



HM Government

UK Net Zero Research and Innovation Framework Delivery Plan: Progress Report 2022 to 2025





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Introduction

The government has set out its mission to make Britain a clean energy superpower to bring British people lower cost, clean, secure power, and capture the good jobs and economic growth opportunities of the net zero transition. Research and innovation are essential to deliver this mission and to delivering on carbon budgets as well as strengthening the UK's climate leadership on the international stage. A third of global emissions reductions required to reach net zero by 2050 will come from technologies that are still in development and not yet commercially available.¹ The UK is at the forefront of innovation, with leading research and development capabilities and a growing community of over 5,000 climate technology startups, second only to the US.² The global market opportunity for UK companies from net zero could reach a cumulative £1 trillion by 2030.³

The government is supporting research and innovation to accelerate progress where market failures or barriers are holding back investment. This has ranged from funding through UK Research and Innovation (UKRI) for fundamental science and research in UK universities and research institutions, to funding for applied research, development and demonstration programmes, including major research and development programmes across government departments.

In 2021, the UK's **Net Zero Research and Innovation Framework** set out the research and development challenges across the UK over the next five to 10 years in seven key categories:

- power
- industry and low carbon hydrogen supply
- carbon capture, utilisation and storage and greenhouse gas removal
- heat and buildings
- transport
- natural resources, waste and F-gases
- whole systems approach

In 2023, the **UK Net Zero Research and Innovation Framework: Delivery Plan** was published to show how government departments and public sector organisations were planning to tackle the research and development challenges in the framework and which innovation programmes they would support between 2022 and 2025. This progress report reviews what has been achieved through each programme over that period and showcases examples of the work supported.

1 IEA (2025), The State of Energy Innovation, IEA, Paris <https://www.iea.org/reports/the-state-of-energy-innovation>, Licence: CC BY 4.0.

2 McKinsey (2025), Poised for take-off: Hyperscaling the United Kingdom's climate tech, <https://www.mckinsey.com/capabilities/sustainability/our-insights/poised-for-take-off-hyperscaling-the-united-kingdoms-climate-tech>

3 McKinsey (2021), Opportunities for UK businesses in the net-zero transition, <https://www.mckinsey.com/capabilities/sustainability/our-insights/opportunities-for-uk-businesses-in-the-net-zero-transition>

Progress overview

Portfolio progression

The delivery plan estimated that UK-based net zero research and innovation spending across government departments and public bodies, including Ofgem, would be around £4.5 billion over three years from April 2022 to March 2025 (figure 1).

The largest research and innovation spend was in the transport sector, followed by the power sector, then industry and low carbon hydrogen. A number of organisations have delivered this. UKRI, a non-departmental public body sponsored by the Department for Science, Innovation and Technology (DSIT), is the largest overall funder with a wide-ranging portfolio covering all sectors. UKRI's strategic theme 'building a green future' sets the direction for this work and includes discovery research, applied research and development, business-led innovation and support for the UK's innovation ecosystem including through the Catapult network.

In addition, government departments run their own research and innovation programmes to develop the technologies and solutions needed to meet their carbon budget sector shares. This includes Department for Transport (DfT) and Department for Business and Trade (DBT) support for transport decarbonisation and innovation in the UK's automotive and aerospace sectors, Department for Energy Security and Net Zero (DESNZ) support to accelerate the commercialisation of low-carbon technologies, systems and business models in power, buildings, and industry, and the Department for Environment, Food and Rural Affairs' (Defra) research and innovation within the natural resources and waste sectors.

Current expected total government and Ofgem spend for the 2022 to 2025 spending period is around £4.2 billion (figure 2) and is broadly in line with the level of spend forecast in the delivery plan. Most of the programmes set out in the delivery plan have been delivered or are on track to achieve expected outcomes. However, innovation is inherently uncertain and some projects received fewer quality applications than expected, had to terminate early due to identifying technical challenges or had to extend project timelines in order to realise the expected benefits. Overall, major programmes spanned five different government departments plus UKRI and delivered a range of support from early-stage research and development to late-stage scale-up innovation. They covered a broad range of net zero innovation challenges from renewable energy to sustainable plastics, from carbon capture to agricultural emissions, as well as tackling cross-cutting barriers to innovation.

Impact of the portfolio

Individual programmes are tracking benefits through their monitoring and evaluation practices, and to support the cross-government delivery plan, a common set of benefit metrics has been agreed and collated for the first time. This suggests several initial outcomes. For example, the portfolio supports the advancement in maturity of innovative technologies, with programmes increasing by an average of two Technology Readiness Levels (TRLs) from programme start to end.⁴ At least 342 patents have been granted for innovative products and services, demonstrating the portfolio's role in supporting routes to commercialisation.

Across the major programmes that were able to report private sector funding, an average of £1.30 of additional funding was leveraged through the innovation programme for every £1 of government innovation funding spent.⁵ For programmes that deliver a successful outcome, it is likely that further private sector investment will be secured, but this has not been evaluated in this exercise. The portfolio is also expected to be supporting over 71,000 jobs across a range of sectors. Research and innovation programmes can also help businesses to grow, supporting more jobs following the programme, but this has not been evaluated in this exercise.

These outcomes are likely to be under-estimates of the full value of the portfolio, as collecting common metrics across a diverse range of programmes and organisations is not straightforward, and impacts for innovation programmes are often only apparent some time after the project has ended.

We will seek to improve the monitoring and evaluation of cross-government net zero research and innovation programmes, with continued coordination and reporting of the portfolio.

4 TRLs are a framework used to assess the maturity of a technology and are assessed on a scale of one to nine. The TRL average reported here assumes equal weighting for each programme.

5 Accounting only for programmes that have reported leveraged investment figures.

Figure 1. Planned proportion of spending per sector as announced by 31 December 2022

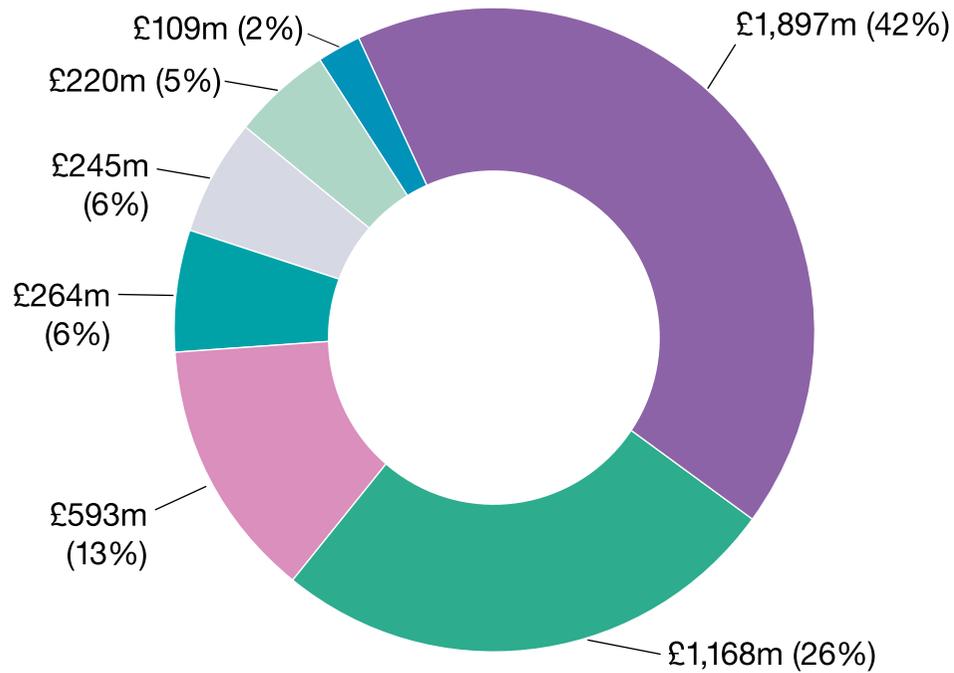
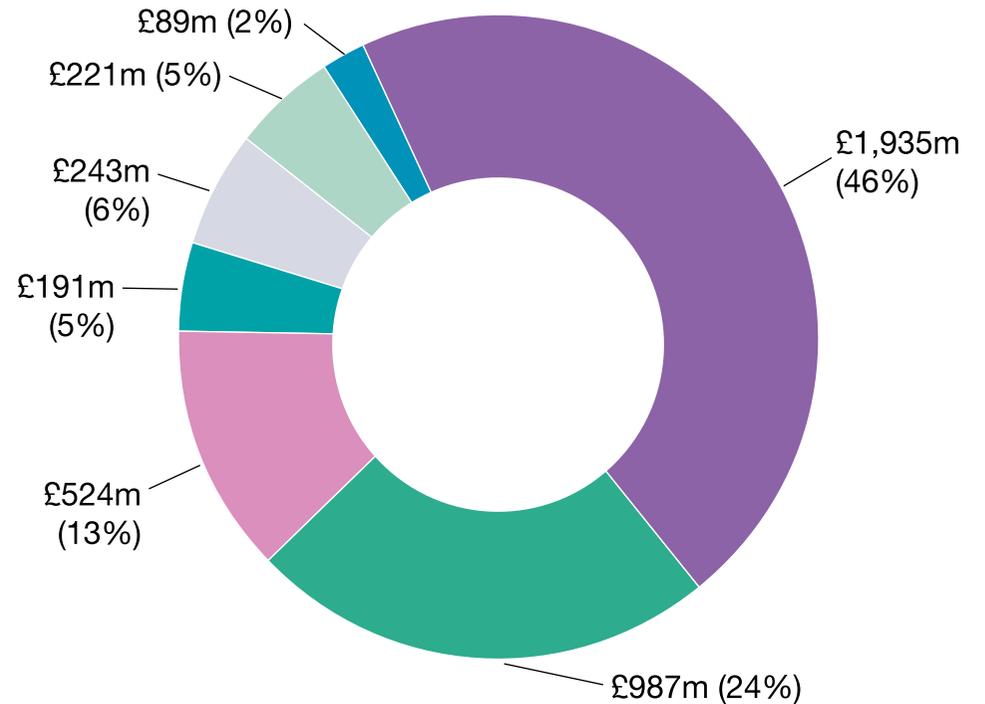


Figure 2. Approximate net zero research and innovation spend (2022 to 2025) as announced by 31 March 2025



- Transport
- Power
- Industry and Low Carbon Hydrogen
- Heat and Buildings
- Natural Resources, Waste and F-Gases
- Whole Systems
- CCUS / GGRs

Note: The proportions and spending included in the charts are intended as illustrative as some spending will relate to more than one sector, for example aspects of spend on buildings, power and transport can overlap in certain instances. Decimals have been rounded to whole numbers so pie chart may not add to exactly 100%. Pie charts include funding of major programmes from the investment plan and smaller programmes from the annex of the Delivery Plan.

Progress updates on net zero research and innovation programmes (2022 to 2025)⁶

This section provides updates for major programmes from the investment plan section of the Delivery Plan.

Power



System integration and flexibility

Flexibility Innovation Programme (part of DESNZ's Net Zero Innovation Portfolio), up to £65 million

Key R&I deliverable(s) 2022-25

Innovative solutions for electricity system flexibility, including: bidirectional electric vehicle charging, interoperable demand side response systems, data and digital, and other innovative market solutions.

Longer term policy objective

Enable large-scale, widespread electricity system flexibility towards 2035 system decarbonisation (previous government policy).

Progress updates

Update: Demonstrated new solutions to unlock consumer-led flexibility including vehicle-to-everything, interoperable demand side response of energy smart appliances, new tariffs and services to vary energy consumption. This is important to adapt to increasing intermittent renewable energy by balancing supply and demand of energy in a cost-effective way.

Link: [Flexibility Innovation Programme](#)

Status: Ongoing (due to complete by March 2026)

⁶ Key R&I deliverables 2022-25 (column 1) and longer-term policy objectives (column 2) are based on those set out in the 2023 Net Zero Research and Innovation Framework Delivery Plan (2022–2025). Please note that some deliverables or objectives may have evolved since the plan's publication.

Energy Demand Solutions Research Programme including Centre for Energy Demand Solutions (UKRI), £13.5 million

Key R&I deliverable(s) 2022-25

Research and identify optimal solutions for reducing energy demand at different scales, uses and geographies.

Longer term policy objective

Reducing the amount of decarbonised electricity generation needing to be deployed by 2035 (previous government policy).

Progress updates

Update: Energy Demand Research Centre (EDRC) launched in July 2023. It supports projects focused on how to develop a low energy future, what technological and social changes are needed, and ensuring that transition to a low energy future is fair and secure.

Link: [Energy Demand Research Centre](#)

Status: Ongoing (due to complete 2028)

Longer Duration Energy Storage Demonstration Programme (part of DESNZ's Net Zero Innovation Portfolio), up to £68 million

Key R&I deliverable(s) 2022-25

First-of-a-kind full-system prototypes and demonstration of longer duration storage, including electric, thermal and power-to-x.

Longer term policy objective

Develop energy storage technologies to facilitate a decarbonised electricity system with high degree of renewables by 2035 (previous government policy).

Progress updates

Update: Delivered eight first-of-a-kind longer duration energy storage demonstrators including electrical storage, thermal storage and power-to-X. Helped secure commercial investors and inform policy by developing technologies, building understanding and reducing costs and investment risks of these novel energy storage technologies.

Link: [Longer Duration Energy Storage Demonstration Programme](#)

Status: Ongoing (due to complete by March 2026)

Strategic Innovation Fund (Ofgem), £263 million (of total £450 million allocation)

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
<p>Demonstrate whole energy system integration including technologies for data and digitalisation, low carbon heat, and zero emission transport.</p>	<p>Prepare UK networks for a decarbonised electricity system by 2035 (previous government policy).</p>	<p>Update: Funding 261 projects including better whole system planning, data and digitalisation for system resilience, security and flexibility, faster connections, and increased capacity. Early indication of benefits includes a potential of £2.6 billion in cost savings and 7.1 million tonnes of CO² savings by 2035. The first completed project demonstrated how offshore wind farms can resolve frequency and voltage challenges, enabling more wind farms to connect while delivering system balancing services.</p> <p>Link: Strategic Innovation Fund</p> <p>Status: Ongoing in the next Ofgem price control, 2026 to 2031.</p>



Renewables

Future of Offshore Wind Programme (part of DESNZ's Net Zero Innovation Portfolio), around £60 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
<p>Development and demonstration of floating offshore wind components (including using lightweight composite materials), and mitigation of impact on radar.</p>	<p>Deploy up to 5GW of floating and total of 50GW offshore wind by 2030 towards the UK's 2035 decarbonisation ambition (previous government policy).</p>	<p>Update: Funding 11 demonstrators in a range of Floating Offshore Wind Centre technologies, the Floating Offshore Wind Centre of Excellence, three demonstrators to mitigate effects of wind farms on radar, and a demonstrator on lightweight composites for next-generation turbines.</p> <p>Link: Future of Offshore Wind: Floating Offshore Wind Demonstration Programme</p> <p>Status: Ongoing (due to complete by March 2026)</p>

Offshore Renewable Energy Catapult, including Floating Offshore Wind Centre of Excellence (UKRI), £24 million

Key R&I deliverable(s) 2022-25

Reduce the cost of floating offshore wind farms, developing UK supply chain and innovation opportunities at all stages.

Longer term policy objective

Unlocking offshore wind sites deeper than 50 meters to increase deployment options for offshore wind energy generation.

Progress updates

Update: Offshore Renewable Energy Catapult has secured investment to enable testing of the next generation of turbines including 150 million blades and 23MW drivetrains. Floating Offshore Wind Centre of Excellence launched strategic programmes for cabling, mooring and anchoring, environmental interaction, and construction, operation and maintenance, alongside core programmes on technical development, supply chain, consent, and policy.

Link: [Offshore Renewable Energy Catapult](#)

Status: Ongoing (current delivery of programme due to complete March 2028)



Case study: Marine Power Systems

Receiving £3.5 million through DESNZ's Net Zero Innovation Portfolio's Future of Offshore Wind Programme, the Marine Power Systems project developed a new modular, flexible floating platform technology that can be stably anchored in deep water, allowing wind turbines to be cost-effectively installed at greater depths. The project achieved a 25% reduction in weight, significantly cutting manufacturing and deployment costs due to reducing the need for steel and smaller cranes and vessels. The platform's performance was successfully tested at FloWave in Edinburgh (a leading ocean energy research facility that simulates real sea conditions), confirming its readiness for real-world deployment.





Nuclear

Low-Cost Nuclear Challenge (part of DESNZ's Advanced Nuclear Fund), up to £215 million

Key R&I deliverable(s) 2022-25

Development of a standardised, small modular reactor design.

Longer term policy objective

Deployment of cost-competitive UK-designed small modular reactors by the early 2030s.

Progress updates

Update: Supported Rolls Royce's UK small modular reactor design. Building on a first phase of concept design, the second phase successfully passed the Office of Nuclear Regulation's Generic Design Assessment 2 in 2024.

Link: [Advanced Nuclear Fund](#)

Status: Ongoing (due to complete by March 2026)

Advanced Modular Reactor Programme (part of DESNZ's Advanced Nuclear Fund), up to £170 million

Key R&I deliverable(s) 2022-25

Identify and deliver the optimal solution for high temperature gas reactor technology.

Longer term policy objective

Demonstration of advanced modular reactor (high temperature gas reactor technology) and integration with other technologies by the early 2030s.

Progress updates

Update: Supporting reactor designs to the maturity required for Generic Design Assessment Step 2 and work on detailed cost and schedule estimates to deploy a high temperature gas reactor.

Link: [Advanced Nuclear Fund](#)

Status: Ongoing (due to complete by March 2026)

Nuclear Fission Research Programme (UKRI), £105 million

Key R&I deliverable(s) 2022-25

Maintaining capabilities in nuclear decommissioning and safe, cost-effective waste disposal, improvements in new build and alternative, safer fuels.

Longer term policy objective

Continual improvement in large-scale-nuclear to support new deployment and UK areas of strength.

Progress updates

Update: The National Nuclear User Facility has been established to provide state-of-the-art experimental facilities for nuclear research and development, with over 30 facilities in 12 universities. An access scheme has been funded at the University of Oxford, facilitating wider community access to the nuclear facilities from mid-2025.

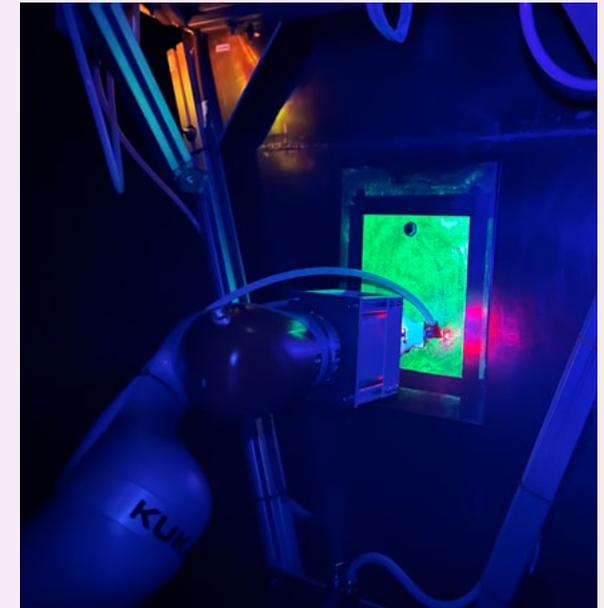
Link: [Nuclear Fission Research](#)

Status: Ongoing (rolling research programme)



Case study: National Nuclear User Facility

The National Nuclear User Facility received £80 million through UKRI's Nuclear Fission Research Programme to invest in the UK's nuclear future, providing state-of-the-art experimental facilities for research and development in nuclear science and technology. There are currently 30 facilities housed in 12 universities, and the UK Atomic Energy Authority, the National Nuclear Laboratory and Diamond Light Source are available for access to work on nuclear materials. All facilities are now up and running and monitoring potential impacts of the research. An example project is the Hot Robotics Programme whereby a robot carried out a survey of the 140 metre-long underfloor duct which runs under the central corridor between the laboratories at Dounreay, and was made available for a survey.





Bioenergy and bioenergy with carbon capture and storage (BECCS)

Biomass Feedstocks Innovation Programme (part of DESNZ's Net Zero Innovation Portfolio), £36 million

Key R&I deliverable(s) 2022-25

Development of innovations to improve yield, efficiency, cost reductions and profitability of biomass feedstocks.

Longer term policy objective

Facilitate a substantial increase in the production of sustainable, domestic biomass to support decarbonisation across a range of sectors.

Progress updates

Update: The programme has evidenced 50% to 100% increases in dry tonnes of biomass per hectare, for example, demonstration of the best genotypes of willow and miscanthus for our climate and biomass production, assessing for climate resilience, and creation of the first North Sea farm for seaweed, expanding marine biodiversity through new habitats and cropping up to four times a year.

Link: [Biomass Feedstocks Innovation Programme](#)

Status: Ongoing (due to complete by March 2026)

Hydrogen BECCS Innovation Programme (part of DESNZ's Net Zero Innovation Portfolio), £30 million

Key R&I deliverable(s) 2022-25

Developing and demonstrating technologies producing hydrogen from biogenic feedstocks combined with carbon capture.

Longer term policy objective

Support the scale up of the UK hydrogen economy across the value chain to enable hydrogen to play its part in decarbonisation, energy security and economic growth.

Progress updates

Update: The programme has achieved production of over 3,000 cubic metres of hydrogen, sustained demonstration of wood chip gasification to hydrogen, creation of enzymes to convert organic waste food and paper to hydrogen, deployed plans to scale up technologies, accelerated decarbonisation across a variety of industries including cement and transport – both for sea and land.

Link: [Hydrogen BECCS Innovation Programme](#)

Status: Ongoing (due to complete by March 2026)



Case study: CATAGEN

CATAGEN, an SME based in Belfast and supported through a £5 million investment from the DESNZ Net Zero Innovation Portfolio's Hydrogen BECCS Innovation Programme, is applying its proprietary recirculating-gas reactor technology to develop a cost-effective method of producing low-carbon biohydrogen, a critical net zero fuel. It will also capture bio-CO₂ which can then be permanently stored or used to displace fossil-fuel CO₂ in downstream industries. CATAGEN have been exploring the net zero markets for their innovation, with promising opportunities emerging in the application of its technology to accelerate decarbonisation in the cement industry, one of the biggest sources of emissions in the UK.



Additional research and innovation activity: UKRI wider innovation ecosystem support

In addition to specific net zero programmes, UKRI has funded various other research and innovation initiatives during this period. Innovation ecosystem support has been provided through the Catapult Network, comprising nine world-leading technology and innovation centres, established by Innovate UK. Several of the Catapults have net zero as an important driver of their work.

- The **Energy Systems Catapult** seeks to help energy SMEs grow, make net zero homes easy and desirable, decarbonise sites and estates, power local net zero transformation, support greener energy networks, and drive worldwide net zero collaboration.
- The **Offshore Renewable Energy Catapult** (see page 9) is the UK's leading technology innovation and research centre for offshore renewable energy, accelerating the development of offshore wind, wave and tidal energy technologies in the UK.
- The **High Value Manufacturing Catapult** is also aiding net zero innovation by supporting manufacturing in low-carbon energy and electric vehicle supply chains, helping manufacturers reduce their emissions, and developing new sustainable materials.
- The **Connected Places, Digital, Compound Semiconductors Applications** and **Satellite Applications** Catapults also have strong overlaps into net zero delivery as part of their remit.

The **UK Energy Research Centre** is an independent research centre funded by UKRI with researchers based in 13 different UK institutions. It carries out world-class interdisciplinary research into sustainable future energy systems. The UK Energy Research Centre takes a whole systems approach to its research programmes which address the challenges and opportunities presented by the transition to a net zero energy system and economy.

UKRI's Engineering and Physical Sciences Research Council continues to invest in **Supergen Hubs**, long-standing flagship investments in sustainable power generation and supply. The current Supergen Impact Hubs are focussed on **Bioenergy**, **Energy Networks**, and **Offshore Renewable Energy**. They are accelerating the pull-through of discovery research into industrial and policy-based impacts for low carbon fuel deployment, network resilience, regional optionality and offshore renewable developments, as some illustrations of their technical and policy impacts.

UKRI's investment in **Centres for Doctoral Training** are vital in fields in which the UK must maintain advanced capabilities, for example nuclear fission. Primarily funded by the Engineering and Physical Sciences Research Council and the Natural Environment Research Council, UKRI continues to invest in Centres for Doctoral Training providing doctoral level training in key areas of net zero. These centres work with industry partners to define industry relevant problems and projects as the basis for PhDs.

Industry and low carbon hydrogen supply



Transitioning to a net zero industrial base

National Interdisciplinary Circular Economy Research (NICER) Programme (part of UKRI's Strategic Priorities Fund), £22 million

Key R&I deliverable(s) 2022-25

Changing the way resources are used, valued, and measured across the UK.

Longer term policy objective

Realise opportunities for businesses and consumers from transitioning to a more circular economy.

Progress updates

Update: Contributed to a circular economy to reduce waste by circulating products and materials at their highest value. Created the Circular Economy Hub, centres and research programmes to develop new technologies, create collaborative business change, influence policy and set up a circular economy data observatory. Established the world's first UN International Centre of Excellence on Sustainable Resource Management in the Circular Economy.

Link: [National Interdisciplinary Circular Economy Research \(NICER\)](#)

Status: Complete (March 2025)

Made Smarter Innovation Challenge (part of UKRI's Industrial Strategy Challenge Fund), £92.2 million

Key R&I deliverable(s) 2022-25

Development and integration of new and existing industrial digital technologies, including AI and virtual reality.

Longer term policy objective

Facilitating resource and energy efficiency in industry via support to scale digital technology solutions.

Progress updates

Update: Projects being supported include smart connected factories, connected and versatile supply chains, adaptable, flexible manufacturing operations and skills, and new ways to design, test and make products. Early project monitoring data indicates that participating manufacturers have achieved a median reduction in CO₂e emissions of 18% and waste of 14%.

Link: [Made Smarter Innovation Challenge](#)

Status: Ongoing until March 2026 (from April 2026, programme will transition into a DBT Managed Programme until 2030)

Transforming Foundation Industries (part of UKRI's Industrial Strategy Challenge Fund), £40.6 million

Key R&I deliverable(s) 2022-25

Growing the UK foundation industries (cement, metals, glass, paper, ceramics, chemicals) sector by 2024 in an environmentally sustainable way.

Longer term policy objective

Improving the environmental sustainability of major industrial sectors

Progress updates

Update: Established an open access facility to scale up and commercialise sustainable glass manufacture. Supporting collaborative research and development competitions focused on cross-sector working, skills, knowledge transfer and adoption. Also includes a research and innovation hub connecting innovators from universities with industry.

Link: [Transforming Foundation Industries](#)

Status: Complete (March 2025)

Smart Sustainable Plastic Packaging Challenge (part of UKRI's Industrial Strategy Challenge Fund), £42.4 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
Develop sustainable plastic packaging materials and designs and enable new recycling processes and infrastructure to be developed at scale.	Establish the UK as a leading innovator in smart and sustainable packaging with a dramatic reduction in plastic waste by 2025.	<p>Update: Delivering around 100,000 tonnes per year of innovative plastic recycling capacity in the UK and around 150,000 tonnes per year internationally. Projects have focused on priority areas including films and flexibles, reuse and refill, and food-grade recycling.</p> <p>Link: Smart Sustainable Plastic Packaging Challenge</p> <p>Status: Complete (March 2025)</p>

Industrial Fuel Switching Programme (part of DESNZ's Net Zero Innovation Portfolio), £55 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
Develop and demonstrate solutions to switch industry from high carbon to low and zero carbon fuels.	Support increasing amounts of fuel switching to low carbon fuels during the 2020s.	<p>Update: Funded 21 feasibility studies, with 11 projects progressing into demonstrators. Biofuels were demonstrated in the production of glass in a world-leading research and development facility for the glass sector, hydrogen use was demonstrated in an aluminium recycling furnace and in a world first hydrogen-fired cremation, and an electricity fuel switch was demonstrated by the replacement of natural gas in an industrial oven for baking biscuits.</p> <p>Link: Industrial Fuel Switching Programme</p> <p>Status: Ongoing (due to complete by March 2026)</p>

Industrial Hydrogen Accelerator Programme (part of DESNZ's Net Zero Innovation Portfolio), £26 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
<p>Demonstrations covering the full technology chain, exploring the potential to produce and use low carbon hydrogen for industrial processes.</p>	<p>Enable switching to low and zero-carbon fuels, in this case hydrogen.</p>	<p>Update: Supported nine feasibility projects with findings illustrating the varied challenges and opportunities of switching to hydrogen. Follow-on projects have developed a blueprint for hydrogen use at steel processing sites, the potential of nuclear-powered hydrogen and use of hydrogen in asphalt production.</p> <p>Link: Industrial Hydrogen Accelerator Programme</p> <p>Status: Ongoing (due to complete by March 2026)</p>

Red Diesel Replacement Programme (part of DESNZ's Net Zero Innovation Portfolio), £40 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
<p>Develop and demonstrate red diesel replacement technologies on construction, mining and quarrying sites.</p>	<p>Accelerating the commercialisation of low carbon alternatives to red diesel and creating spin-off opportunities for other sectors.</p>	<p>Update: To develop technologies for innovation in low carbon fuel and system alternatives to be deployed on non-road mobile machinery, 16 feasibility studies investigated innovations in distribution, storage and energy delivery systems, equipment development or fuel development. Six projects progressed into demonstrators.</p> <p>Link: Red Diesel Replacement Programme</p> <p>Status: Ongoing (due to complete by March 2026)</p>

Industrial Decarbonisation Challenge (part of UKRI's Industrial Strategy Challenge Fund), £126 million

Key R&I deliverable(s) 2022-25

Development of low-carbon technologies through investment in deployment projects, clusters and the Industrial Decarbonisation Research and Innovation Centre.

Longer term policy objective

Increasing the competitiveness of industry and reducing the carbon footprint of heavy and energy intensive industries.

Progress updates

Update: Exceeded initial aims and laid the foundation for developing at least four low carbon industrial clusters by 2030 and the first net zero industrial cluster by 2040. Developing technologies such as carbon capture and storage and hydrogen fuel switching.

Link: [Industrial Decarbonisation Challenge](#)

Programme status: Complete (March 2024)



Case study: National Interdisciplinary Circular Economy Research (NICER) Programme

The NICER Programme is a four-year £30 million investment from UKRI to move the UK towards a circular economy. The programme is made up of five circular economy research centres, each focused on a speciality material flow, and the co-ordinating Circular Economy Hub. These collaborations cover 34 universities and engage 150 industrial partners. Alongside numerous research breakthroughs from technologies to extend metal life, methods to model flows of resources through the economy and novel approaches to polymer chemical recycling, the programme has built strong relationships with stakeholders and supported small and medium-sized enterprises. Demonstration of a clear route to the legacy of the programme is the establishment of the world's first UN International Centre of Excellence on Sustainable Resource Management in the Circular Economy, involving several NICER Centres, signifying national leadership and coordination, with an initiative that aims to drive sustainable transition pathways for industries and communities.





Scaling up the supply and demand for low carbon hydrogen

Hydrogen and Alternative Liquid Fuels Research Programme (UKRI), £7 million

Key R&I deliverable(s) 2022-25

Launch of two Hydrogen Hubs covering technology challenges and integrating hydrogen and alternative liquid fuels into the wider energy system.

Longer term policy objective

Tackling cross-sector challenges relating to hydrogen and hydrogen-based low carbon liquid fuels.

Progress updates

Update: Two national research hubs established. The hubs are working on solutions to research challenges that will accelerate deployment of hydrogen technologies and its integration within the wider system.

Link: [UK Hub for Research Challenges and Alternative Liquid Fuels](#)

Status: Ongoing (due to complete 2028)

Low Carbon Hydrogen Supply 2 Programme (part of DESNZ's Net Zero Innovation Portfolio), £60 million

Key R&I deliverable(s) 2022-25

Develop and demonstrate hydrogen production, storage and transport solutions to supply a UK hydrogen economy.

Longer term policy objective

Support the scale up of the UK hydrogen economy across the value chain to enable hydrogen to play its part in decarbonisation, energy security and economic growth.

Progress updates

Update: To make hydrogen production, transport and short-term storage more efficient and cost-effective, the programme supported 23 feasibility studies and five demonstrations, including proton membrane exchange electrolysers, plasmolysis, and electrolysis using sea water and leak-free hydrogen valves.

Link: [Low Carbon Hydrogen Supply 2 Programme](#)

Status: Ongoing (due to complete by March 2026)



Case study: ITM Power

ITM Power has received £7.7 million through DESNZ's Net Zero Innovation Portfolio's Low Carbon Hydrogen Supply 2 Programme competition to accelerate the commercial development of their fourth generation proton exchange membrane electrolyser stacks. The funding is dual purpose – to enable real-world testing of the next generation of electrolyser stacks, and to support manufacturing upgrades. The new generation electrolyser stacks have been tested at the company's headquarters in Sheffield and are being 'field' tested in Germany and Norway to validate their performance under real-world conditions.



Carbon capture, utilisation and storage (CCUS) and greenhouse gas removal (GGR)

CCUS Innovation 2.0 Programme (part of DESNZ's Net Zero Innovation Portfolio), £20 million

Key R&I deliverable(s) 2022-25

Develop novel CCUS technologies and support demonstration of next generation CCUS to reduce deployment costs.

Longer term policy objective

Support the establishment of connections for four of the UK's major industrial clusters to decarbonisation infrastructure by 2030.

Progress updates

Update: Supported 19 projects covering areas such as developing next generation point source carbon capture technologies, utilisation of carbon dioxide in other industrial processes and storage monitoring technology. Important in enabling decarbonisation of industrial sectors with hard to abate emissions, such as iron, steel and cement.

Link: [Carbon Capture, Usage and Storage \(CCUS\) Innovation 2.0 Programme](#)

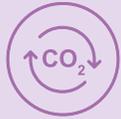
Status: Ongoing (due to complete by March 2026)

Direct Air Capture and Greenhouse Gas Removal Innovation Programme (part of DESNZ's Net Zero Innovation Portfolio), £60 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
Demonstration/pilot plants covering direct air capture, bioenergy with carbon capture, seawater solutions and biochar.	Deliver one or more first-of-a-kind greenhouse gas removal demonstrators.	<p>Update: Achieved CO₂ capture from air and sea at pilot scale for the first time in the UK. Projects included direct air capture, biochar, capturing methane emissions from cattle, and direct ocean capture. Substantially reduced energy demand for carbon removals, assessed impact on marine life and demonstrated circular economy of biomass and peatland restoration.</p> <p>Link: Direct Air Capture and Greenhouse Gas Removal Innovation Programme</p> <p>Status: Ongoing (due to complete by March 2026)</p>

Greenhouse Gas Removal Demonstrators Programme (part of UKRI's Strategic Priorities Fund), £22 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
Support for a series of land-based GGR demonstration projects such as rock weathering, afforestation, perennial crops, peatland and biochar.	Understand the effectiveness, cost and limitations of large-scale land-based GGR methods needed to achieve the level of removals required for net zero.	<p>Update: Improved the viability and scalability of innovative approaches to removing CO₂ from the atmosphere. Insights have supported climate change policy and put the UK at the forefront of these emerging technologies. With significant industry engagement, the demonstrators are helping create a market in GGR and the business models to meet that demand.</p> <p>Link: Greenhouse Gas Removal Demonstrators Programme</p> <p>Status: Ongoing (due to complete 2026)</p>



Case study: Equinor

Equinor's ENCORE project (Environmental CO₂ Remover) aimed to demonstrate the first low-temperature, liquid-based, direct air capture system operating at scale. The project was awarded £3 million by DESNZ's Net Zero Innovation Portfolio's Direct Air Capture and Greenhouse Gas Removal Innovation Programme, to design, build, and test the demonstrator located in the East Midlands, reusing local industrial infrastructure. The results have so far exceeded expectations, demonstrating a capture rate of over 150 tonnes of CO₂ per year, with the selected liquid-based approach optimised for scaled deployments as future plants grow toward million-tonne-per-year industrial capacities.

Image credit: Rolls-Royce





Buildings and heat

Prospering from the Energy Revolution Challenge (part of UKRI's Industrial Strategy Challenge Fund), £17 million

Key R&I deliverable(s) 2022-25

Work with local authorities to deliver integrated place-based approaches to deliver cleaner more affordable energy.

Longer term policy objective

Develop smart local energy systems to provide investable, scalable local business models and finance mechanisms to enable greener, profitable investment decisions.

Progress updates

Update: The programme demonstrated benefits of smart local energy systems for energy bills, system costs, citizen engagement and co-benefits to local residents. Projects continue to develop through UKRI's Net Zero Living programme and DESNZ's Local Net Zero Accelerators.

Link: [Prospering from the Energy Revolution Challenge](#)

Status: Completed in 2024

Green Home Finance Accelerator Programme (part of DESNZ's Net Zero Innovation Portfolio), £20 million

Key R&I deliverable(s) 2022-25

Develop and pilot novel green lending products to support domestic energy efficiency and low-carbon heating retrofit among non-fuel poor households.

Longer term policy objective

Expansion and diversification of the green lending market, improving access to capital, and reducing barriers to the widespread decarbonisation of the building stock for owner occupiers and private landlords.

Progress updates

Update: Funded 26 discovery projects, with 13 moving to pilot phase. Supported lenders in developing and testing a range of innovative green finance products and services, like home improvement loans, to encourage domestic energy performance enhancements. Additionally, aimed to foster partnerships between lenders and energy efficiency providers, and reduce consumer barriers.

Link: [Green Home Finance Accelerator Programme](#)

Status: Ongoing (due to complete by March 2026)

Heat Pump Ready Programme (part of DESNZ's Net Zero Innovation Portfolio), £60 million

Key R&I deliverable(s) 2022-25

Develop and trial technologies and tools to address barriers to heat pump uptake and increased deployment.

Longer term policy objective

Enable heat pump deployment at significantly increased density and scale to support the target of 600,000 heat pumps installed each year by 2028.

Progress updates

Update: Tested approaches for high density heat pump deployment and processes for overcoming barriers to domestic deployment. Innovation in heat pump design to address key barriers to deployment (e.g. developing smaller systems with up to 20% reduced operational costs). Breakthrough in financing with bundling heat pump installations into long-term securitised financial products that can attract large-scale investment at competitive interest rates.

Link: [Heat Pump Ready Programme](#)

Status: Ongoing (due to complete by March 2026)

Hydrogen Heating Programme (DESNZ), £100 million

Key R&I deliverable(s) 2022-25

Deliver a neighbourhood trial by 2024, and a village-scale trial by 2025, to assess the feasibility, costs and benefits of 100% hydrogen for heating.

Longer term policy objective

Enable strategic decisions in 2026 on the role of hydrogen for decarbonising heat in buildings.

Progress updates

Update: Under the previous government, this programme was scaled back with the village-scale trial stopped due to unavailability of the intended hydrogen supply. The government has announced it will assess the latest evidence before consulting later in 2025 on the role of hydrogen in home heating.

Link: [Hydrogen Heating Programme](#)

Status: Ongoing (due to complete by March 2026)

Building Information Modelling and National Digital Twin Programme (DBT), £20 million

Key R&I deliverable(s) 2022-25

Develop digital technologies for the design and operation of better and safer buildings and infrastructure.

Longer term policy objective

Enable the improved operation of buildings, infrastructure networks and systems, to facilitate energy and resource efficiency.

Progress updates

Update: The programme will complete the technical architecture for information exchange by the end of the year. Successful demonstrations of the technology in relation to energy systems and retrofit undertaken on the Isle of Wight.

Link: [National Digital Twin Programme](#)

Status: Ongoing to March 2026 (with potential further funding up to 2035)



Case study: Clean Heat Streets

Clean Heat Streets, funded through the DESNZ Net Zero Innovation Portfolio's Heat Pump Ready Programme, trialled an innovative methodology to accelerate deployment of heat pumps at high-density, taking a street-by-street approach, in Rosehill, Oxford. The project, led by Samsung Electronics UK, brought together key local stakeholders including local councils, academic institutions, the local distribution network operator, installers and community groups. Firstly, the project worked to understand the homes and residents within the area by conducting local area energy mapping. Next, the project worked to understand the route to engaging the community through leafleting, door knocking and setting up heat pump show homes which allowed residents to experience a heat pump working in a house similar to their own. Finally, the project developed a process to guide consumers through their heat pump journey, leveraging support to residents through a Community Liaison Officer, who supported residents to understand their quote for a heat pump and how to use the heat pump post installation.



Addressing consumer challenges across the portfolio

The portfolio addressed the challenges consumers face in adopting innovative technologies. **DESNZ's Heat Pump Ready** Programme aimed to promote heat pump adoption by addressing deployment strategies, engaging consumers and overcoming barriers to adoption including high costs. The programme supported projects which included development of technologies and tools, as well as guidance and training to facilitate knowledge sharing of heat pumps. **DESNZ's Green Home Finance Accelerator** programme aimed to develop a range of green finance products and reduce consumer barriers towards investing in energy efficiency and low carbon heating.

A project funded through **UKRI's Faraday Battery Challenge** aimed to offer customers batteries that perform better and last longer than existing types by using modelling and virtual iteration to speed up electric vehicle battery development, helping to overcome consumer barriers to electric vehicle adoption. Additionally, **DESNZ's Flexibility Innovation Programme** launched innovative tariffs, products and services to unlock consumer-led flexibility.

Ofgem's Strategic Innovation Fund aimed to keep consumers at the heart of the net zero transition by reducing costs, increasing value for money and providing energy security. This was achieved through whole system network planning to facilitate faster and cheaper network transformation and asset rollout, novel technical, process and market approaches, and unlocking energy system flexibility.

Transport



Transport and mobility as a system

Live Labs 2 Programme (DfT), £30 million

Key R&I deliverable(s) 2022-25

Public-private-academic partnerships to trial innovations decarbonising local road construction, operation, maintenance and decommissioning.

Longer term policy objective

Addressing regional needs and place-based approaches for transport decarbonisation,

Progress updates

Update: Seven local authority-led projects are concentrating on how to decarbonise local highways infrastructure and assets. The projects have published their carbon baselines, and the majority are conducting their on-road trials.

Link: [Live Labs 2 Programme](#)

Status: Ongoing (due to complete March 2026)



Land transport

Zero Emission HGV and Infrastructure Demonstrator (ZEHID) Programme (DfT), £200 million⁷

Key R&I deliverable(s) 2022-25

Demonstrating zero emission (exhaust) HGVs and recharging/refueling infrastructure, enabling multi-year data collection at-scale, in real world operations.

Longer term policy objective

Accelerate the deployment of zero emission HGVs into UK fleets and the associated infrastructure in the UK.

Progress updates

Update: Over 300 zero emission HGVs have been ordered so far, with initial infrastructure locations online in the first half of 2025. The programme is expected to bring forward the decarbonisation of the HGV fleet by up to four years.

Links: [Zero Emission and Infrastructure Demonstrator Programme](#)

Status: Ongoing (delivery phase due to complete by March 2026, demonstration phase due to complete by March 2031)

⁷ Originally called Zero Emission Road Freight HGV Demonstrator (ZERFD) Programme.

Faraday Battery Challenge (part of UKRI's Industrial Strategy Challenge Fund), £215.2 million

Key R&I deliverable(s) 2022-25

Development of electrochemical energy storage research, early-stage commercialisation, skills and market analysis.

Longer term policy objective

Strengthening electric vehicle infrastructure which supports ending the sale of new petrol and diesel vehicles by 2030.

Progress updates

Update: Supported growth of a domestic supply chain for battery manufacturing by financing lab to factory research and innovation in battery technology. Established the world-leading Faraday Institution with over 500 researchers and generating over 1,000 publications and 14 spinout companies. Developed a large-scale pilot facility, UK Battery Industrialisation Centre, that is supporting industrially-relevant scale-up of innovation.

Link: [Faraday Battery Challenge](#)

Status: Phase 2 complete (March 2025)

Advanced Propulsion Centre (APC) (DBT), £225 million

Key R&I deliverable(s) 2022-25

Research, development and commercialisation of the next generation of low carbon and zero emission vehicle technologies.

Longer term policy objective

Accelerating the development and commercialisation of low carbon and zero emission vehicle technologies to maintain UK strengths in the automotive sector.

Progress updates

Update: Since opening in 2013 the programme has supported over 300 individual research, development and demonstration projects which we estimate will help save 425 million tonnes of CO₂ emissions from on-road and off-highway transport applications and create or safeguard 59,000 jobs in the UK.

Link: [Advanced Propulsion Centre](#)

Status: Ongoing (evolved into new programme, Drive35, from July 2025)

Automotive Transformation Fund (ATF) (DBT), £75 million

Key R&I deliverable(s) 2022-25

Late-stage collaborative research and development, to accelerate the research, development and commercialisation of strategically important emerging vehicle technologies, strengthening the UK competitive edge internationally.

Longer term policy objective

To ensure a UK-led transition to zero emission vehicles, strengthening the UK's attractiveness as an investment location for research and development and advanced manufacturing.

Progress updates

Update: Programmes have supported over 100 projects in the zero-emission vehicle supply chain in either developing a decision-ready business case or validation of scale-up processes through its feasibility study and Scale-Up Readiness Validation programmes respectively.

Link: [Automotive Transformation Fund](#)

Status: Ongoing (evolved into new programme, Drive35, from July 2025)



Case study: Zero Emission HGV and Infrastructure Demonstrator (ZEHID) Programme

Funded through DfT, the programme is supporting four consortia-led projects comprising more than 35 organisations from across academia, industry, research, business and the public sector, with projects taking place across the UK. Over 300 zero emission HGVs have been ordered to date, with 54 planned infrastructure site locations having been announced. All vehicles and infrastructure will be deployed by March 2026, before entering a five-year demonstration period where data will be collected to inform commercial investment decisions on whether battery electric or hydrogen fuel cell HGV technologies may be better suited for decarbonising specific use-cases.





Aviation and maritime

Aerospace Technology Institute (ATI) Programme (DBT), £685 million

Key R&I deliverable(s) 2022-25

Co-funding development of zero-carbon aircraft, technologies, ultra-efficient aircraft technologies, enabling technologies and infrastructure.

Longer term policy objective

Supporting the development of zero-carbon and ultra-low-emission aircraft technology, while growing UK share of global aerospace manufacturing.

Progress updates

Update: Co-invested in the long-term development of sustainable aircrafts, including next generation ultra-efficient engines and wings, and zero-carbon emission technologies. Since 2013, the programme has facilitated over £3.6 billion of joint government/industry funding towards 438 collaborative research and development projects.

Link: [Aerospace Technology Institute \(ATI\)](#)

Status: Ongoing (extended to 2035)

Future Flight Challenge (part of UKRI's Industrial Strategy Challenge Fund), £87.9 million

Key R&I deliverable(s) 2022-25

Develop and demonstrate drones, advanced air mobility and regional passenger aircraft, electrical/hydrogen infrastructure, regulation and standards.

Longer term policy objective

Developing the future aviation ecosystem to allow the safe and effective operation of new forms of net zero aircraft.

Progress updates

Update: Projects supported include work on the safe integration and operation of drones, advanced air mobility and regional aircrafts, advancements in electrification and autonomy, supporting a 'pop-up airport' that will create the world's smallest airports that can be deployed to support disaster emergencies.

Link: [Future Flight Challenge](#)

Status: Complete (2025)

UK Shipping Office for Reducing Emissions (UK SHORE) (DfT), £206 million

Key R&I deliverable(s) 2022-25

Develop and demonstrate pre-commercial clean maritime technologies and support accelerating the deployment of near-commercial solutions.

Longer term policy objective

Supporting the UK maritime sector's transition to low and zero emission technologies.

Progress updates

Update: Funded research and development to accelerate the technologies necessary to decarbonise the UK maritime sector. Allocated £200 million to over 150 projects across the UK, progressing clean maritime solutions up the TRL scale, ranging from academic feasibility and research to real world demonstrations in commercial operations. Leveraged over £100 million direct private investment and supported more than 350 organisations.

Link: [UK Shipping Office for Reducing Emissions \(UK SHORE\)](#)

Status: UK SHORE will continue with further innovation support for the Maritime sector



Case study: UK SHORE

DfT's UK SHORE programme has received around £200 million of funding in the 2022 to 2025 spending period and has supported more than 150 projects comprising over 300 organisations from academia, industry, research, business and public sector, covering all regions in the UK. This includes 10 at-scale vessel and infrastructure projects demonstrating at commercial capacity for at least three years from March 2025. Examples include electric ferries, methanol and electric vessels, an unmanned hydrogen-powered Thames hydrographic survey vessel, and providing electric shore power at ports. Also, a £7.4 million investment in a UK national Clean Maritime Research Hub, building a virtual consortium of UK universities and industry to drive academic clean maritime research.

Image: Artemis Technologies



Natural resources, waste and F-gases



An integrated and dynamic approach to land use

Land Use Research and Development Programme (Defra), £6.6 million

Key R&I deliverable(s) 2022-25

Mapping biodiversity, environmental impact of land management actions and delivering a land-use research platform.

Longer term policy objective

Maximising emissions reductions from the farming and land use sector, delivered by Defra's environmental land management schemes under the Future Farming and Countryside Programme.⁸

Progress updates

Update: Providing new evidence on land use change impacts on biodiversity, food production and water quality, and additionally on blockers and enablers of land use change. New land use models and tools produced with evidence gathering.

Link: [Land Use for Net Zero Hub](#)

Status: Ongoing (current suite of projects due to complete by March 2029)



Case study: Land Use for Net Zero, Nature and People (LUNZ) Programme

The [LUNZ Programme](#), co-funded through Defra, UKRI, DESNZ and the devolved administrations, addresses key policy-relevant research and knowledge challenges in the three priority areas of land use change, soil system health and carbon dynamics, and reducing agricultural emissions. It draws together a consortium of 34 experts and institutions to fast-track evidence into policy planning in government to inform optimal routes to balance the competing demands on our land, economy, and society. Work has included aligning soil management methods and metrics across the devolved administrations and setting up a network of low-carbon demonstration farms.



Image credit: Harley Stoddart

⁸ Now called Farming and Countryside Programme.



Forests, peatland and the marine environment

Nature Returns (part of HM Treasury's Shared Outcomes Fund), £12.5 million⁹

Key R&I deliverable(s) 2022-25

Research into how carbon accumulates and is released from different habitats in different circumstances.

Longer term policy objective

Identifying strategies that optimise both biodiversity and climate change at the landscape scale.

Progress updates

Update: The Nature Returns Programme has delivered a partnership of public and non-governmental organisations testing and building evidence for landscape-scale nature-based solutions. New data and evaluations are being delivered to improve policy, land management and investment decisions.

Link: [Nature Returns Programme](#)

Status: Ongoing to March 2026 (with potential to extend)

Nature for Climate Fund (Trees) Research and Development Programme (Defra), £22 million

Key R&I deliverable(s) 2022-25

Research to support the delivery of the England Trees Action Plan, including putting tree planting on a trajectory to meet net zero targets.

Longer term policy objective

Supporting the tree planting target of 30,000 hectares each year by 2025 (previous government policy) and developing a sustainable forest economy.

Progress updates

Update: Research outputs across 69 projects have supported outcomes including: the Timber in Construction Roadmap, all Defra tree planting grants, including the new agroforestry grant within the Sustainable Farming Incentive, and updates to the UK Forestry Standard.

Link: [Nature for Climate Fund](#)

Status: Completed in 2025

⁹ Originally called 'Nature based solutions for climate change at the landscape scale'. Delivered by Natural England and funded through HM Treasury's Shared Outcomes Fund.

Peat and Soil Research and Development Programme (Defra), £14.1 million

Key R&I deliverable(s) 2022-25

Develop evidence on lowland peat re-wetting, responsible management, and greenhouse gas implications and soil health impacts of alternative farming models.

Longer term policy objective

Developing a pathway for emissions abatement on lowland peat and the sustainable management of soil, supported by a soil health indicator.

Progress updates

Update: The programme will yield interim and final results, including a new predictive Agricultural Land Classification map, new emissions factors for peat and research to help target and support peatland restoration.

Status: Ongoing (current suite of projects due to complete by March 2029)



Food and biomass

Agri-Food Research Programme (Defra), £16.4 million¹⁰

Key R&I deliverable(s) 2022-25

Research into improved crop and livestock genetics and the impacts of novel fertilisers, feeds and management practices.

Longer term policy objective

Enable a more sustainable, productive, resilient and climate smart food system and boost UK food production. 85% of farmers in England engaged in low carbon practices by 2035 (previous government policy).

Progress updates

Update: The programme has delivered nearly 100 separate research projects spanning the breadth of potential agricultural emissions reductions, including delivering evidence for precision breeding, novel nutrient management tools and bringing Defra's new Dairy Demonstrator online.

Status: Ongoing (current suite of projects due to complete by March 2029)

¹⁰ Originally called the Agricultural Research Programme.

Transforming the UK Food Systems (part of UKRI's Strategic Priorities Fund), £34 million

Key R&I deliverable(s) 2022-25

Research to fundamentally transform the UK food system by placing healthy people and a healthy natural environment at its centre.

Longer term policy objective

Driving efficient, sustainable, resilient food production and contributing to global food security. 85% of farmers in England engaged in low carbon practices by 2035 (previous government policy).

Progress updates

Update: Aims to transform the UK food system using a systems approach. Research spans regenerative agriculture, food system and net-zero modelling, menu optimisation, reduced meat consumption and other key topics. Findings from across the programme are informing actions to transform the UK food system.

Link: [Transforming UK Food Systems Programme](#)

Status: Ongoing (due to complete 2027)

Transforming Food Production Challenge (part of UKRI's Industrial Strategy Challenge Fund), £28.6 million

Key R&I deliverable(s) 2022-25

Developing and supporting new ways of producing food, reducing emissions and reducing pollution.

Longer term policy objective

Driving efficient, sustainable, resilient food production and contributing to global food security. 85% of farmers in England engaged in low carbon practices by 2035 (previous government policy).

Progress updates

Update: A total of 92 projects have benefited from programme funding, including 316 different organisations. Project themes covered future food production systems, science and technology into practice, international opportunities, and investment ecosystems.

Link: [Transforming Food Production Challenge](#)

Status: Complete (March 2024)

Towards Sustainable Climate-Neutral Farming Systems (AgZero+) (UKRI), £12.8 million

Key R&I deliverable(s) 2022-25

Developing new UK farming systems to produce sufficient food, while reducing emissions and pollution, and protecting biodiversity and soil health.

Longer term policy objective

Driving efficient, sustainable, resilient food production and contributing to global food security. 85% of farmers in England engaged in low carbon practices by 2035.

Progress updates

Update: Land Cover Plus Hedgerows and Plus Carbon maps produced. Effects of innovative farming systems on crop yield, emissions, carbon stocks and biodiversity quantified. Autonomous biodiversity monitoring systems trialled. Decision support tools (for example, E-planner) released to provide practical advice on sustainable farming.

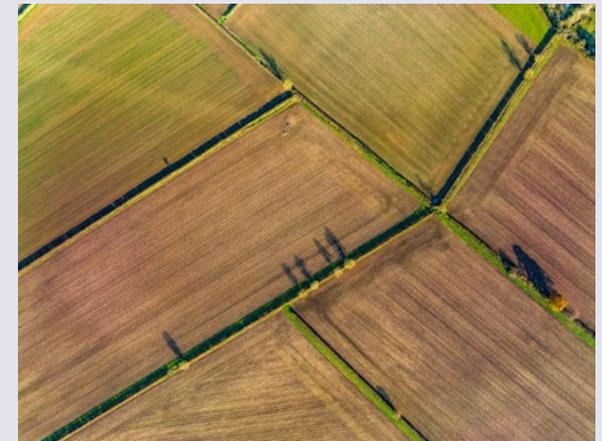
Link: [AgZero+](#)

Status: Ongoing (due to complete 2027)



Case study: Enabling farmers to improve environmental outcomes while increasing food production

E-planner, a free to use tool developed by the [AgZero+](#) programme, is helping farmers to balance production and environmental enhancement by identifying the most suitable places for different environmental management options such as pollinator habitats, woodland creation and improvement of water resources. E-planner was co-designed with farmers and combines complex environmental data such as soil type and texture, slope and aspect, and proximity of water resources and wildlife habitats in easy to use, interactive maps.





A whole systems approach

Changing the Environment Programme (UKRI), £24 million

Key R&I deliverable(s) 2022-25

Collaborations across energy decarbonisation, circular economy, reversing biodiversity decline, sustainable supply chains and cleaner air.

Longer term policy objective

Identifying and navigating pathways to achieving net zero to enable development of environmental solutions at scale.

Progress updates

Update: This programme enables whole systems approaches to complex environmental challenges. Projects are translating their research into effective action to reducing carbon emissions, for example by informing Northern Ireland's forthcoming Climate Action Plan, developing innovative spatial modelling to optimise land use for farming, and fostering community-led approaches to Glasgow's transition to a healthy and sustainable future.

Link: [Changing the Environment Programme](#)

Status: Ongoing (due to complete 2027)

UK Geoenery Observatories (UKGEOS) initiative (UKRI), £12.4 million

Key R&I deliverable(s) 2022-25

Two subsurface observatories in Glasgow and Cheshire will capture new data on the impact of low carbon energy and emission storage solutions on net zero.

Longer term policy objective

Commercialisation of geothermal energy and understanding how geothermal, hydrogen, carbon capture and storage, and storage solutions for renewable energy can reduce carbon emissions.

Progress updates

Update: Construction has been completed on the Cheshire Observatory, the final part of the UK Geoenery Observatories network. This will be used to optimise and de-risk subsurface energy storage systems and geothermal heat in an aquifer setting.

Link: [UK Geoenery Observatories \(UKGEOS\)](#)

Status: Completed in 2024

Future Observatory: Design the Green Transition (UKRI), £25 million

Key R&I deliverable(s) 2022-25

Leading designers and design research teams reimagining the infrastructures and systems needed to address complex challenges.

Longer term policy objective

Harnessing design research and good design policy to achieve the green transition through societal and technological change and green choices.

Progress updates

Update: Future Observatory plays an instrumental role in driving shared learning. Outcomes include co-design for reducing consumable waste in NHS Scotland and greater sustainability in the travel planning of 160,000 staff and 20 million visitors annually, co-design with homeowners of retrofitting to transition to lower carbon housing in different regions of the UK, and a pioneering plan for turning potato harvest waste into textiles which could lift farm incomes by up to £1 million a year.

Link: [Future Observatory: Design the Green Transition](#)

Status: Ongoing (due to complete 2028)

Financing Net Zero Programme (UKRI), £15 million¹¹

Key R&I deliverable(s) 2022-25

Supporting the delivery of new financial products and services to ensure a more integrated approach to scaling and levelling-up net-zero solutions.

Longer term policy objective

Unlock financial market solutions to accelerate the low-carbon economy and boost clean growth investment.

Progress updates

Update: Over 400 investors have been engaged, with over 150 companies showcased. The programme has delivered financial technical assistance and training to over 40 local authorities, supporting a pipeline of investable place-based projects. It has also supported high growth businesses through investor partnerships to unlock £26 million private equity, catalysing over £45 million follow-on investment.

Link: [Financing Net Zero Programme](#)

Status: Ongoing (due to complete March 2026)

¹¹ Originally called Finance for Net Zero Programme.

Driving the Electric Revolution (part of UKRI's Industrial Strategy Challenge Fund), £33.8 million

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
Developing products and the supply chain for power electronics, machines and drives.	Developing crucial underpinning technologies needed across all sectors and growing UK manufacturing and supply chains.	<p>Update: The four open access Driving the Electric Revolution Industrialisation Centres are helping develop the next generation of products to improve supply chain productivity, quality and efficiency. Examples include development of a new manufacturing line for advanced power electronic components for global markets and the manufacture of advanced printed electronics for markets in East Asia.</p> <p>Link: Driving the Electric Revolution</p> <p>Programme status: Complete (March 2025)</p>

Net Zero Living Programme (UKRI), £60 million¹²

Key R&I deliverable(s) 2022-25	Longer term policy objective	Progress updates
Three to six pioneer places accelerated towards net zero by 2030 and up to 20 fast follower places and international collaborations.	Unlocking demand and boosting supply of consumer-centric low carbon products and services.	<p>Update: Delivering over 200 projects focused on innovation to overcome the non-technological barriers to delivering place-based decarbonisation. The programme has funded projects for local authorities and businesses to deliver innovative solutions for citizen engagement, data, systems planning and innovative financing.</p> <p>Link: Net Zero Living programme</p> <p>Status: Ongoing (due to complete March 2026)</p>

¹² Originally called Net Zero Places / Living Labs



Case study: UK Geoenergy Observatories

The UK Geoenergy Observatories (UKGEOS) network received a £12.4 million investment from UKRI between 2022 and 2025 to deliver essential new data from the subsurface. Construction has completed on the Cheshire Observatory, the final part of the UK Geoenergy Observatories network, and this can be used to optimise and de-risk subsurface energy storage systems and geothermal heat in an aquifer setting. The initiative also includes an observatory in a mine water setting in Glasgow, a data portal and a core scanning facility. Research at the observatories will help unlock the potential of geothermal energy.



Additional research and innovation activity: International

The UK has continued to deliver on its up to £1 billion [Ayrton Fund](#) commitment on clean energy innovation in developing countries, which is part of the broader £11.6 billion of UK International Climate Finance between 2021 and 2026. Up to March 2025, the UK spent £552 million via the Ayrton Fund on the research, development and demonstration of new clean energy technologies and business models for developing countries, in areas such as [energy storage](#), [sustainable cooling](#), [electric cooking](#), [green grids](#), [smart energy systems](#), [electric vehicles](#), [e-waste recycling](#), and [solar home systems](#) – among others. Ayrton-supported innovations have so far improved clean energy access for 38 million people, leveraged £2.5 billion in investment, reduced 8.4 million tonnes of CO₂, and created and supported over 198,000 green jobs. Several of the Ayrton Fund Challenge priorities align with UK net zero priorities – including energy storage, smart grids/systems, and hydrogen – and synergies are actively developed between UK expertise and international partnerships.



Case study: Ayrton Fund helps boost Mobile Power growth in Africa

Sheffield-based innovator Mobile Power received support from the Ayrton Fund through the [Transforming Energy Access](#) platform to develop and scale an innovative battery charging, swapping, and distribution business model. Mobile Power now operates in seven African countries, including Nigeria, Sierra Leone, the Democratic Republic of Congo, Liberia, Uganda, Gambia, and Zambia. So far, Mobile Power has delivered 23 million battery rentals, benefiting over 400,000 people who use the batteries daily to charge their phones, light up their homes, and power their electric motorbikes and small businesses. Mobile Power's solar-powered charging hubs have attracted more than £12 million in follow-on investment, including £7 million from British International Investment in early 2025 to further grow its reach and impact in the Democratic Republic of Congo.



