leave enough time for their proposal to pass through their organisation's Je-S submission route before this date. Any proposal that is incomplete, or does not meet NERC's eligibility criteria or follow NERC's submission rules (see [NERC Grants Handbook](#)), will be office rejected and will not be considered.

All attachments, with the exception of letters of support and services/facilities/equipment quotes, submitted through the Je-S system must be completed in single-spaced typescript of minimum font size 11 point (Arial or other sans serif typeface of equivalent size to Arial 11), with margins of at least 2cm. Please note that Arial narrow, Calibri and Times New Roman are not allowable font types and any proposal which has used either of these font types within their submission will be rejected. References and footnotes should also be at least 11 point font and should be in the same font type as the rest of the document. Headers and footers should not be used for references or information relating to the scientific case. Applicants referring to websites should note that referees may choose not to use them.

Applicants should ensure that their proposal conforms to all eligibility and submission rules, otherwise their proposal may be rejected without peer review. More details on NERC's submission rules can be found in the [NERC research grant and fellowships handbook](#) and in the [submission rules](#) on the NERC website.

Proposals for this call should be submitted in **large grant** format following the requirements and documents required in Section F of the handbook (linked in the above paragraph).

Please note that on submission to council ALL non-PDF documents are converted to PDF, the use of non-standard fonts may result in errors or font conversion, which could affect the overall length of the document.

Additionally where non-standard fonts are present, and even if the converted PDF document may look unaffected in the Je-S System, when it is imported into the Research Councils Grants System some information may be removed. We therefore recommend that where a document contains any non-standard fonts (scientific notation, diagrams etc.), the document should be converted to PDF prior to attaching it to the proposal.

## *5.2 Eligibility*

For this call, NERC eligibility rules apply, however it should be noted that PIs and Co-Is from all disciplines supported by UKRI are welcomed and encouraged to apply.

Public Sector Research Establishments (PSREs) with 10 or more researchers with PhDs (or equivalent) are eligible to apply. If PSREs wishing to apply have not previously applied for UKRI funding and are not currently designated IRO status they will be required to complete an [eligibility form](#) to ensure they have the required research capacity, systems and controls in place to manage the research and grant funding. PSRE applicants should contact [Avril.Allman@nerc.ukri.org](mailto:Avril.Allman@nerc.ukri.org) at the earliest opportunity to discuss their interests in applying.

It is likely that the successful proposal will be led by experienced researchers who are internationally recognised and have a well-established track record of publication, as well as a proven ability to deliver a large-scale research project or centre successfully.

We encourage inter-institutional and interdisciplinary applications and strongly encourage partnerships with non-HEI organisations and the inclusion of relevant third sector, business and public sector co-investigators and partners. Please note that only travel and subsistence and small additional costs can be included in the grants for these bodies.

UKRI research and fellowship grants for all schemes may be held at approved UK Higher Education Institutions (HEIs), approved Research Council Institutes (RCIs) and approved Independent Research Organisations (IROs). Full details of [approved RCIs and IROs](#) can be found on the UKRI website.

Individual & Research Organisation eligibility is detailed in Section C of the [NERC research grant and fellowships handbook](#).

Investigators may be involved in **no more than two** proposals submitted to this call and only one of these may be as the lead Principal Investigator.

At the application stage, investigators **may also** be named as PI or Co-I on one of the GGR Demonstrators applications ([linked here](#)). However, applicants may only be included on **one** funded Demonstrator or Hub proposal.

## 6. Assessment Process

### 6.1 Outline proposal

Outlines will be assessed by an expert panel, who will shortlist those applications to be invited to submit a full proposal.

Outline Proposals will be assessed on:

- Remit
- Potential Fit to Scheme: Proposals will be directly scored against the degree to which they address the objectives and scope of the GGR Demonstrators Directorate Hub outline call.

The panel will consider each outline against the assessment criteria before informing applicants of the outcome and inviting successful outlines proposals to the full proposal stage.

### 6.2 Full Proposals

Only those applications invited at the outline stage will be allowed to submit the full bid stage.

Applicants will be invited to give a presentation at the interview panel in [September 2020](#). All proposals will be internationally peer-reviewed and final funding recommendations made by an interview panel consisting of independent experts. Applicants will have the opportunity, via Je-S to provide nominated reviewers. UKRI does not guarantee these will be used.

Applicants will be given the opportunity to provide a written response to peer review comments prior to the interview panel. The lead PI, along with up to two key members of the Directorate Hub team will be invited to present their proposal to the interview panel.

The assessment criteria to be used will be as follows:

- Excellence: relates to the originality and quality of the proposal
- Fit to Scheme: Proposals will be directly scored against the degree to which they address the objectives and scope of the GGR Demonstrators Directorate Hub call using the criteria:

## **Directorate Hub design (management and governance) (40%)**

- Quality and appropriateness of approach for delivering GGR Directorate Hub objectives and activities
- Fit to/understanding of the requirement and what it entails;
- Quality and delivery of work plan, e.g. realistic milestones and deliverables
- Appropriate communication structures in place
- Appropriateness of composition and management structure to deliver the requirement (including spread of expertise);
- Quality and appropriateness of identified members and their understanding of their roles and responsibilities within the Hub

## **Leadership team (20%)**

- Quality / fitness of proposed PI and Hub team;
- Division of roles between the PI and the rest of the leadership team. It is anticipated that there will be a Champion/Director to act in a figurehead capacity for the Programme, with suitable deputy support to manage against single point failure.
- A leadership team that demonstrates a track record of effective interdisciplinary working;
- Demonstration of expertise across disciplines and experience of working with a range of partners and stakeholders, and supporting novel approaches and models;
- A robust management plan, details of Hub project management, governance, managing relationship with Demonstrators and managing for impact;
- Demonstration of having considered structure and diversity/ equality issues for all elements of the proposal, including governance, and awarding of flexible funds

## **Appropriateness (20%)**

- Quality and appropriateness of proposed mechanisms for monitoring and evaluation;
- Quality and appropriateness of proposed mechanisms for commissioning flexible funds, quality assurance, risk management.
- Clearly articulated strategy and mechanisms to deliver proactive engagement with users, including non-academics, at all stages of the process.

## Value for Money (20%)

- Funds requested are justified and essential, accepting that some of the research activities will be more fully defined as the Programme progresses
- Appropriateness of the scale and balance between the core Hub activities
- Appropriateness of time commitment by the PI and leadership team

UKRI will use the recommendations of the interview panel along with the overall available budget to make the final funding decision.

Applicants will be given feedback from the Panel summarising the reasons why the application was successful/unsuccessful. No further feedback will be available.

## 7. Key dates

Activity	Date
Announcement of Opportunity issued	September 2019
Community meeting (non-mandatory)	16 October 2019
Expression of Interest (Eoi) deadline	19 November 2019 (4pm)
Assessment of Expression of Interest	January 2020
Full proposals invited	February 2020
Full Proposals deadline	6 May 2020 (4pm)
Assessment of full proposals	September 2020
Decision announced	October 2020
Directorate Hub award begins	1 February 2021
Cross-Programme kick-off meeting	May 2021

## 8. Contact

For general enquiries, please contact [ggr@nerc.ukri.org](mailto:ggr@nerc.ukri.org)

If you have discipline specific queries a team is available, please contact:

AHRC: Tim Pank [tim.pank@ahrc.ukri.org](mailto:tim.pank@ahrc.ukri.org)  
 BBSRC: Roderick Westrop [Roderick.Westrop@BBSRC.ukri.org](mailto:Roderick.Westrop@BBSRC.ukri.org)  
 EPSRC: Gerard Davies [Gerard.Davies@epsrc.ukri.org](mailto:Gerard.Davies@epsrc.ukri.org)  
 ESRC: Lynette Preston [environmentandenergy@esrc.ukri.org](mailto:environmentandenergy@esrc.ukri.org)  
 NERC: Joe Taylor [ggr@nerc.ukri.org](mailto:ggr@nerc.ukri.org)  
 Innovate UK: Harsh Pershad [Harsh.Pershad@Innovateuk.ukri.org](mailto:Harsh.Pershad@Innovateuk.ukri.org)

Enquiries relating to technical aspects of the Je-S form should be addressed to:  
 Je-S helpdesk: Email: [jeshelp@rcuk.ac.uk](mailto:jeshelp@rcuk.ac.uk) / Telephone: 01793 444164