

Putting people and
communities into
greenhouse gas removal:
**COMMERCIAL AND
SOCIO-LEGAL EVIDENCE**

Summary
September 2020

Authorship

Lead Author and Analyst:

Richard Heap, Foresight Transitions

Oversight and Strategic Guidance:

Mark Workman, Foresight Transitions & Imperial College.

Advisor:

Steve Hall, University of Leeds

Advisor:

Harry Armstrong, Nesta

Acknowledgements

The report was made possible with the support from ClimateWorks Foundation. Additional support with the publication was provided by Atkins.

The authors would like to extend a special thanks to Andy Gouldson and the Leeds Climate Commission, West Yorkshire Combined Authority, Leeds City Council, and the Imperial College MSc students who contributed to the analysis. And, to all who helped with the stakeholder mapping and contributed through the workshops and interviews, recognising that many were interviewed in confidence and unattributed.

This document may be freely quoted or reprinted, but acknowledgment is requested.

About Foresight Transitions

Foresight Transitions was set up in 2017 and provides bespoke analysis based on fundamental research around financial modelling, user perceptions and experiences, technological development and regulatory and policy risks in possible futures accommodating for deep uncertainty.

We also offer a unique level of research to assist decision making under deep uncertainty across the technology transitions, resource systems, environmental and climate change issues.

Disclaimer

The information in this publication is provided for informational purposes only. Great care has been taken to maintain the accuracy of information collected and presented, however the authors do not make any express or implied warranty concerning such information. Any estimates contained in the publication reflect our current analyses and expectations based on available data and information. Any reference to a specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply an endorsement, recommendation, or favouring.

There is a growing interest in Greenhouse Gas Removal (GGR) as businesses, industry, local authorities and individuals come to terms with what net-zero carbon emissions means.

CONTEXT

In May 2019, the UK Committee on Climate Change (CCC) released a report outlining pathways to reduce emissions, with the aggregate goal of 'net zero' emissions in the UK by 2050. Established natural ways of removing CO₂ and less established Greenhouse Gas Removal (GGR) options are included to achieve emissions reductions. The report proposed that over 50MtCO₂ would need to be captured and stored in 2050 via engineered removals. Meanwhile, established land-based removals could increase the net forestry sink to over 22 MtCO₂ per year by 2050. In relative alignment with scenarios presented by the Energy Transitions Commission, a variety of land based and engineered GGR methods are considered necessary to abate emissions from the **'harder to abate sectors such as industry, freight transport and aviation'**.

The UK has enshrined the net-zero emissions target into legislation, meaning that GGR will likely be part of the government's strategy to achieve a net zero carbon reduction. The frameworks needed to govern GGR and the issues that need to be addressed are not well understood. GGR technologies will be deployed extensively across the landscape, affecting a wide range of local communities. However, little is known about how local communities will respond. If new technologies are to gain approval, it is imperative they are evaluated from a variety of framings and viewpoints, rather than purely a technical and least cost basis.

A proactive, participatory approach to engagement with local communities will identify the issues to inform the governance frameworks. How this is done is as important as the issues themselves; focussing on procedural justice will build trust and enable social legitimacy. This bottom up assessment of GGR options will identify the non-financial values, map value chains, and create insights into local business models. Focussing on this form of socio-legitimacy will not only help mitigate the negative externalities of GGR but can also engage local enterprises and open up opportunities to new commercial models and innovation. Enabling this to happen will require the oversight of a bespoke body and the idea of a national Agency reporting to government should be explored.

SUMMARY

There is a growing interest in Greenhouse Gas Removal (GGR) as businesses, industry, local authorities and individuals come to terms with what net-zero carbon emissions means. As the costs and difficulty of decarbonising parts of industry, transport, and heat demand, are revealed attention is shifting to how to address them using negative emission technologies, which remove greenhouse gases from the atmosphere (Figure 1).

However, there are diverging views about the role of GGR and which techniques should be used, as well as the costs and effectiveness.

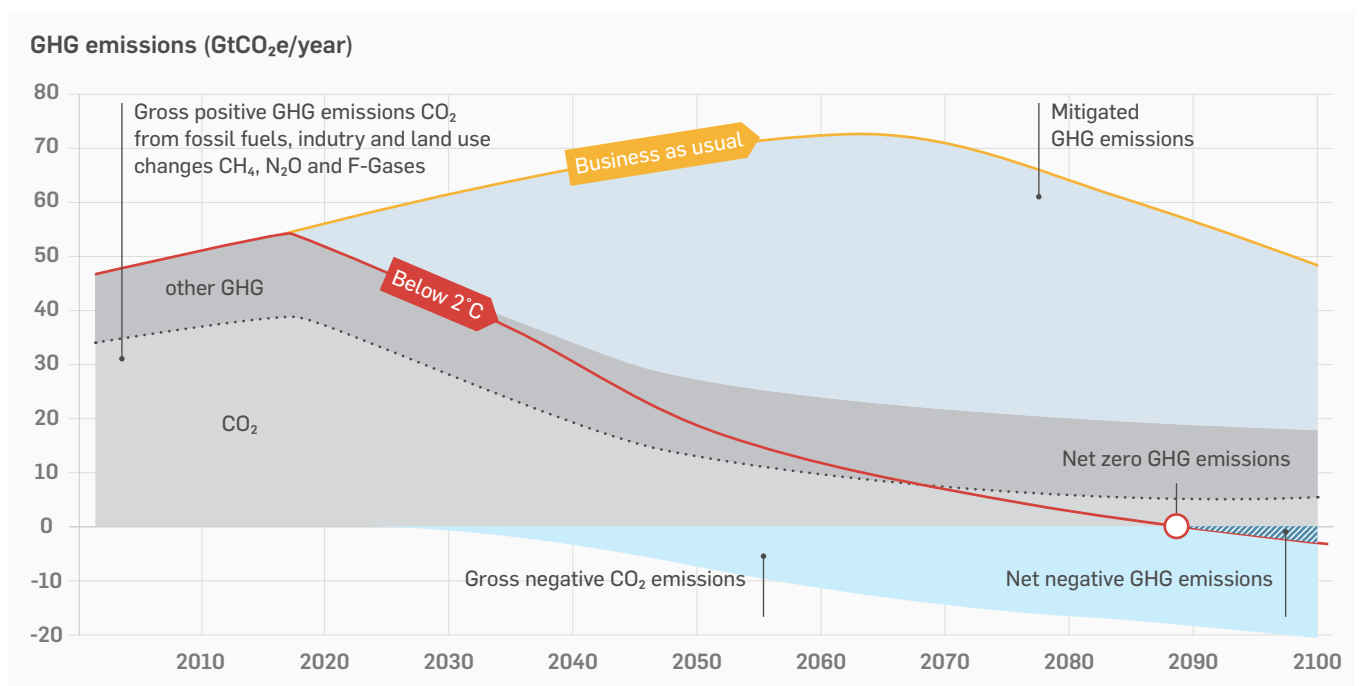
Of equal concern is how little is known about the impacts on local communities and how they will respond to large-scale deployment of GGR, even for familiar sectors like forestry and land management.

Afforestation, for example, will lead to wholesale changes to landscapes affecting the land use, agriculture, and the local communities within them. This drive for rapid land use change to tackle climate change will require a balance to be struck between priorities such as the biodiversity crisis, regional flood risks and local economic and cultural interests.

How these issues are addressed will have a significant impact on the rate and scale of deployment of land based GGR technologies.

Proactive engagement with local communities and interested parties will help anticipate the issues, allowing deployment proposals to adapt and appropriate governance structures to emerge. Participation will engender trust and enable the proposals to be regarded as socially legitimate.

Figure 1. A global emission trajectory for staying below 2°C of global warming (Source UNEP 2017)



Experience in other sectors has shown that failure to invest time and effort into good engagement with local communities around large infrastructure proposals can lead to disruption, for example, onshore renewables and fracking. This emphasis on process is lacking in the current legal requirements for engagement.

A more strategic, anticipatory approach is needed than has been used to date. This approach needs to convene the various interests and explicitly address these issues face to face, to build trust, social legitimacy, and new institutional capabilities. Working across sectors and interests a co-productive approach will raise understanding, inform the development and design of the proposals, so as to overcome the barriers to GGR. It can also help realise any opportunities it might bring to the communities.

Scale of GGR required in a short timeframe

Achieving the Paris climate ambitions of remaining below 1.5°C means that, even with aggressive mitigation effort, the UK will need a portfolio of GGR techniques to draw down about 100 million tonnes of CO₂ per year by 2050, and beyond. Globally the GGR economy could reach the giga-tonne scale, requiring industries two to three times the size of the current oil and gas sector. At present, the combined global negative emissions effort is less than a few thousand tonnes per year.

The rate of development and scale up of new infrastructure and industries will be substantial. With a limited amount of time and space to develop and deploy GGR options any delay risks constraining these options, at the time when we might need them most.

However, the governance frameworks to ensure the appropriate use of these new industries, and enable this transformation, are fragmented and inadequate. Without this there is a risk that demand for GGR will outstrip supply, leading to socially unacceptable practices and putting at risk the objective of achieving net-zero. Development of the governance frameworks should be informed by the issues emerging from early engagement, as tested in this project.

The tendency to regard engagement as a means to deal with negative externalities and a hurdle to deployment needs to shift to one where it adds value and can enable opportunities. Engaging local enterprises can lead to new commercial opportunities and innovation.

Understanding the opportunities and challenges and how to enable or resolve them will give a clearer picture of the potential role that GGR will play in mitigating climate change.

The project

This project sets out to explore what deploying the various GGR options would look like on the ground and understand the implications from the bottom up. Using the Yorkshire region in the United Kingdom as a case study, it sought to identify the interested parties and stakeholders and explore how enhancing participation in decision making could facilitate socially legitimacy.

The project considers five main GGR options: Afforestation, Bioenergy with CCS (BECCS), Direct Air Capture, Biochar and Enhanced Weathering. It also notes the role of other nature-based solutions including peatland restoration and protection. Scenarios for how each option might be deployed in the Yorkshire region are used to inform the engagement.

An extensive literature review combined with interviews was used to identify the governance aspects for the GGR technologies and create local scenarios. Local networks and stakeholder mapping were used to identify a broad range of stakeholders and interested parties. Over 100 interviews were conducted to identify the issues and perspectives along with the underlying governance needs. A workshop, focussed on afforestation, explored the specific issues. A follow-up co-production workshop prioritised the main challenges and identified enabling actions. In total over 30 local organisations and stakeholders were engaged in the workshops.

Findings

The project found that the scale and breadth of each GGR technology means there will be a wide range of parties that will have interests and concerns. Any process will need to balance national and local interests.

Social attitudes and perspectives are altered by proximity to any development. For example, whilst tree planting may be widely regarded as positive, large swathes of forests across landscapes do not always fit with local cultural identity and farming practices. With land use being an important factor in GGR, local concerns about distributional burden between regions may be balanced with other factors such as job creation. Similarly, large industrial clusters forming around Carbon Capture Utilisation and Storage (CCUS) infrastructure may provide local employment but be resisted by national interests on the basis of their feedstock, trust in the operators, or in the science behind geological storage.

i) What will deployment of GGR look like?

A key finding is the limited awareness and understanding of the range of GGR options, even amongst those professionally engaged with climate change mitigation. With many of the GGR options yet to be demonstrated, much of the knowledge is held by the developers, and has yet to find a series of outlets trusted by each stakeholder.

Understanding the potential impacts of the options, without any real-world examples, requires generating a representation of the technology. Framing becomes important as specific aspects of the techniques can easily become associated with existing concerns, which may or may not be helpful.

This work discovered a clear divergence of views about the various GGR options including which ones might be acceptable in any region. This study examined one region to see how much agreement existed; even the need for GGR was far from agreed.

Participants challenged the assumptions used in the national and international scientific modelling, and, as many of the options have yet to be demonstrated at scale, uncertainty was cast over the available performance data and costs.

There was broad-based agreement that GGR should be reserved to address only the 'residual', hard or expensive to treat, emissions. A key priority, from the interviews, is the need for a strategic level framework, to set out how this will be determined and implemented, to ensure GGR is not used for "mitigation avoidance".

ii) Complexity

A common factor to all the GGR options is that the value stack³ for each is complex, aligning financial and non-financial benefits to support proposals. The value chains also cross several economic sectors so investors building business cases will need to gain new confidence and capability in those which they are likely unfamiliar with, for example, farming and land use sectors, agricultural policy and energy markets.

The scale and extent of some GGR options means trade-offs between non-financial values, such as biodiversity and aesthetic and cultural perceptions are unavoidable.

This complexity is illustrated by afforestation, which, outside of Scotland, is struggling to find available land for tree planting. The GGR scenario developed for Yorkshire would see a doubling of tree cover, a five-fold increase above current regional programmes for flooding alleviation and planting of a new National Forest. This will require building skills and capacity and ensuring future markets for timber, to secure the carbon indefinitely.

iii) Recognising non-financial values

The Northern Forest is an ambitious plan to substantially increase tree cover across the North of England, currently one of the least forested areas of Europe. However, current programmes are already struggling to meet their goals, constrained by the availability of land due to regulatory, commercial, cultural and social constraints.

³ A Value Stack considers the various revenue streams and factors in how the additional diverse non-financial values can affect and determine the overall benefit.

These constraints include Sites of Special Scientific Interest (SSSI) and archaeological significance, as well as Area Plans that define permitted activity, such as National Parks and Areas of Outstanding Natural Beauty. Landowners and tenant farmers in this research raised concerns about long-term contracts for tree planting and liability and ensuring the permanence of the woodland, which will require an incentive mechanism that addresses the lock-in and long-term business models.

These stakeholders also highlighted the cultural aspects of changing their farming practices and business models, which, for some, was their personal and family's identity. It would also require retraining. Even with substantial assistance and transaction costs covered, landowners were reluctant to commit to planting new woodland.

Forestry and carbon removal will need to fit in with the wider landscape design and management which includes addressing the biodiversity crisis and flood alleviation. However, planting broadleaf woodlands comes with a lifetime maintenance cost, whereas the most cost-effective option for carbon removal is fast-growing coniferous plantations. Dense coniferous plantations, however, offer little value for biodiversity. Strengthening of the evidence base for carbon sequestration rates and capacity of different species, planting regimes and soils will be needed to inform decision making.

The need for a strategic framework for land management was emphasised. A framework that can align economics, policy, and regulation to allow business models to capture value from land use change / tree planting. However, to do this will require a wider discussion and debate across society about choices for land use and landscapes; a debate which is becoming increasingly polarised.

Given the scale of change that is envisaged, this cannot be done through a simple consultation. It is critical this polarisation is addressed in open public fora. It will require a more deliberative approach that builds a social understanding of the issues.

Recommendations

The use of GGR to help address climate change will have a transformative impact on mitigation strategies. It will also require the creation and rapid expansion of new industries.

However, there are fundamental gaps in the governance frameworks for GGR at a strategic level and at a local level.

The government departments for Business, Energy and Industrial Strategy (BEIS), Transport (DfT) and Department for Environment, Food and Rural Affairs (DEFRA) should adopt an Anticipatory Governance approach to the development and deployment of Greenhouse Gas Removal and achieving the net-zero target. This will help identify and inform the development of the governance frameworks that will need to be put in place.

- » **Greenhouse Gas Removal is integral to achieving the net-zero target, but a clear understanding is needed of the role it will play in abating climate change and how it integrates with reducing emissions.**

Perspectives are already becoming polarised. Proactive and participatory engagement will allow issues to be identified in advance and a balanced consideration of any concerns and opportunities.

- » **Strategic guidance and governance are needed on how GGR integrates with other policy priorities particularly agriculture, biodiversity, and energy.** This will need to integrate learning from local developments with top down strategic guidance and scientific input. The issues identified at a local level highlight where GGR deployment will be contested by other policy objectives and incentives.

- » **A proactive participatory approach should be integrated into planning law, with clear guidance for developers and local authorities on how public engagement should be undertaken. This will integrate procedural justice into the development of GGR proposals which is fundamental to social legitimacy.** Planning law is currently the primary point of engagement for GGR, but its current vague specifications do not promote procedural justice and social legitimacy, which risks projects being disputed and delayed.

Multiple issues will arise when GGR technologies are deployed into local communities and regions. These will define the scale and rate at which the technologies will be deployed. How these perspectives are addressed is as important as the issues.

- » **Local and regional authorities will need to value carbon removal and sequestration and integrate it into local and regional development plans, to avoid conflicting objectives.**
- » **Technology developers along with central and local governments should focus on raising awareness and understanding of GGR and the technologies. This capacity building is essential to enable more informed decision making.** Few people are aware of GGR technologies, which will reduce the value of the insights that can be gained by developers when presenting project proposals. Proactive engagement will help raise awareness and build the understanding and capacity.
- » **A national level discussion led by BEIS, DfT and DEFRA, is needed to explore the assumptions about GGR and to understand the role of the different options in mitigating climate change.** This should explore the multiple dimensions that will need to be considered and be informed by local perspectives. National discussions should be used to inform the development of the strategic governance frameworks. A range of tools and media have been developed to enable this.

Demonstration projects for emerging GGR technologies should incorporate local engagement e.g. BBSRC GGR Demonstrator project. While the focus is often on technical and commercial learning, local engagement would identify wider issues that could affect commercial deployment, which could be incorporated into the design. It could also identify new opportunities. The technologies would benefit from wider awareness and understanding, which would raise their legitimacy.

Current governance frameworks for GGR are fragmented, with some clear gaps that need to be addressed. Stimulation of the development and deployment of GGR, whilst avoiding undermining efforts to mitigate emissions, will be essential, together with managing the wider impacts of deployment.

- » Developing these frameworks is urgent and the **establishment of an independent body with responsibility for GGR should be a high priority.**
- » **A GGR Agency is proposed that would oversee the recommendations outlined above with responsibility for the development of GGR strategy, manage its implementation and monitor its impact.** It would oversee the engagement and participatory activities required to deliver successful outcomes. Agency stakeholders would include public-private enterprises, local communities, developers, industry, civil society and NGOs and policy makers.
- » **The Agency would report to Government through the three departments of BEIS, DfT and DEFRA.**
- » **The Agency would interact internationally to harmonise policies and standards,** including with the European Commission and EU regulatory frameworks post-Brexit.

FOR MORE INFORMATION CONTACT:

info@foresighttransitions.co.uk