

A Snapshot into UK Climate-tech Innovation

Steps to deliver real green growth

December 2022

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About the Climate-tech Policy Coalition

The Climate-tech Policy Coalition consists of the The Coalition for a Digital Economy (Coadec), Tech Nation, TechUK and the Centre for Climate Change Innovation (CCCI). Together they represent a cross-section of entrepreneurs, inventors and innovators on the forefront of climate technology, or climate-tech.

Its mission is to help unlock the economy of the future: a low, to no, carbon future of green growth fuelled by British entrepreneurs.

From June to October 2022, the Climate-tech Policy Coalition undertook an intensive series of roundtables with entrepreneurs and startup colleagues covering nine critical sectors.

These roundtable discussions were completed under the Chatham House rule, with subsequent follow up sessions held with additional firms meaning that in total, over 100 firms participated in this project. The narratives and recommendations coming out of this exercise are captured in this report.

The objective of this report is to equip policymakers and regulators with tangible steps to unleash the economy of the future, an economy that is low-carbon and lucrative.

About Coadec

Coadec is an independent advocacy group that serves as the policy voice for Britain's technology-led startups and scale ups. Coadec was founded in 2010 by Mike Butcher, Editor-at-Large of technology news publisher TechCrunch, and Jeff Lynn, Executive Chairman and Co-Founder of online investment platform Seedrs.

Coadec fights for a policy environment that enables early-stage British tech companies to grow, scale and compete globally. We have over 2000 startups in our network and have been instrumental in building proactive coalitions of businesses and investors on issues that are integral to the health of the UK's startup ecosystem. Our work has seen many successes, from the establishment of the Future Fund and the expansion of the Tier 1 Exceptional Talent Visa, to the delivery of the UK's Patient Capital Fund.

About Tech Nation

Tech Nation fuels the growth of game-changing founders, leaders and scaling companies so they can positively transform societies, environments and economies. Tech Nation provides them with the coaching, content and community they need for their journey in designing the future. Through its Net Zero Programme, Tech Nation specifically supports the growth of the most impactful climate tech companies in the UK.

About techUK

techUK is the UK's leading technology membership organisation, with more than 850 members spread across the UK. We are a network that enables our members to learn from each other and grow in a way which contributes to the country both socially and economically. By working collaboratively with government and others, we provide expert guidance and insight for our members and stakeholders about how to prepare for the future, anticipate change and realise the positive potential of technology in a fast-moving world. techUK launched in 2013 to champion the technology sector and prepare and empower the UK for what comes next, delivering a better future for people, society, the economy and the planet.

About Undaunted

Undaunted, previously the Centre for Climate Change Innovation, is a multi-stakeholder partnership at the heart of London and the UK's climate change innovation community led by the Grantham Institute at Imperial College London and the Royal Institution.

We bring together key stakeholders in London to speed up, grow and scale the solutions we need to face the climate crisis. We do this by stimulating and housing dialogue with policymakers, entrepreneurs, academics, innovators, investors and the public to enable solutions and actions to scale up and commercialise as rapidly

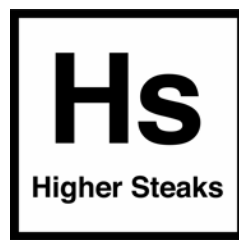
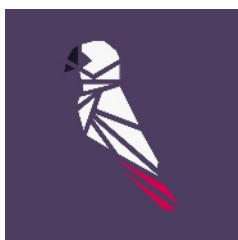
as possible to ensure a just and sustainable future. We run an accelerator programme called the Greenhouse for early-stage climate innovators and deliver training programmes on climate innovation, amongst other activities

Physically located in London, we also have a UK-wide and international outlook. We are leading catalytic interventions with strategic partners to make London a world-leading nexus for climate innovation in all its guises by co-creating, embedding and showcasing the solutions needed and connecting to other centres in

Acknowledgements

We are indebted to the startups that participated in the ten roundtable discussions that produced these pamphlets. The authority and integrity of the recommendations hereafter stem from the real experiences of climate-tech entrepreneurs at the vanguard of the economy of the future.

Selected Participants

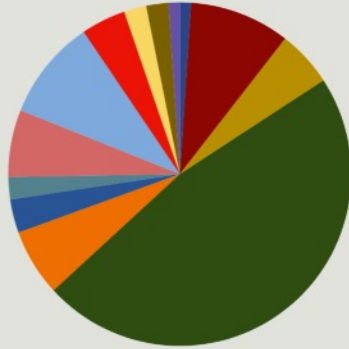




Breakdown of Participants

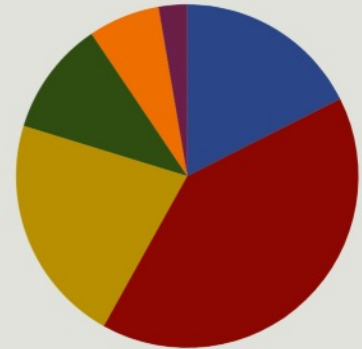
Location

- East Midlands - 1%
- Eastern - 9%
- International - 5%
- London - 47%
- North East - 6%
- North West - 3%
- Northern Ireland - 2%
- Scotland - 6%
- South East - 9%
- South West - 4%
- Wales - 2%
- West Midlands - 2%
- Yorkshire & Humber 1%



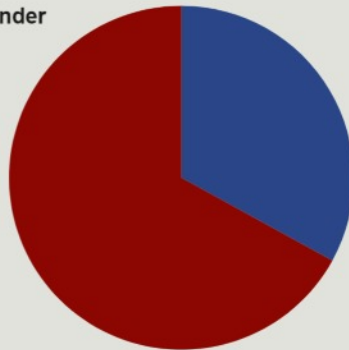
Number of Employees

- <5: 18%
- 10-24: 41%
- 25-49: 22%
- 50-99: 11%
- 100-499: 7%
- 500-999: 3%



Founders

- At least one female founder
- No female founders



Fundraising

Median
Fundraise:
£2,750,000

Mean
Fundraise:
£28,400,000

Introduction: The State of Climate-tech Today

Entrepreneurs are turning their attention to some of the greatest challenges humanity has ever faced, whilst seizing an almighty opportunity.

Innovators across the UK are seeking to mitigate the impact of climate change by decarbonising the economy root and branch, as well as reducing other impacts such as biodiversity, particulate pollution, eutrophication, and water and land use. And, as climate change is already impacting societies today, founders are developing adaptation tools and technology at pace to minimise disruption caused by already locked-in climate change. There is also an urgent need to know more about climate change to understand the different ways to mitigate its effects as well as predict its future impacts on assets, societies and markets.

Crucially, firms in these three key areas represent the next economy, a paradigm shift with significant economic upside. They are also a fundamental part of combating climate change, as identified by the centrality of technology transfer and innovation in the Sharm el-Sheikh Implementation Plan.¹

The UK's net zero ecosystem already contributes around £60bn per year to the UK economy, supporting over 760,000 jobs.² Investors agree that climate-techs present an opportunity, ploughing \$222bn into the sector between 2013 and 2022. Globally, there are now 160 climate-tech unicorns, valued at over \$1bn each, with 9 based in the UK. These make up just under 7% of the UK's total number of tech unicorns, and there are a further 19 future climate tech unicorns, currently valued between \$250mn - \$800mn, showing a healthy pipeline of climate pioneers in the UK. The UK is second only to the US for the number of companies working to address the climate crisis, with over 5,200 climate-tech companies in the UK to date.³

The UK is a hotspot for climate-tech innovation today, powered by an established venture capital ecosystem, world-class regulations, and impatient, talented entrepreneurs. After the Bay Area in California, London is the most active climate-tech hub in the world.⁴ Climate-tech firms are a source of well-paid jobs, attract world-class talent and evidence suggests that the "spillover effect" of indirect downstream innovation and economic growth is greater for climate-techs than other firms.⁵

But this new economy is being stalled.

While the onus is on climate-techs to prove their value to the market, the existing policy and regulatory regime in the UK features numerous barriers to climate-tech innovation, particularly around scaling and deployment. These hamper climate-tech entrepreneurs and stunt the chances of the UK seizing the opportunities of the next economy.

The Climate-tech Policy Coalition was created to shine a light on the issues with this incumbent regime, and crystallise a selection of tangible actions that the Government can take to reduce or remove systemic barriers. Crucially, the recommendations included in this report are the product of consultation with entrepreneurs themselves. Together, they represent a blueprint for unleashing the next economy.

The main takeaway from this exercise is that the opportunity is ours for the taking, but if we don't, somewhere else will beat us to it.

Overview of Policy Recommendations

Cross Sector Recommendations	Ensure there is stable policy environment with strong net zero goals and signals to ensure market creation and resilience to climate impacts	Help climate-tech firms to bridge the “Valley of Death”, starting by adjusting the pension charge cap	Establish a Net Zero Innovation Directorate in the Cabinet Office
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Energy	GHG Removal	Food & Agtech	The Built Environment	Transport & Mobility	Waste & Packaging	Industrial Decarbonisation	Carbon Accounting	Nature Based Solutions
Introduce an “Innovation Pot” into the CfD regime	Update the Climate Change Act ‘UK Removals’ Definition	Novel Food Authorisation Reform	Replace EPCs	Pass the Transport Bill & Introduce the LZEV Category	Standardisation & Labelling for Compostable Materials	Introduce an Office for Carbon Removal	Carbon Accounting Standards	Reinstate ELMS & Incentivise Innovation Adoption
Fast Track Open Energy	Deliver the Rec’s of the MRV of GHG Removals Task and Finish Group	Reform Food Labelling	Make Funding Under the ECO more Accessible	Nationwide Low-carbon Mobility Sandboxes	Integrate Innovative Packaging Materials and Reuse into Government Strategy	Increase Government Procurement of Low Carbon Materials	Call for Evidence on Data for Carbon Accounting	Incorporate Nature Based Solutions into the UK Emissions Trading Scheme
Explore the Concept of an Ofgem Policy Sandbox	Take Actions to Establish a Market for GHG Removal	Agricultural Autonomous Robots Regulations Reform	Pass the Carbon Emissions Building Bill	A CfD Regime for Green Hydrogen	Introduce a Sandbox for Innovative Use of Waste Products		Subsidise Access to Decarbonisation Tools	

Measures to Help the Entire Sector

Ensure there is stable policy environment with strong net zero goals and signals to ensure market creation and resilience to climate impacts

Help climate-tech firms to bridge the “Valley of Death”, starting by adjusting the pension charge cap

Establish a Net Zero Innovation Directorate in the Cabinet Office

Ensure there is a stable policy environment with strong net zero goals and signals to ensure market creation and resilience to climate impacts

Startups operate under a perennial degree of risk, and climate-tech entrepreneurs are no different. Founders often innovate with limited budgets, time and resources, and rely on investors or institutions to back an idea or primitive product in the hope that one day they will change the game. While markets are powerful drivers of change, the Government has a role to play in mitigating risk and correcting failure.

Firstly, where industries are impacted by outdated regulation that locks in fossil-fuel intensive practices, it is important that the Government supports regulators to orient towards outcomes through legislation. Secondly, markets are often not optimally efficient in valuing investment in innovation, and consequently Governments can mitigate this failure by incentivising actions and reducing risk exposure.

Across both dynamics, the Government’s strategic vision is also crucial, setting the mood music for entrepreneurs, investors, and the broader business community.

Governments that want to become the epicentre of the economy of tomorrow must be clear that net zero is a priority for growth and that political leaders are primed to take the necessary action. It is also vital that Governments recognise locked in climate change, and that steps are taken to adapt to the new reality and entrench resilience.

Chris Skidmore’s review of net zero, which concluded in October 2022, was a helpful opportunity for actors across the economy to confirm that investment in climate mitigation, adaptation and knowledge as part of a transition to Net Zero emissions by 2050 is good for the UK economy.⁶

Startups on our roundtables agreed that it is vital that the UK Government remains at the forefront of global climate action: this is good for the planet, and good for growing the lucrative climate-tech sector.

In practice, this commitment includes investment in critical infrastructure, such as renewable energy generation and pipelines and storage facilities for greenhouse gas removal. The UK should harness tools like the capital allowance regime to incentivise investment in technological upgrades as evidence of this

commitment. While the First Year Allowances regime explicitly refers to expenditure on electric vehicles and associated infrastructure, the enhanced capital allowances scheme for energy-saving and environmentally beneficial (water efficient) technologies ended in 2019. It is important to optimise incentive schemes to maximise the investment in green technologies as part of the UK's transition to a net zero, resilient future.

Further, one explicit action that the Government could take to demonstrate its commitment to using innovation as a tool to combat climate change is to operationalise the Advanced Research and Invention Agency (ARIA) and ensure it has a strategic focus on climate-tech.

Introduced in 2021, ARIA has the potential to revolutionise the funding of innovative companies in the UK, including climate-techs. ARIA could be the flagship of innovation strategy in the UK if it emulates the successes of the US Defense Advanced Research Projects Agency (DARPA) upon which it is based. Since the 1950s, DARPA has supported projects that led to the creation of the internet and the global positioning system (GPS).

In 2009, DARPA spun out an agency, ARPA-E, dedicated to fostering innovation in energy, including supporting the development of technologies that accelerate decarbonisation and the transition to net-zero, as well as promote energy security. ARPA-E has provided over \$3.06bn in the 13 years since, funding more than 1,300 transformational energy projects.⁷ These projects have secured 25 exits as of April 2022, with the firms therein valued at over \$21bn.

We call for climate-tech to be a core priority of ARIA, with consideration for a specific division within the agency, which could be called ARIA-NZ, dedicated to technologies that will rapidly accelerate the transition to net zero greenhouse gas emissions in the UK and around the world.

To maximise its utility, ARIA-NZ could be home to a range of Focused Research Organisations (FROs), which could prove promising for the development of technologically complex and nascent climate technologies. As identified in a recent report by The Entrepreneurs Network, the Tony Blair Institute for Global Change, and Convergent Research, FROs are structured to deliver time limited, quantifiable progress in transformative scientific research.⁸ FROs are run by a mix of technical founders and academics with a defined objective and finite duration, to focus on projects that are big, complex and not directly profitable.

Notably, we heard extensively during the roundtables that the UK is world-leading in climate invention and early stage technology development. Consequently, while initiatives like ARIA are helpful in shoring up our advantage, they must not come at the expense of support for later stage technology development and commercialisation. This later stage is where there is much work to do.

Help Climate-Tech Firms Bridge the 'Valley of Death'

Colleagues from multiple roundtables explicitly referred to the "valley of death phenomenon", whereby generous support for early stage technology readiness level (TRL) innovations is not matched with support for progressing commercial readiness level (CRL) or market readiness level (MRL). As a result, firms are able to get their proof of concept to the point of mass production but then see funding options drop off a cliff as they require a commercial track record to appeal to most venture capital investors (VCs). This phenomenon is particularly acute for the ideas that require significant investment at that next stage, including engineering, deep science and technical innovations.

This means early stage climate-tech innovators, who are often subsidised by the British taxpayer in the early stages, are being plucked at the point of commercialisation because the UK is not supporting their later stage development sufficiently.

Other countries have exhibited a will to take bigger risks in investing in climate-tech startups than the UK, and sometimes approach them directly to try and lure them away, including to Continental Europe. Ultimately, this pattern could lead to some of the UK's brightest startups leaving the UK, meaning the extensive help at the earliest stages from UK investors and the Government benefits another country down the line: the British taxpayer could subsidise the next generation of climate-tech unicorns headquartered abroad. Indeed, in the energy sector this pattern also conflicts with the increased prioritisation of energy security after Russia's invasion of Ukraine. We should be focusing on efforts to grow domestic energy production using innovative technologies, and keep them here.

The Government could help unlock investment by enabling financiers to invest at different stages. One significant step in this direction would be to adjust the pension charge cap to allow pension funds to invest in some higher risk activity that could support disruptive firms caught in the valley of death. The pension charge cap is currently set at 0.75% for defined contribution (DC) occupational pension schemes. The charge cap prohibits pension exposure to higher risk, but potentially higher reward investments like startups. This is because venture capital fees are significantly higher than passive asset classes with lower returns (equities) due to the costs of managing an unlisted portfolio of companies, which translates into a performance fee.

Concerns around the additional risk should certainly be considered, and therefore the allocation of funds to high risk assets should be proportionate. A British Business Bank study has shown that allocating only 5% portfolio allocation in startup investments appropriately balances against the risks of investing - protecting retirement savings.⁹

Adjusting the pension charge cap will also complement the Government's new Long Term Investment for Technology and Science (LIFTS) competition, which will provide up to £500m to support new funds mobilise pensions and other investor capital into advanced R&D.¹⁰ Alone this would not be a panacea, but would be a useful first step in opening up institutional finance to fill the 'valley of death' funding gap.

Establish a Net Zero Innovation Directorate in the Cabinet Office

In February 2022, Coadec published a report outlining its thoughts on how to unlock climate-tech entrepreneurship in the UK. This included the need to promote accessibility and interactivity between climate entrepreneurs and the Government. This could be achieved through the introduction of a new Net Zero Directorate within the Cabinet Office that should act as the 'war room' for the UK's net zero response.

While the Directorate would function as a gatekeeper for climate-tech firms, this entity would also be tasked with identifying climate innovation opportunities across government, including where updates of the regulation and legislation are required to unlock green growth and reduce multiple types of environmental impact. The concept of innovation and regulatory 'sandboxes' feature extensively in this report, and the Directorate would be a useful coordination body to understand opportunities to leverage best practice and build interoperability between sectors.

We also recommend that the new Net Zero Directorate sitting in the Cabinet Office operate an 'open door' for climate-tech. Startups are time and resources poor. Initiatives such as 'office hours' enable startups to easily identify who to talk to, as well as give them a place to communicate concerns and share their vision.

An open door to startups should also help the government avoid decisions that unintentionally hurt the sector. This would allow startups to feel part of the process and less like they are always playing catch up, trying to convince the government to reverse policies and regulations that would stifle innovation and restrict the UK's success in realising the opportunities of the net zero transition.

With Alok Sharma's time as COP President now over, we see an opportunity to leverage the expertise and infrastructure assembled over the past year to be put on a more permanent footing within a Government committed to net zero.

Energy

What is the Energy Sector?

We defined the energy sector as including primary energy supply, firms operating in the surrounding supply chain and infrastructure, firms engaged in the energy transition, and software-as-a-service (SaaS) firms providing innovative software to support businesses and consumers interacting with energy data and optimising demand.

Roundtable Takeaways

Against the backdrop of an unprecedented energy crisis, we held two roundtables with innovators in the sector.

Some colleagues that attended the sessions had previous experience interacting with the regulatory sandbox operated by Ofgem. The sandbox is an initiative that enables innovative firms to operate in the energy sector without strict adherence to, or outside of, the full Ofgem rulebook.

While there was near consensus that the sandbox is useful for innovation in the energy market, some roundtable participants felt that it is underutilised. Knowledge about the sandbox was inconsistent, with some participants unaware that recent changes mean a form of advanced regulatory assurance is now provided by Ofgem. We heard from multiple sources that the Ofgem sandbox could be developed to accommodate products and services that require 'policy' innovation to also be tested. This is an interesting concept, and could enable the trialling of alternative business models alongside innovative and distributed renewable supply, however would need careful design.

The desire and need for a systems approach to energy innovation was a repeated theme with colleagues referring to examples of products, like heat pumps, which are impacted by the strategies and policies of multiple departments. The interaction between hardware and software featured extensively in our roundtables with energy climate-techs, including specifically on the interaction between intelligent demand side response and storage capability.

Multiple energy startup founders referenced the "valley of death" phenomenon. Startups in the energy sector can be extremely capital intensive, and the stage where assets have been purchased and must now be maintained while the company remains pre-revenue, can be very precarious indeed. One roundtable attendee said "we have a great startup mentality in the UK, but we don't know how to scale up". Multiple attendees predicted that this funding gap is, and will increasingly be, plugged with financing from abroad, from countries with a bigger risk appetite than the UK.

Steps to Unlock Energy Innovation

**Introduce an
“Innovation Pot” into
the Contracts for
Difference regime**

Fast track Open Energy

**Explore the Prospect of
a Policy Sandbox**

Introduce an “Innovation Pot” into the Contracts for Difference regime

The Contracts for Difference (CfD) mechanism enables renewable energy generators to bid for contracts with the government-owned Low Carbon Contracts Company (LCCC) to produce energy in exchange for a flat (indexed) rate. The rate equals the difference between the “strike price” cost of investing in renewable energy technology and the “reference price” measure of the average market price for electricity in the UK.

In the fourth allocation round (AR4) in December 2021, the CfD pot structure grouped early stage technologies with remote island wind and floating wind in Pot 2.¹¹ Under this design, renewable energy generated by earlier commercial readiness level (CRL) technologies cannot compete on price with the mature technologies, locking in the perpetual cycle of CfD contracts going to the more established renewable technologies. It is not aspirational to continue to ring fence certain technologies, such as was the approach with tidal stream and floating offshore wind in AR4. This requires the Government to “pick winners” and is an unsustainable approach to enabling innovation across multiple technologies.

We propose that the introduction of an additional “innovation pot” would be a more sustainable way of building in support for earlier stage technologies.

It is important that this structure would be value for money for bill payers, meaning careful consideration would be needed to determine the budget of a fourth pot to manage risk. However an innovation pot would assist early stage technologies to take a big step towards commercial viability, as demonstrated by the success of mature technologies that have benefited from the regime.

Fast Track Open Energy

The increasing digitisation of energy data through the roll out of smart metres has created the opportunity to enable consumers to use their energy use data meaningfully. Meanwhile, the UK has become a leader in financial data portability through the roll out of Open Banking through the 2017 CMA Order and the implementation of PSD2.¹² Over six million UK customers have used services powered by open banking.

The Data Protection and Digital Information Bill (or Data Reform Bill for short), tabled in July 2022 will equip Secretaries of State with the “power to make provision in connection with customer data”.¹³ In essence, this ‘enabling legislation’ will provide the mandate to expand consumer data portability across the economy: consumers will be able to consent to connect their data to service providers. **Energy data, and specifically smart meter data, should be prioritised by the Business Secretary as a next Smart Data ‘scheme’.**

The approach outlined in the Data Reform Bill ensures that each sector can be implemented in a proportionate way that accounts for the specific dynamics of the actors and data sets in that scheme. Fortunately, the foundations of this scheme is already underway through the Open Energy programme being run by one of our roundtable participants, IcebreakerOne,¹⁴ alongside the Smart Metre Energy Data Repository Programme.¹⁵

Smart Data will open up a new frontier of innovation and competition across the economy by decoupling service provision from the data derived from the provision of services. Smart Data also puts control back in consumer and small businesses hands. Research commissioned from BEIS, for example, found that the average small business could save around £35,000 through Smart Data schemes in banking, finance, energy and telecoms.¹⁶

Explore the Concept of an Ofgem Policy Sandbox

The Ofgem Sandbox can be a superb resource for innovating under the status quo of governance and energy policy, however participants in our roundtables raised the issue that this has limited utility in identifying opportunities for policy intervention through the lens of climate-techs. **Consequently, we advocate that the UK government explore the concept of a policy sandbox, drawing on the facilities already available and from experiences abroad.**

One promising option is the development of physical sites designed to test low carbon energy, such as the Hydrogen Village at Ellesmere Port or the National Grid's Deeside Centre for Innovation, that could provide a testing ground for new products and services that may point to opportunities for policy development.^{17 18} Beyond the UK, the experience of the DELTA project in Darmstadt, Germany may provide a blueprint for identifying energy transition policy innovation at scale.¹⁹ Regardless of the final approach taken, we advocate that the UK's climate-tech innovators are placed at the centre of a scheme designed to trial policies for a low-carbon energy future.

Greenhouse Gas Removal (GGR)

What is the Engineered Greenhouse Gas Removal Sector?

Our roundtable focussed on firms removing greenhouse gases (GHGs) from the air using technological means (as opposed to nature-based biological processes). Our group included direct air capture (DAC) of GHGs and firms involved in carbon capture and storage (CCUS), often associated with intensive GHG emitters such as heavy industrial facilities. It also included the surrounding supply chain and infrastructure.

Roundtable Takeaways

One of the first themes that emerged was that it was important for GGR to become a priority of the Government's net zero agenda, with GGR now forming a central part of the latest carbon budget set by the Climate Change Committee.²⁰ A December 2020–October 2021 call for evidence concluded that “net zero will not be feasible without engineered greenhouse gas removals”.^{21 22} For firms participating in our roundtable, it was not certain that this shift from ‘nice to have’ to ‘necessity’ has occurred.

Linked to this reality that removing GHGs must now be a core part of net zero agendas, we heard from multiple stakeholders on the roundtable that they were ready to relocate their businesses to other countries, unless there were clear actions from the UK government to support the GHG removal sector. This is not a case of impatience, but a pragmatic reflection of the sector being taken more seriously abroad.

Roundtable attendees emphasised that the GGR sector requires significant capital investment in underlying physical infrastructure, including the means to transport and securely store captured GHGs. Alongside the physical assets themselves, there also needs to be more clarity around the cost of using pipelines, the quality standard for captured gases like CO₂, and the timing of payments.

Simultaneously, there must be the cultivating of regulatory infrastructure too, in the form of carbon markets and rules, permitting and regulations around storage to minimise leakage. Some attendees also flagged that there is also a lack of governmental clarity on monitoring, reporting and verification (MRV), vital to the integrity of the GHG removal industry, and wider carbon crediting more generally. As one participant put it, “a carbon credit is for life, and not just for Christmas”. These requirements are additionally important with the expanding voluntary carbon offsetting market, expanding UK Emissions Trading Scheme (ETS) and the consequent increase in demand for carbon credits.

Some participants were critical of the generous extent of grandfathering of emissions permits in the ETS, as the main driver for greenhouse gas emissions reductions in the heavy industrial and power sectors, with a broader concern that while the emphasis has been on ‘sticks’ to compel decarbonisation so far, there is a conspicuous lack of ‘carrots’ to incentivise investment in carbon efficiency. To that end it is important for the Government to expedite work in defining business models for GHG removal.

Steps to Unlock GGR Innovation

Update the Climate Change Act 'UK Removals' Definition

Deliver the Recommendations of the MRV of GHG Removals Task and Finish Group

Take Actions to Establish a Market for GHG Removal

Update the Climate Change Act 'UK Removals' Definition

One of the simplest ways in which the Government could demonstrate its commitment to mechanical GGR is to enable the technology to support the UK's legally imposed carbon budgets. Under the current wording of the 2008 Climate Change Act, a removal of greenhouse gases "means removals of that gas from the atmosphere due to land use, land-use change or forestry activities in the United Kingdom".²³ As a consequence the UK's carbon budgets cannot include GHGs removed using other methods. **This should be amended to include GHGs removed using a wider range of technologies.**

Set Clear GHG Removal MRV Requirements

Monitoring, reporting and verification are vital elements of a functioning GHG removal sector, both mechanical and ecological. If the integrity of the sector is doubted through incompetent or inconsistent measurement, erratic reporting or the possibility of stored GHGs leaking, at minimum this will detract investors and businesses, but more fundamentally it will undermine the net zero transition.

BEIS should deliver the recommendations of the MRV of GHG Removals Task and Finish Group.²⁴

This includes developing detailed MRV protocols for each type of GGR, as well as establishing an independent function to sit between private GGR firms and the Government, responsible for enforcing the MRV requirements. This new regulator is discussed in more depth later, in the Industrial Decarbonisation section.

Take Actions to Establish a Market for GHG Removal

The Government must cultivate a market for GGR to ensure the sector's viability. This means that the commercialisation routes it consulted on in 2022 must be doubled down on, and **we support the introduction of a bespoke CfD regime for GHG removal, including the Dispatchable Power Agreement (DPA) for CCUS, in the short term.**^{25 26} This regime should reflect the best practice of the energy market CfD, including transparent contracted prices and the 'pots' concept to enable technologies of different technology readiness to be integrated.

We also support the advanced market commitment model, such as that offered by Stripe, Alphabet, Shopify, Meta and McKinsey, which demonstrates the role of the private sector in supporting development of the sector.²⁷

Critically, the goal of actions to create a commercial market for GHG removal should be to mitigate the short-term high cost, recognising the potential for significant cost reductions with economies of scale. Further, the short-term steps most appropriate for the maturity of the GHG removal market today may not be the best model for tomorrow. For instance, we heard from startups that the CfD construct may lock out smaller innovative firms. A 'pots' structure could mitigate this risk.

Going forward, we expect the Government to consider alternative models like auctions. We also believe ways to enable firms to voluntarily add engineered carbon removals to the compliance market should be considered. The government could also look into the introduction of tax incentives such as the US's 45Q tax credit, which has seen success in incentivising firms to invest in carbon credits (and corresponding removal).

Food & AgTech

What is the Food & AgTech Sector?

Food & agtech is a diverse sector that includes producers of novel foods and conventional foods using novel techniques, firms looking to apply technology to conventional agricultural processes, SaaS firms in the agricultural sector, and those involved in the supply chain. It also includes firms concerned with food distribution and food waste.

Roundtable Takeaways

Critically, the issue of approaching the sector systematically was made clear by roundtable attendees, with multiple references to the importance of infrastructure and standards as central to promoting consistency and clarity for innovative firms in the sector. At a strategic level, there was support for calling for the Net Zero, Agricultural, and Food strategies to be aligned.

One participant raised the prospect of better accrediting firms for their decarbonisation strategies, alongside exploring the prospect of a “Green Tax Credit” that incentivises adoption of sustainable practices through refunding eligible expenditure. There was also discussion on the roundtable about the inadequacy of food labelling in light of the decarbonisation agenda and innovative food production methods, with this discussed in more detail as part of the Waste and Packaging section below. Other firms also called for pesticide use to be included on food packaging and a continued focus on nutritional quality alongside sustainability.

Some colleagues on the call discussed food waste and noted that the Government’s food waste strategy was insufficient to meet UN sustainable development goal 12.3 to halve per capita food waste.²⁸ Alongside bringing timeframes for reductions forward, one participant also believed there should be more onus on food retailers to report their food waste.

There was extensive discussion about novel food production techniques, including vertical agriculture, cultivated meat and insect farming. In the vertical farming space, one participant raised how conventional land subsidies do not carry across the vertical farm agenda, where land is vertically stacked rather than horizontally spread. Further, the Government did not appreciate the potential role that vertical farming could have in supporting rewilding and increasing soil carbon sequestration, if land freed up from agriculture as a consequence of vertical farms is restored. Multiple stakeholders raised the importance of soil carbon content, and that this is a conspicuous absence from the Government’s agricultural strategy.

For novel food producers, there was critique of the current food authorisation procedure, with the process owned by the Food Standards Agency (FSA) deemed opaque, unpredictable and confusing for firms.

Steps to Unlock Food & AgTech Climate-tech Innovation

**Novel Food
Authorisation Reform**

Reform Food Labelling

**Agricultural
Autonomous Robots
Regulations Reform**

Novel Food Authorisation Reform

One specific area of food and agtech innovation that was impacted by the UK's departure from the EU was novel foods. The UK did not carry over the Transitional Measure for foods in the process of being approved under the EU's Novel Food Regulation, meaning that all non-approved foods were rendered illegal after Brexit.

The only exception to this was Cannabidiol (CBD) which obtained its own bespoke transition regime, meanwhile in July 2022, the Food Standards Agency (FSA) announced plans for a transition regime for insects.²⁹ Reviewing and refining the Novel Foods regime was identified in the January 2022 Benefits of Brexit Government report, alongside working with the FSA to streamline the application process.³⁰ Unfortunately, since Brexit the existing regime has been severely strained by the volume of applications.

We believe the Government should undertake a root and branch review of novel food authorisation in the UK, with the goal to create a clear and consistent regime that is accessible to startups and supports the development of a domestic food system that is more resilient in the face of climate change.

This could include:

- Changing the definition of pre-submission dialogue and accelerating this stage of the process
- Appointing a dedicated case worker to improve efficiency and clarity of communication
- A wholesale review of the Novel Foods Regulation to be more outcomes focused instead of reviewing dossier by dossier
- Standards on nomenclature and terminology
- Ensuring that novel foods reform is aligned with the objectives of the Genetic Technology (Precision Breeding) Bill³¹

Food Labelling Reform

The government should support industry moves already underway to remove best before dates, particularly as food is a central part of the Government's Net Zero Strategy and broader adherence to the Courtauld Commitment to reduce per capita food system waste by 20% by 2025 and 50% by 2030.³² Additionally, there is an opportunity to review the applicability of labels in the context of novel food production techniques

like controlled environment agriculture, vertical farming and cellular agriculture. **To start with, a call for evidence on the appropriateness of food labelling would enable multiple issues to be aired.**

Agricultural Autonomous Robots Regulations Reform

For firms developing robots to support agricultural production, outdated EU legislation remains a blocker on the further development of their products. Autonomous robots can play a major role in decarbonising agriculture through increasing resource use efficiency, including nitrogen, increasing yield through accelerated plant breeding, and reducing food waste, amongst other impacts.³³

Today, the EU Machinery Directive prohibits the use of autonomous robots without human oversight.³⁴ While prototypes and pilots are therefore possible under observation, the long term deployment of autonomous robots requires legislative refresh.

The UK Government should therefore update the regulations around autonomy in agriculture to enable commercialisation of the technology at scale. This is a particularly pressing issue in the context of recruitment pressures over the past few harvest seasons.

The Built Environment

What is the Built Environment Sector?

We defined the built environment as a sector concerned with constructing buildings, designing physical materials for building construction, (SaaS) providers utilising data to increase efficiency of construction, and firms involved in the construction supply chain.

Roundtable Takeaways

Our Built Environment roundtable was a lively discussion. While it is beyond the scope of this exercise, it is important to reference that many stakeholders in the Built Environment roundtable referenced the Housing Crisis, and specifically the need to build more homes in the UK, alongside the corresponding need to refresh planning law in the UK.

One of the major topics of discussion that received near unanimous support was critique of current environmental standards for buildings, with Environmental Performance Certificates (EPCs) coming under fire for “not being worth the paper they’re written on”. Many roundtable attendees discussed the need to incentivise behaviour change. Behaviours can be influenced through the provision of information, and also through greater adoption of “green mortgages”, but it is vital that the underlying measures of sustainability are therefore meaningful: EPCs are not.

In addition, colleagues pointed to a “general inability for the current UK regulatory system to engage with live data”, with specific critique of the Standard Assessment Procedure (SAP) used to assess energy performance of new buildings. New technologies, business and processes can use real-time building information to help reduce emissions during use. The current SAP makes it impossible to apply a number of approaches.

Colleagues had extensive experience interacting with jurisdictions around the world that have both more robust legislative frameworks around build efficiency standards. One highlight was the NABERS regime, which started in Australia and has launched in the UK, and is a much more forensic assessment of multiple elements of a building’s performance, and is updated annually.³⁵ NABERS is mandatory down under, however it remains optional in the UK.

A second example raised was Local Law 97 in New York which mandates minimum levels of environmental performance for buildings exceeding 25,000 square feet.³⁶ Introducing a similar law would combat commercial buildings acting as ludicrously as heating up an entire office block, only to cool it down to the optimum level (which was described by one attendee). A third example of international best practice was raised on the industrial decarbonisation roundtable: France has introduced a new RE2020 regulation, which applied as of January 2022, which mandates analysis of embodied emissions over the entire life cycle of a building.³⁷

Some stakeholders believed that the Government’s approach to decarbonising the built environment sector was much too prescriptive, at the expense of more nimble and lower cost techniques to reduce the environmental footprint.

There was discussion on the industrial decarbonisation roundtable relevant to the built environment that the Environment Bill was a missed opportunity to introduce more ambitious legislation to support decarbonisation of the Built Environment. This could still occur with the passage of the Carbon Emissions Bill, which was retabled earlier in 2022.³⁸ This Bill has a much needed focus on ‘whole life embodied carbon’, similar to the French example above.

The fundraising experience of founders on the call reflected that of founders across the climate-tech sector. They are particularly experiencing a shortage of available funds to bridge funding rounds at a later stage. One firm that produces innovative materials for construction referenced that their business is particularly CapEx intensive, increasing pressure on available funds. They pointed to a need for more institutional funding to be exposed to startups.

Steps to Unlock Built Environment Climate-tech Innovation

Replace EPCs

Make Funding Under
the ECO more
Accessible

Pass the Carbon
Emissions Building Bill

Replace EPCs

We heard loud and clear that as they are currently produced and monitored, EPCs are nonsense, hindering decarbonisation and not equipping homeowners with accurate information. We also heard that for old buildings using reduced data SAP (rdSAP), the assumptions for producing EPCs are even more out of touch.

As a first step to fix this, the Business Secretary should launch a consultation on changes to the Energy Performance of Buildings regime in line with the new powers being introduced under the Energy Security Bill.³⁹

EPCs would benefit from being produced with more accurate data, and work to build the data infrastructure for EPCs should be expedited, alongside action D1 of the Improving Energy Performance Certificates: action plan - progress report “to consider whether further data can be released in the future based on user research and subject to data protection requirements”.⁴⁰ We heard from participants that the “performance gap” between reality and modelled energy efficiency is often significant, and results from the lack of real energy consumption data used.

A potential future state could see all EPCs replaced with Display Energy Certificates (DECs) currently used in public buildings.⁴¹

DECs reflect actual energy consumed per surface area of a property, and can be produced using data from smart metres. Crucially, this would enable targeted support for the worst performing properties. If the data is uploaded automatically, and then published in a register, this would promote efficiency and transparency into the sector. Additionally, as a more meaningful measure of energy efficiency, DECs will incentivise adoption of innovative technologies and services to decarbonise buildings.

The UK has a plethora of startups ready to support in accessing the right data to support this shift and both the SAP and rdSAP need to be programmed to accommodate new technology. This means the Building Research Establishment (BRE) must become more open to startups and innovative technologies.

Make Funding Under the ECO more Accessible

Providing products and services under the Energy Company Obligation (ECO) should be much more open to innovators. As it currently stands, it is not clear how innovative providers of construction materials or installers of innovative equipment can apply for funding under the ECO, with a long promised ECO4 innovation guidance document still not forthcoming on the Ofgem website. Additionally, we heard from roundtable attendees that even if they do follow the defined process, requirements under the ECO are incredibly prescriptive, including adherence to defined PAS measure types that are inherently locked into established materials.

Pass the Carbon Emissions Building Bill

We heard from participants in the initiative that **passing the Carbon Emissions Building Bill, retabled in June 2022, would progress decarbonisation of the construction sector and incentivise adoption of low-carbon innovative materials and software to optimise efficiency.** This would also put us closer to international leaders in the space and incentivise adoption of climate-techs in the built environment sector, including materials manufacturers and SaaS providers specialising in optimisation and efficiency.

Transport & Mobility

What is the Transport & Mobility Sector?

We defined transport and mobility as the sector producing products and services to move goods and people, as well as firms designing the infrastructure to do so. It includes innovative transport technologies including electric vehicles, the low-carbon transport sector supply chain, as well as SaaS providers.

Roundtable Takeaways

Our Transport & Mobility Roundtable included firms from a range of technologies and elements of the transport supply chain, and also included companies based in the UK and companies founded abroad but operating extensively in this country. We also included colleagues with concern for particulate pollution and other non-exhaust emissions.

There was general agreement that the UK does not do as good a job as other countries at facilitating the trialling of new technologies at scale, with the notable exception of electric scooters which have their own immediate concerns below. Colleagues cited many cities abroad that are more open to testing new technologies which has a knock on effect on where climate-tech transport startups then choose to locate as they mature: the openness to trialling is met with more investor capital.

Importantly, one firm reported having had a positive experience interacting with local authorities and regulators to support testing innovative maritime technology - potentially offering a template for other sectors.

More generally, the issue of later stage funding in the UK was raised, as it was on many other roundtables. Colleagues explicitly referenced the limited exposure of UK pension funds to startup investment, alongside a general concern that there is a low risk appetite from larger firms in the sector to interact with smaller, innovative firms. This 'valley of death' experience at the point of scaling commercially reflects the focus on TRL rather than CRL or MRL. Focussing on technology maturity does, however, mean that startups had a very different perception of the early stage funding support available in this country. Many praised the UK's EIS and SEIS schemes, alongside the attractiveness of the R&D tax credit regime.

There were some technology specific issues raised: firms involved in the session that had exposure to hydrogen technology voiced concern that despite some moves from the Government, hydrogen technology is not being meaningfully invested in. Hydrogen requires infrastructure to be built, and to be meaningfully part of a net zero transition must also be sourced from renewable energy driven electrolysis ('green' hydrogen).

We also had representation from electric scooter firms on the roundtable who raised frustration at the slow process of progressing shared e-scooter micromobility services to further cities, which had not joined the original trials, despite the market demand and public authority interest being high. They praised the forthcoming Transport Bill as it would provide greater certainty about the legal status of electric scooters,

but flagged that long term viability also requires investment in corresponding infrastructure. The sector would benefit from a holistic roadmap which will also provide certainty for investors.

Finally, colleagues also raised the importance of post-Brexit visas for startups. The current political uncertainty and lack of clarity on the immigration regime is hindering firms' ability to recruit from abroad.

Steps to Unlock Transport & Mobility Climate-tech Innovation

**Regulatory Certainty
for Electric Micro
Mobility**

**Deploy Low-Carbon
Mobility Sandboxes
Nationwide**

**Build a Green
Hydrogen Market using
Contracts for
Difference**

Regulatory Certainty for Electric Micro Mobility

The Government should pass the Transport Bill and introduce the new low-speed, zero-emission vehicle (LZEV) transport category. We heard from multiple startups providing electric scooters that for too long the sector has been operating under a cloud of uncertainty. Passing the Bill would be a positive step in the right direction.

Deploy Low-Carbon Mobility Sandboxes Nationwide

Transport and mobility innovation is dependent on physical space to trial, and requires coordination with authorities to have any chance of meaningfully scaling. We heard from a roundtable participant about the successful piloting of an electric marine vehicle, made possible through the close collaboration and constructive partnership of multiple government agencies in Scotland.

We call on the Government to deploy low-carbon mobility sandboxes nationwide. This would entail the testing of cutting edge mobility technologies like vertical take-off and landing (VTOL) aircraft and magnetic propulsion in close partnership with a locality. This should also include a focus on testing technologies that remove other, non-exhaust, emissions.

Build a Green Hydrogen Market using Contracts for Difference

We call on the Government to deliver one of the goals set out in the 2021 Hydrogen Strategy and deliver a Contracts for Difference regime to support the green hydrogen sector.⁴²

Waste & Packaging

What is the Waste & Packaging Sector?

The waste and packaging roundtable included two distinct sectors. Waste covers firms looking to reduce waste, improve waste disposal, increase resource reuse efficiency, or utilise waste as a resource. Packaging includes firms that design, manufacture and dispose of packaging materials. The sector covers novel material production, innovative applications of conventional materials like plastic, as well as firms operating reuse schemes.

Roundtable Takeaways

Firms represented on our waste and packaging roundtable included those designing new materials for packaging, firms designing software to support with waste disposal, analysis and utilisation, and also firms offering reuse schemes.

One of the areas that was raised by multiple participants was the need for standardisation and clear labelling around compostable materials, which can be of inconsistent quality and sources of greenwashing. Critically, there is a significant difference between packaging that can be composted at home, versus packaging that requires an industrial compost and therefore needs to be disposed of appropriately by households. It is also clear that there is confusion about the degree of contamination permitted for packaging to be 'compostable'. Some colleagues believed that in many cases, packaging branded 'compostable' ends up in an industrial landfill.

There was general scepticism about the food waste strategy in the UK, particularly with such fragmentation between local authorities. One attendee raised the example of the emergence of two parallel Deposit Return Schemes (DRSs) between England and Wales, and Scotland, and also the banning of organic materials going to landfill in Scotland, which they believed then led to the exporting of this waste to be sent to landfill abroad. Colleagues had an appetite for some way to demonstrate best practice in waste disposal, to then emulate or inspire other parts of the UK. Ideally, this 'sandbox' could be a testing ground for innovators to demonstrate their alternative materials that remove and reduce waste.

Some colleagues made the interesting point about the need to reframe 'waste products' to 'waste resources' that need to be harnessed. There was much discussion about the complexity of waste processing and disposal, but also how innovators could be let loose on waste streams to find opportunities for products and services.

Colleagues believed that the Plastic Tax was a missed opportunity to integrate innovative packaging materials and reuse into government strategy, with the emphasis instead on the recyclability of plastic. As a consequence, there remains a lack of incentives for firms to meaningfully invest in innovative packaging sourced from new materials with a much lower environmental footprint, such as seaweed based packaging. Attendees suggested that plastic reduction should also be integrated into the net zero strategy, which would then promote the use of alternative materials.

The focus on 'recycling' at the expense of innovative and disruptive alternatives has carried across to the UK's innovation institutions according to some attendees. One suggested that InnovateUK are focussed solely on recycling innovation, with much less desire to support alternative technologies or approaches, such as compostables or waste reduction techniques. However, others reported positively on InnovateUK's attitude to waste startups, reporting productive collaboration on pre-waste processing. There was an overarching reflection, however, that startups in the sector were overly reliant on InnovateUK to scale, due to the lack of funding available elsewhere. While SEIS and EIS encourage investment into waste-tech firms at the early stage, attendees reported that the market undervalues waste innovation, and particularly technologies that are hardware intensive, leading to many companies experiencing the 'valley of death' when they look to scale.

Finally, multiple roundtable attendees flagged that data is an underutilised asset in waste & packaging innovation and it would be interesting to consider what an 'open banking style' approach to standardised API data exchange could look like in waste and packaging.

Steps to Unlock Waste & Packaging Climate-tech Innovation

Standards for Compostable Materials

Integrate Innovative Materials into Government Resources and Waste Strategy

Introduce a Sandbox for Innovative Use of Waste Products

Standards for Compostable Materials

There is an urgent need for **standardisation and clear labelling around compostable materials**. At present, there is a diversity in what is meant by compostable, with one key distinction being compostable at home versus compostable industrially. In the absence of clear guidance, aside from there being a risk that packaging harms the environment, it holds back genuinely innovative compostable (or otherwise more sustainable) packaging from competing. One example of progress is the labelling introduced in Austria, however even here there is an opportunity for the UK to be even more rigorous to close loopholes like mixing industrially compostable material with starch which can lead to the dispersal of microplastics.⁴³

Integrate Innovative Materials into Government Waste Strategy

The recent introduction of the Plastic Packaging Tax was a missed opportunity to integrate innovative packaging materials and reuse into government strategy, with the emphasis instead on the recyclability of plastic. It is often better from an emissions perspective to use less plastic, regardless of recyclability which itself is complex and energy intensive, particularly as there are numerous innovative technologies in development.⁴⁴ There should also be a review of the tax to examine whether it truly reflects the lifetime cost of plastics.

Introduce a Sandbox for Innovative Use of Waste Products

Many startups we interacted with believed that the Government should position waste as a resource more explicitly. Indeed, one way of achieving this would be to introduce a **waste sandbox**, which would enable startups to harvest waste for reuse more effectively. Today, there are extensive rules and regulations around the treatment of waste, and for good reason. We would like to see the Government consider a way to enable innovators to work on waste in a way that does not compromise safety or the environment but maximises the potential of this untapped resource through targeted, time limited and supported interaction with waste streams under a 'sandbox' ethos. Such a sandbox might also include waste reduction approaches so that recognising the value of waste as a resource doesn't compromise the importance of reducing waste at source.

In the absence of a distinct 'waste regulator', this sandbox could be owned by two potential channels. Firstly, a 'lodestar local authority' could be nominated, or applied for, to become a best in class waste management jurisdiction, powered by waste innovators. Alternatively, the sandbox could be a public/private partnership put out to tender. Intuitively, it would make sense for one of the large waste disposal firms, like Suez or Veolia, to be involved.

Industrial Decarbonisation

What is the Industrial Decarbonisation Sector?

We defined industrial decarbonisation as the sector looking to reduce the emissions of heavy industry, which conventionally has high GHG emissions due to the amount of power required, or the processes involved in resource production. Examples include the production of cement, steel, aluminium, chemicals or other construction materials.

Roundtable Takeaways

One of the overarching themes from a roundtable that included firms interacting with a variety of carbon intensive industrial processes was the fundamental need for regulatory certainty. Critically, multiple attendees reported that their interactions with the heritage industrial processing sector was that decarbonisation was a 'compliance' exercise, and not an opportunity. In this vein, so long as this remains the attitude of the sector, if regulations do not compel meaningful decarbonisation, then this is unlikely to happen fast.

Another key message raised by firms in the sector that building and integrating as much renewable energy as possible, and fast, was the priority for decarbonising heavy industry.

To support in the short term, colleagues felt that greater standardisation of carbon credits, which are popular among heavy industry impacted by the ETS, would help ensure that decarbonisation is occurring. There was scepticism about the consistency and quality of the credits today.

Firms reported funding pressures, particularly at the juncture between technical development and commercialisation. The 'valley of death' was a common experience, with some firms discussing it was likely they would ultimately move abroad, or be acquired by international firms. They also reported that the Innovate UK funding application process was also often inefficient and unpredictable. There was also a bias towards software, when the industrial processes sector is hardware intensive.

One colleague also raised that in the context of industrial process decarbonisation, Innovate UK's priority technologies are dictated by superficial UK limitations: for example, mining is not prioritised despite potential opportunities to exploit natural resources in the UK where we could impose greater environmental safeguards. The UK economy requires holistic decarbonisation of the supply chain, including in provision of precious metals. It would be beneficial to explore if these could be sourced closer to home.

The skew towards TRL at the expense of MRL and CRL could be exacerbated if new entities like ARIA just focus on technology innovation, and not on routes to market for climate-tech. One area of funding opportunity raised by one roundtable attendees was greater utilisation of government procurement to build market demand. They specifically flagged the procurement of fuel.

There was discussion from a few attendees about the relative lack of entrepreneurs operating in the industrial decarbonisation space. One attendee suggested this was a self-fulfilling cycle of a lack of examples to inspire the next generation of entrepreneurs, but also flagged that universities are notoriously bad at

commercialising academic research. They cited an example of a university demanding a 30-50% stake in a spinout - an arrangement that is ultimately bad for the entrepreneur and the university in the long run as it renders onward investment incredibly challenging to attract. Finally, one attendee raised that local authorities have a real opportunity to drive decarbonisation in industrial processes through granting conditional licences.

Steps to Unlock Industrial Decarbonisation Climate-tech Innovation

Introduce an Office for Carbon Removal

Increase Industrial Decarbonisation through Government Procurement

Introduce an Office for Carbon Removal

The industrial decarbonisation roundtable reiterated some of the findings from the mechanical GHG removal session, including that developing existing standards for carbon credits, and the associated MRV requirements, should continue to be prioritised. We heard that the sector needs greater regulatory certainty, however and there is significant diversity in the quality of carbon credits today, jeopardising the integrity of the industry, whilst also enabling greenwashing to flourish.

To remedy this inconsistency, we agree with the Environment APPG that it is time to introduce an Office for Carbon Removal.⁴⁵

Innovative startups like Sylvera have demonstrated that data is there to be employed by the future regulator.⁴⁶ As well as overseeing and enforcing MRV standards, this new regulator could also then work with other entities to ensure the efficient functioning of the carbon market. For instance, it would work with the Advertising Standards Authority to combat poor quality offset advertising, in the same way that the Financial Conduct Authority does with financial services products.

Increase Industrial Decarbonisation through Government Procurement

The UK government should incentivise industrial processes to decarbonise through their procurement programmes more. For example, the UK government is a major customer of fuel, either directly (through Defence, for example), or indirectly through public transport tenders. There is also an opportunity to utilise infrastructure investment like HS2 to require low-carbon concrete, for example. The Small Business Research Initiative presents the logical home for doubling down on using government procurement to accelerate adoption of innovative industrial decarbonisation tech.⁴⁷

Carbon Accounting

What is the Carbon Accounting Sector?

We defined carbon accounting as a sector concerned with measuring, recording and reporting on GHG emissions. This includes firms using satellites and sensors to register the emission of gases, and firms then converting this data into B2B or B2C services and products to enable customers to take action.

Roundtable Takeaways

A major theme of this roundtable was that to attract attention from investors and to incentivise entrepreneurs to take the risk of starting businesses in the carbon accounting sector, the UK government must take GHG emissions seriously. Usefully, the UK's binding commitment to reach net zero emissions by 2050 is a key part of demonstrating the country's commitment to the sector.

A lack of consistent standardisation was overwhelmingly the most unanimous key barrier mentioned in this roundtable. Critically, this means accuracy and frequency of reporting with space for competition in user interface and ease of use. Colleagues reported that while there is a move towards this in some sectors like finance, it is important that the Government lay out cross-sector standards. One participant suggested that an answer to this could be through industry collaboration such as was seen with the introduction of open banking in the finance sector. However, attendees also raised the need for international collaboration on carbon accounting standards as many firms operate cross border, as do GHG gases.

An attendee also raised that it is also aspirational for reporting of data under future standards to be automated to maximise efficiency, utility and minimise the risk of human error.

One of the key areas of debate was data point availability and quality, with one attendee provocatively suggesting that the sector needs to do a better job at articulating what's missing. It's well known that more data is a demand, but much more useful would be clear direction on which data would be of most utility. The Government has a role to play in providing the routes for these views to be expressed efficiently.

Attendees raised the suggestion that the sector should also broaden the conversation beyond GHG gases to other environmental impacts, such as biodiversity. The need to equip the UK workforce with more knowledge and training in the field was also discussed, as was that this would hopefully effectively flow from the introduction of aligned standards.

While some attendees were in favour of expanding mandatory reporting to smaller businesses, others referenced that there was a need to recognise the restraints those businesses operate under. One attendee noted that there should also be incentives introduced to encourage firms to report, as opposed to just using the 'stick' of regulatory compulsion. The UK government's procurement strategy already reflects this to an extent.

Steps to Unlock Carbon Accounting Climate-tech Innovation

Standardise Emissions Reporting

A Call for Evidence on Carbon Accounting Data Requirements

Subsidise SME Access to Decarbonisation Tools

Standardise Emissions Reporting

The lack of standardisation was overwhelmingly the most unanimous key barrier to firms' growth for firms that attended the carbon accounting roundtable and the Government should explore the best way to fill this gap, potentially leveraging the experience of open banking for inspiration. If the UK is to reach net-zero emissions by 2050, it is vitally important that actors across the economy speak the same technical language.

Critically, the Government can also support this through leading by example. A June 2022 report from the National Audit Office on the Government's record in reporting public sector GHG emissions found that "most central government bodies are measuring some of their emissions but full compliance with the emissions elements of HM Treasury's Sustainability Reporting Requirements was low".⁴⁸ Interestingly, however, the report also found that the Government does a better job at incentivising reporting through its procurement channels by "requiring companies bidding for government contracts over £5 million to report five of the 15 possible types of scope 3 emissions". To best support the sector in the short term, the Government should ensure that its own reporting is optimum, and explore ways to improve the private sector further through its supply chain.

A Call for Evidence on Carbon Accounting Data Requirements

BEIS should launch a call for evidence on data requirements for the carbon accounting sector. Data availability is a critical barrier that many carbon accounting startups cite, however it is not immediately clear on which data sets would stand to unlock growth in the sector most, and there is a balance to be struck to ensure the continuation of competitive innovation between different providers. It is also not clear how data holders would be impacted by different data sets being provided. This consultation would offer a valuable opportunity to lift the lid on the issue and make the most of stakeholders who have been exploring this issue for some time.

Subsidise SME Access to Decarbonisation Tools

A foundational barrier to adoption of carbon accounting services is the lack of awareness among SMEs. Despite a desire to engage with the green agenda, it is still too difficult for startups and small businesses to decarbonize. According to a report from the Zero Carbon Business Partnership, 71% of SMEs could not recommend a single web source for help on decarbonization, with a third unfamiliar with the phrase "net zero".⁴⁹ As a consequence, even if firms choose to investigate measures to reduce the environmental impact,

they often don't know where to start or are presented with multiple sources of overlapping, complex information.

If the Government is serious about accelerating SME and startup decarbonization, it could treat the issue like it treated another foundational challenge: increasing productivity. To solve this problem, the Government rolled out the Help to Grow Business and Digital schemes in 2022 and the Government could adopt a similar approach to decarbonization and produce a Help to Green scheme. Help to Green could be structured similarly to Help to Grow, with a Management scheme designed to provide training for employees in sustainability practices, through providers like the Carbon Trust. This approach has been advocated by MakeUK, who found that 6 in 10 manufacturers said they require training in sustainable production practices.⁵⁰ Meanwhile, a Help to Green: Digital scheme could provide subsidised access to tools and software to accelerate decarbonization. For example, through the procurement of Environmental Management Software that enables governance of a sustainability programme, or through software to support reducing the emissions across a supply chain.

The scheme would take extensive designing but **subsidising access to decarbonisation tools is aspirational**, as is the critical inclusion of startups as vendors in any scheme.

Nature Based Solutions

What is the Nature Based Solutions Sector?

We defined nature based solutions startups as firms using natural processes to mitigate or adapt to climate change, such as through rewilding, reforestation, other biological GHG sequestration (such as biochar or enhanced weathering), as well as firms designing technology to monitor the natural environment or SaaS firms to interact with data on the natural environment.

Roundtable Takeaways

A core theme running through our roundtable on nature based solutions was that investment in the sector required clear Governmental commitment to net zero, and the role a flourishing natural environment plays in reducing GHG emissions.

Multiple colleagues pointed to the current uncertainty around the future of land incentives post-Brexit, specifically the landmark Environmental Land Management Scheme (ELMS), and the corresponding three new schemes rewarding environmental land management: the Sustainable Farming Incentive (SFI), Local Nature Recovery, and Landscape Recovery. Attendees felt that shifting the focus away from this public funds for public goods approach towards a more general funding arrangement is perverse, not just for the Government's commitment to net zero, but also in its commitment to incentivising adoption of innovative practices.

Colleagues on the call raised the critical value of biodiversity, and the role of innovative tech startups in supporting the regeneration of habitats, harvesting data and analysing trends in wildlife. At a high level, roundtable attendees felt that it is not clear that the Government takes biodiversity seriously, while funding procedures have not outgrown the constraints of the clean development mechanism that contained restrictive requirements around duplicative benefits (of carbon and biodiversity). One attendee also raised the potential of including nature based solutions as part of the UK ETS.

Innovate UK Grant funding was extensively discussed with agreement that grant funding is skewed towards early stage technology readiness levels (TRLs) at the expense of firms transitioning towards commercialisation. CapEx funding in particular is very hard to secure. The 'valley of death' experienced by many firms in the UK will lead to them relocating elsewhere. Meanwhile, one attendee also fed back that Innovate UK's Innovation Loan included inappropriate questions of startups, such as requesting 10 year business projections. This reflected comments on other roundtables about the scope for improvement in the Innovate UK funding application process.

Steps to Unlock Nature Based Solutions Climate-tech Innovation

Maintain Mission-Based ELMS

Incorporate Nature Based Solutions into the UK Emissions Trading Scheme

Maintain Mission-Based ELMS

Decarbonising agriculture is a critical part of the UK's net zero transition, and the move towards an outcomes based approach to farming subsidy post-Brexit has been heralded as a useful way to incentivise farmers to invest in sustainability. ELMS presents an opportunity for farmers to adopt practices and utilise tools and technology that also benefit the planet, in contrast to the general funding approach under the EU. This would position the UK as world-leading in supporting the decarbonisation of the sector.

However, recent uncertainty around the future of ELMS is leading farmers to hesitate to invest, with data suggesting just 1,000 farmers signed up for the SFI up to October 2022, just 1.6% of the Government's 2028 target participation.⁵¹ While the scheme remains in limbo, and farmers deter, there will also be knock-on uncertainty for the supply chain, including providers of innovative technologies that could support decarbonisation.

We urge the Government to reconsider its abandonment of ELMS, and instead develop the scheme to incentivise the use of technology and innovation to support the three schemes.

Incorporate Nature Based Solutions into the UK Emissions Trading Scheme

We propose that the government build on its early efforts to incorporate the potential of high quality nature based solutions into the UK ETS. So far the Woodland Carbon Code and the Peatland Code are the main Government-backed schemes that exist to promote quality and consistency of nature-based GHG removals, however they remain separate from the compliance markets.

While the June 2022 consultation on Developing the UK ETS set out intentions to investigate ways to integrate agriculture and land use into the ETS, this was not followed through on.⁵² For startups operating in the NBS sector, clarity that their technologies will be integrated into existing markets is a critical next step in giving them a path to commercialisation.

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