



Accelerating
the Net Zero
Transition

Net Zero Review 2024

Foreword

At Innovate UK our vision is for the UK to prosper from being the fastest transitioning economy to net zero.

For us, 'prospering' means creating value for the UK from the products and services that are needed to get to net zero as quickly as possible. It means inspiring, involving and investing in UK business innovation to create green jobs, sustainable growth and exports. It means laying foundations for a clean economy in which towns, cities and regions across the UK can thrive.

This review focuses on our key objectives to deliver our vision, in the following areas: Agriculture and Food; Heat and Power; Make and Use; Mobility; and Systems Integration. This shows the breadth of activity required to deliver net zero and how the innovations we fund will drive change in every sector of our modern economy, and across every town, city and region of the country.

This is our fourth net zero review and as in previous years the core of the review focuses on the funding we have committed to in the previous financial year

(2023-24), summarising how this is spread across our themes and geographically across the UK.

The focus of the report is impact which is brought to life through real projects and programmes that are delivering on our objectives. The exemplars we share here highlight the benefits, outputs and outcomes that have been delivered through our work to date, and how their impact is expected to grow with scale and deployment in future.

Innovate UK is here to accelerate business-led innovation. This report is a showcase of successes so far, but more importantly it shows the UK can prosper from the transition to a net zero economy.



Mike Biddle
Executive Director
Net Zero

Contents

| | |
|----------------------|----|
| Introduction | 03 |
| Heat and Power | 06 |
| Mobility | 14 |
| Make and Use | 20 |
| Agriculture and Food | 26 |
| Systems Integration | 31 |

Innovate UK helps businesses to grow by developing and scaling the new climate tech solutions we need to transform our lives. Our vision is for the UK to prosper from our transition to a Net Zero.

Our Review for 2024 lays out key innovation objectives across our net zero themes and showcases some key areas of our work.

The following case studies provide a glimpse into the many initiatives being carried out across our core innovation themes of Agriculture & Food, Heat & Power, Make & Use, Mobility and Systems Integration.

These case studies each explore:

- A core theme objective and how the chosen project helps to advance it
- Innovate UK's role in funding and supporting the project
- How the project impacts end-users and progresses the UK towards net zero
- The wider impact on the company and industry as a whole

The year in numbers

Across the UK in 2023/24, Innovate UK has:

Awarded

2645

net zero related grants

Supported

1876

companies

Committed over

£1.4bn

to net zero research and innovation projects*

2023/24 spending by net zero theme:

£945_m

Mobility

£198_m

Make and Use

£139_m

Heat and Power

£93_m

Agriculture and Food

£46_m

Systems Integration

Innovate UK's

5 year impact

Small and Medium Sized Enterprises (SMEs) awarded a Net Zero Research and Innovation grant from Innovate UK since 2019 have:



Generated over £5.7bn Gross Value Added (GVA)



Raised over £57.8bn in Private Investment



Created over 15,000 jobs in Net Zero



Exported over £10.5bn in goods and services

*This figure includes 20% of the Innovate UK funding committed to the Catapult Network in 2023/24 as the funding is allocated over 5 years. It also includes programmes which are funded by other government departments such as DfT, but managed by Innovate UK

Working across the UK

We are a UK-wide organisation, providing funding and support services to accelerate Net Zero innovation and catalyse change.

This selection of projects funded during 23-24 highlights innovations we have supported in every region of the UK.



Scotland

- Dynamic, Digitised Decarbonisation investment and engineering roadmaps for UPgrading building portfolios
- An all-encompassing innovative Green Hydrogen supply chain system resulting in a significant energy savings
- A feasibility study of innovative mineral processing routes for the UK's automotive industry

Northern Ireland

- Net Zero - Derry & Strabane - From Ambition to Action
- Increasing yield in UK protected cropping by altering light quality
- Developing Next-Generation Common-Platform Fuel-Cell and Battery-Electric Multi-Axle Buses

North East

- Biogas powered electrolyzers for green hydrogen production, compression and creating a localised supply chain.
- Oakdale: a step-change in UK materials and manufacturing using carbon negative materials to achieve carbon neutral batch designs
- Overcoming the social system barriers to decarbonisation of agriculture and land management in England's most rural county

North West

- Thermo-regulating magnetic coverings for storing and releasing lost heat
- Commercial development of nutrient sensors to improve productivity and reduce emissions in fruit farming systems
- Hyer Power - Hydrogen extended range Powertrain for Special Purpose vehicles

Yorkshire and the Humber

- Optimising Energy Demand in Rural Communities via Precision Agriculture Technology (SWIFT)
- A New Polymer Property Sensor to Enable Greater Use of Recycled Plastics in Extrusion and Injection Moulding
- Developing a Property Retrofit Assessment and Household Engagement Platform

Wales

- Fabulous Fibre: increasing productivity, sustainability and resilience in the wool industry
- Innovation in Housing: Health and prevention in Cwm Taf Morgannwg
- Compact Battery Propulsion for Inclusive Regional Trains

West Midlands

- Mag-Cure: A novel method for magnetically induced bonding and de-bonding of thermoset adhesives
- Incredible Husk & WCM: Unlocking sustainable composite materials applications to support decarbonisation of the automotive industry
- Crop lifecycle monitoring and automation platform (CropMAP)

East Midlands

- Leicestershire CAN: A framework for cross-sector decision making, governance and delivery to accelerate net zero action
- Measurement Led Actionable Building Diagnostics
- Clean Hybrid Alternative Marine Powertrain (CHAMP) 2

East of England

- Mobile Industrial Solar Platform (MISP) - Scalable and portable solar generation bringing industrial-scale levelised cost of electricity for last mile electrification
- Valorisation of waste plant biomass to produce circular biodegradable materials including single use packaging
- Advancing Retrofit to Drive Net Zero in Three Rivers

London

- Improving the resilience of cereal grains and oilseeds in storage and transportation
- Innovation in data gathering, processing and communication to support Local Authorities' building portfolio challenge
- Affordable novel wind tunnel for zero-emission aircraft propulsion testing

South East

- Novel alkaline electrolyser with optimized micro-patterned electrodes for efficient ultra-low cost hydrogen
- Creating a low carbon, environmentally sustainable and socially just value chain for rare earth magnets
- Language Interface for Net Zero Innovation (LINZI)

South West

- Automated high density macroalgal protein biomass cultivation system
- Enabling the mortgage industry to drive net zero retrofitting through a data-driven portfolio approach
- Establishing feasibility for safe, sustainable transportation of end-of-life EV batteries for recycling

Heat and Power



Ian Meikle
Director of Heat and Power



The UK government has set the ambitious target of a clean power system by 2030 to help meet its net zero targets.

However, decarbonising energy systems requires technical innovation as well as new ways to invest and deploy at scale across the whole energy network.

Innovate UK’s Heat and Power programmes are facilitating the development of solutions that will modernise the UK’s energy networks and decarbonise industry. They are also helping scale up the renovation of buildings to reduce our reliance on fossil fuels while promoting better health and wellbeing.

We support innovative SMEs increasing UK content in energy supply chains and major players developing game-changing renewable and nuclear capabilities. All while helping accelerate the innovations and partnerships needed to realise a just and inclusive energy transition in developing nations.

Our Power programmes help energy-intensive industries and industrial clusters across the country develop the skills and capabilities to make significant investment decisions in carbon capture and storage, sustainable fuels and the rollout of nuclear technologies.

Our Heat in Buildings programme drives innovations in the refurbishment of our homes and workplaces so we may heat them more efficiently and reduce the detrimental impact of poorly heated buildings on respiratory, circulatory and mental health.

Incorporating net zero solutions requires new ways of thinking, as well as deployment methods that enable systems to work for everyone.

As such, we are supporting Ofgem to develop the innovation pathways and energy network company incentives to drive change within the upcoming price control framework.

Net Zero Heat and Power programmes aim to achieve the following objectives:

- **Driving scale-up and UK content in renewable and nuclear energy generation**
- **Creating smarter, decarbonised, more flexible, fair and secure energy networks at lowest cost to consumers**
- **Decarbonising industry, including the development and roll-out of the UK’s CCUS, hydrogen and synthetic fuel markets**
- **Scaling up the renovation of buildings to move away from fossil fuels and to promote health and wellbeing**

Producing, storing, distributing, and using low carbon heat and power are essential to achieving net zero and improving our health and wellbeing.

In the last 5 years, SMEs receiving Net Zero Heat and Power grants from Innovate UK have:

£25_{bn}

Raised over £25bn in private investment

£81_k

Generated over £81k of GVA per employee

£1.5_{bn}

Exported over £1.5bn of goods and services



Objective

Driving scale-up and UK content in renewable and nuclear energy generation

Meeting the UK government's objective to deliver clean power by 2030 relies on the acceleration of renewable technologies, supported by new, affordable sources of low-carbon nuclear energy.

Through initiatives like the Offshore Renewable Energy Catapult, Innovate UK is supporting research and development projects that will enable the UK to capture the full potential of renewable energy including 50GW of offshore wind by 2050, and ensure strong UK content in supply chains across the whole energy system.

Nuclear power will also likely be required to constitute 25% of the UK's net zero energy mix.

Innovate UK's Low-Cost Nuclear Programme is helping accelerate the adoption of nuclear power by supporting businesses developing solutions like small modular reactors (SMRs) that reduce the time and cost of build and delivery, helping them access new private finance opportunities.

Case Study

Supporting collaboration between businesses and strong UK content in supply chains

Innovate UK's Innovation Exchange accelerates knowledge transfer by matching industry challenges with innovative companies to deliver solutions through connection and collaboration.

In 2019, Innovate UK Business Connect was approached through the Innovation Exchange by wind farm operator and developer, EDP Renewables (EDPR).

EDPR was seeking to identify innovative companies that could support them in making wind turbine installation more efficient and safer.

They required solutions that would modernise and speed up outdated practices for installing the more than 1000 bolts used to secure wind turbine components, while also improving Quality, Health Safety and Environmental (QHSE) performance.

Through the Connected Data for Improved Efficiency of Bolt Torquing Operations Offshore challenge, the team at Innovate UK Business Connect identified several companies with proposed solutions who were invited to pitch to EDPR at its offices in Edinburgh.

ITH Bolting Technology UK presented a maintenance-free bolting technology that stood out to the assessing team, leading to a relationship being formed between the company and EDPR, supported by Innovate UK.



Artist's render of SMR (interior)

In 2023, this collaboration resulted in ITH securing the contract to supply its offshore foundation bolted connection technology for the Moray West Offshore Wind Farm, which is due to finish construction in 2025 and will be a significant addition to the UK's capacity to generate renewable energy.

Enabling collaboration and knowledge transfer through initiatives like the Innovation Exchange is a key pathway through which Innovate UK is helping accelerate the UK's transition to net zero, supporting innovative UK companies to prosper through access to new opportunities.

25%

of the UK's energy mix to be delivered by or originate from a nuclear power source to reach net zero

Objective

Creating smarter, decarbonised, more flexible, fair and secure energy networks at lowest cost to consumers

The UK's energy networks have a crucial role in delivering net zero by 2050 and clean power by 2030, requiring us to reinforce our network and optimise our existing energy grid to incorporate low-carbon technologies.

With the National Grid Electricity System Operator predicting that UK electricity demand will grow 64% by 2035 as we increasingly electrify transport and heating, we will also need to embrace the opportunities of demand and flexibility to ensure a balanced and cost-effective network.

Innovate UK's funding, in partnership with Energy Systems Catapult, is contributing to creating energy networks that are smarter, decarbonised, flexible, fair, and secure, introducing these vital upgrades at the lowest cost to consumers.

Case Study

Driving the transformation of the UK's energy networks

Established in 2021, the Ofgem Strategic Innovation Fund (SIF) supports the joint government and industry goal to achieve Clean Power by 2030, making the UK a global hub for energy innovation.

Delivered in partnership with Innovate UK, the £450m+ Ofgem funded SIF programme is part of the price control mechanism managed by the energy regulator.

The vision of the SIF is to 'Accelerate the UK's transition to net zero at lowest cost to the consumer and make the UK the best country for energy businesses to grow and scale.'

It aims to achieve this by: ensuring value for money for energy consumers while empowering businesses and communities; by accelerating net zero delivery while making energy systems more secure and robust; and by enabling diverse business collaboration to deliver change, support the best ideas to scale and encourage finance and investment.

In 2023/24 the Strategic Innovation Fund awarded over £120m in grants to 131 unique projects, including the Community Led Integrated Planning (CLIP), led by UK Power Networks, which is pioneering a circular, community-led, digital planning approach to decarbonisation.

Also funded through the SIF is the Crowdflex-Beta project, led by the National Energy System Operator (NESO), which is developing digital tools to help unlock full energy supply chain flexibility.



An electricity pylon

And the INSIGHT project, led by the Scottish and Southern Electricity Network, aims to deliver a real-time alert and control system, monitoring and mitigating stability issues that arise when new sources of power generation are connected to the grid.

Through projects like these across the Strategic Innovation Fund, Innovate UK is contributing to increasing energy security, reducing costs and supporting stakeholder collaboration on innovative products and services that will accelerate the UK's transition to net zero.

Awarded over

£120m

in grants by Strategic Innovation Fund

Objective

Decarbonising industry while developing and rolling out the UK's CCUS, hydrogen and synthetic fuel markets

Decarbonising industry is vital for reaching net zero targets, revitalising our industrial communities and establishing the UK's global competitiveness as a provider of low-carbon products and services.

Through programmes like the Industrial Decarbonisation Challenge, Innovate UK has provided the path to net zero for the UK's industrial clusters.

In parallel, the Low Cost Nuclear Programme has identified emerging opportunities to utilise output nuclear heat in decarbonising industry.

Shared infrastructure will enable decarbonisation of UK industrial clusters



Case Study

Decarbonising UK industrial clusters

Innovate UK's £210 million Industrial Decarbonisation Challenge (IDC) focused on transforming key industrial clusters through the development of low carbon technologies such as Carbon Capture and Storage (CCS) and Hydrogen production and distribution.

The IDC facilitated knowledge sharing across industry, laying the foundation for collaboration within and between industrial clusters to accelerate cost-effective decarbonisation.

Innovate UK enabled the delivery of six regional plans for achieving net zero by 2040, established a research centre to drive progress in industrial decarbonisation and supported nine deployment projects creating advanced engineering designs that enable the deployment of onshore and offshore decarbonisation infrastructure.

The Challenge has stimulated industry investment of £982 million, nearly four times the original target, and supports the government ambition of four low carbon clusters by 2030 and the world's first net zero cluster by 2040.

By 2030, IDC deployment projects could capture 11 million tonnes of CO₂ annually and a potential further 18 million tonnes CO₂ annually through future projects connecting to the shared infrastructure that has been developed.

Economic impacts include employment that will peak at 57,000 jobs per year and gross value added that exceeds £2 billion a year at the height of IDC project construction.

Further opportunities to accelerate industrial decarbonisation and deliver economic value will continue to be realised through research and innovation supported by Innovate UK.

This includes initiatives like the Low Cost Nuclear Programme, which has illuminated the potential of using output heat from nuclear power plants for industrial heating or the efficient production of hydrogen and synthetic fuels.

£982m

industry investment
stimulated through the
Industrial Decarbonisation
Challenge

Objective

Heat in buildings

Scaling up the renovation of buildings to move away from fossil fuels and to promote health and wellbeing.

Dependence on fossil fuels for heating makes the housing sector difficult to decarbonise and reliant on the planned retrofitting of over 25 million buildings across the country.

Innovate UK Net Zero Heat programmes are helping the UK prosper from a rapid move away from gas and oil-based heating systems.

They are contributing to scaling-up the renovation of buildings, focusing on upgrading the efficiency of buildings to use less energy in the first place, and then using decarbonised heating systems.

Innovate UK is also working to drive health and wellbeing benefits as a result of retrofitting, with projects exploring how to make homes warmer, more efficient and safer for more vulnerable residents.

Net Zero Heat programmes are about improving our homes from both a carbon emissions and health basis, addressing parts of society that aren't often reached by Innovate UK programmes while creating job opportunities that can expand the workforce in order to meet targets.

Our programme activities ensure we're able to generate better data on the performance of a building before and after it has been upgraded, to help accelerate the adoption and trust in new solutions.



Let Zero planning meeting

Developing new data collection and analysis techniques to accelerate the decarbonisation of buildings

Almost 30 million buildings in the UK are still to be decarbonised, with 28.6 million of these being homes.

The current pace of refurbishment is far too slow to meet net zero legal targets by 2050, with a lack of information about the current state of the building stock across the UK one of the most significant barriers to the mainstreaming of retrofit.

Innovate UK is supporting projects that help us to gather accurate data on performance and upgrade potential of buildings which will accelerate our ability to refurbish buildings and achieve net zero.

Almost
30m
buildings in the UK are still to be decarbonised

Case Study

Enabling more accurate data on the quality and condition of buildings

Accelerating UK refurbishment initiatives requires building data to be collected in a quick, low cost and net zero way so projects can be built on an accurate base of evidence, rather than slow guesswork.

The Built Environment Scanning System (BESS), developed by xRI with funding from the Innovate UK Net Zero Heat programme, hopes to solve this by providing invaluable data on the quality and condition of building stock at scale.

The BESS will allow for significantly more accurate and efficient delivery strategies, based on real-world data across building portfolios.

Understanding the actual condition of buildings is critical to determining the correct upgrade pathway, and such work currently has to be done via a visit and inspection by sight. BESS scans building stock gathering accurate data on the condition and dimensions of the dwellings simply by driving past.

Going beyond this, Innovate UK is supporting a Building Data Trust where everyone, including banks, portfolio owners and those holding data on buildings, can start to share that data in a safe way for even deeper understanding of building stock.

This system has been called for by the sector for a long time and will rapidly accelerate data getting into the hands of the right people to lead retrofit projects.



BESS attached to an AI-powered Tesla

Since receiving Innovate UK funding through the Net Zero Heat programme, xRI has seen increased interest from those looking to scan their portfolios, with potential customers ranging from local authorities to real estate firms.

Decades worth of buildings have had scant data logged, leaving portfolio owners and other stakeholders in the dark on the materials, maintenance and conditions of their buildings.

The BESS project aims to reset this, establishing a baseline of hard data that will enable wider programmes of decarbonisation to take place at scale across the UK.

Supporting private sector landlords to renovate properties to move away from gas for heat

Energy efficiency has become a common concern across all kinds of housing, not just as the UK progresses towards net zero, but also in the face of rising energy bills and a higher cost of living.

Through the Net Zero Heat programme, Innovate UK is helping to drive projects that incentivise and encourage private sector landlords to upgrade homes that are energy inefficient.

This includes working with landlords to identify a renovation pathway which is tailored to the needs of their occupants. Projects contributing to this identify approaches and technologies that will give landlords confidence that they will be able to upgrade their properties and improve the lives of their occupants, affordably and efficiently.

£2.4m

in funding secured for the Let Zero project

Case Study

Providing data to drive private rental housing renovation projects

Working with landlords to improve their decision-making on property renovations can not only help to progress decarbonisation, but also offer significant benefits to their tenants, especially vulnerable people.

Led by South Yorkshire Mayoral Combined Authority, the Let Zero project is one such initiative that has secured £2.4 million in funding through the Innovate UK Net Zero Heat programme.

The 18-month project will develop an end-to-end solution, powered by AI, to give landlords a trusted path for upgrading their properties, tailored to the needs of the occupants and driven by the desire to address the complex requirements of private rented housing.

The solution is being tested in South Yorkshire as an extension of the local authority's retrofit programme, but with the potential to be scalable across the UK.

With private sector landlords facing increasing regulatory requirements when it comes to decarbonising and retrofitting their portfolios for net zero, a key challenge of the Let Zero project will be growing trust in being able to do this in a safe and cost-effective way.

For tenants, the project holds potential as a way to help stabilise energy bills and reduce their carbon footprint.

The outcomes of Let Zero will play a crucial role in providing data to drive this on a national scale.

The Net Zero Heat programme is helping to drive projects such as this that incentivise and encourage landlords to upgrade homes.

Developing new net-zero heating solutions



Mobility

Moving people, goods and services in a net zero world calls for rapid, widespread adoption of both technological and behavioural change.



Claire Spooner
Director of Mobility



Transport contributes over 25% of the UK's carbon emissions. While existing innovations are helping reduce this, greater support is needed to accelerate the development of new technologies and achieve deeper reductions.

Achieving significant progress toward net zero in transport requires the UK to support scale-up manufacturing and demonstrators of technologies that deliver cleaner, more sustainable mobility solutions.

Through our Net Zero Mobility programmes, Innovate UK is facilitating the innovations that will underpin this vision and ensure that transport systems and infrastructure remain resilient and responsive.

These programmes encompass a broad portfolio of investments in everything from railways and surface transport to aviation and maritime, as well as off-road vehicles.

Projects funded through Innovate UK's Net Zero Mobility, and those in collaboration with the Department for Transport and the Department for Business and Trade, including the Aerospace Technology Institute Programme and the Advanced Propulsion Centre, are helping to revolutionise supply chains, advance zero-emissions transport, accelerate aerospace innovation and fast-track new vehicle technologies.

The impact of this can be felt right across the transport sector, with Innovate UK enabling companies to demonstrate the viability of their innovations to allow new solutions to be adopted, diffused and exploited more readily in the journey to reach net zero.



Net Zero Mobility programmes aim to achieve the following objectives:

- **Innovate in UK battery manufacturing to improve battery efficiency and strengthen supply chains**
- **Accelerate the acceptance and adoption of new classes of air vehicles**
- **Create a world-class ecosystem and supply chain for zero-emission vehicles**
- **Deliver growth for UK aerospace through transformative technologies and innovation**

In the last 5 years, SMEs receiving Net Zero Mobility grants from Innovate UK have:

£27.8bn

Raised over £27.8bn in private investment

£2.3bn

Generated over £2.3bn GVA

£4.8bn

Exported over £4.8bn of goods and services

Objective

Innovating in UK battery manufacturing to improve battery efficiency and strengthen supply chains

Widespread adoption of electric vehicles is a key pathway by which the UK will reduce emissions related to our transport network.

To enable this, there is a need to redesign battery materials to improve their energy capacity and reduce their size and weight.

Innovate UK is supporting research and development projects to improve the efficiency of batteries while developing the UK battery technology industry and infrastructure.

£800m

invested in innovative battery companies through the Faraday Battery Challenge



Case Study

Demonstrating the potential of silicon battery materials

The SUNRISE project, funded through the UKRI Faraday Battery Challenge, has developed a new, silicon-based material that allows batteries to store up to 50% more energy, dramatically increasing the range of electric vehicles.

Battery materials specialist, Nexeon Ltd, began exploring the potential of silicon as a battery material in 2006 but didn't have an avenue to accelerate its development.

Through the Challenge, Innovate UK supported Nexeon and the SUNRISE project to demonstrate the lifecycle potential of its new material through proof-of-concept production and testing.

This support also allowed them to develop processes to manufacture the material on a large scale, helping the company secure significant private investment, including an £80 million licensing deal.

The new material has been the cornerstone of Nexeon's forward business strategy since 2022, leading to the creation of 50 highly skilled job roles to help the company further its development and expansion.

This includes securing a site for its first commercial volume silicon material plant in South Korea and supplying commercial material to Panasonic.

Nexeon has gone on to further evaluate the potential of higher-density, silicon-based battery materials leading to enhanced performance across the automotive industry, consumer electronics, power tools and beyond.



Development of silicon-based EV batteries

Continuing to enable this will be the UKRI Faraday Battery Challenge, which helps de-risk innovations and accelerate the development and adoption of new technologies that lower the barriers to entry for consumers by allowing batteries to be smaller and cheaper.

Launched in 2017, the Challenge is a £610 million programme delivering a mission-led, research and innovation program that covers "Lab to Factory" development, cutting-edge research, and national scale-up infrastructure.

It has catalysed £800m private investment, spun out 14 new companies and created 1000 new highly skilled jobs, allowing the UK to become a world leader in battery science.

By leveraging scientific strength, with our delivery partners Faraday Institution and UK Battery Industrialisation Centre, we are building an ecosystem that supports industry growth and ensures UK prosperity.

Objective

Accelerating the acceptance and adoption of new classes of air vehicles

New forms of aviation have the potential to transform how we deliver vital services in the UK and catalyse a revolution in Net Zero air transport and digitally enabled growth.

Innovate UK is delivering programmes that are developing the ecosystem for these technologies and are shaping new market opportunities.

Projects funded through these programmes will use new classes of electric, hydrogen and autonomous aircraft to transform how we connect people, deliver goods and provide services across the UK.

Remote drone aircraft under testing



Case Study

Revolutionising public services through future aviation tech

The advent of autonomous, low emissions aircraft presents exciting opportunities to better connect communities and allow essential services to reach further than before.

One of the flagship projects of the UKRI Future Flight Challenge - a visionary £300 million programme delivered by Innovate UK - is helping to make this a reality.

Launched in July 2022 and led by AGS Airports Ltd, Project CAELUS is developing and trialling drone enabled logistics at scale, reducing the time taken to transport essential medical supplies across urban and rural areas.

The CAELUS consortium has designed drone landing stations for NHS sites across Scotland and developed a virtual model of the proposed delivery network.

Flight trials between hospitals in NHS Lothian and NHS Borders took place in August 2024, reducing transport time for laboratory samples from up to five hours by road to just 35 minutes by air.

Further demonstrations will prove flight networks that encompass the movement of blood samples and chemotherapy medication in the West of Scotland, Grampian and Highlands.

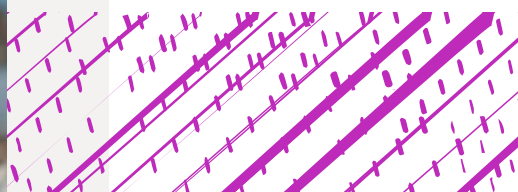
As well as helping open new delivery networks, expand existing ones and lower overall emissions, the project has established best practices for how to deliver a project of this kind while navigating regulators like the Civil Aviation Authority.

These learnings have helped inform decisions on subsequent rounds of funding and provided insights to policy teams across government departments.

UKRI Future Flight Challenge projects demonstrate the many different pathways to applying innovative aviation technologies to essential public services, while importantly reducing emissions associated with these applications. It is now globally recognised for its work in growing what is, in essence, a brand-new sector.

One of the key successes of the Challenge has been in uniting tech innovators with regulators and end-users to help progress net zero objectives, accelerating the adoption of new classes of air vehicles and delivering digitally enabled growth.

£300_m
total budget of UKRI Future Flight Challenge



Objective

Creating a world-class ecosystem and supply chain for zero-emission mobility

Innovate UK is delivering multiple investments on behalf of the UK Government to enable the creation of a world-class ecosystem and supply chain for zero emission mobility.

Innovate UK delivers a suite of programmes with our partners in the UK Government focused on decarbonisation, automation and improving the customer experience of road, rail and maritime sectors.

We do this by supporting projects focused on both vehicles, vessels and infrastructure to develop and test and prove the technologies in real world settings.

The Land and Maritime Team leads and champions the development of the Innovate UK Transport Vision for 2050, setting our clear targets to deliver a zero carbon transport future.

£206m

invested by the UK shore programme since 2022

Case Study

Demonstrating zero-emissions crew transportation in the field

Current battery technology limits the practical range of crew transfer vehicles, meaning they can only make a limited number of transfers to offshore wind farms before recharging.

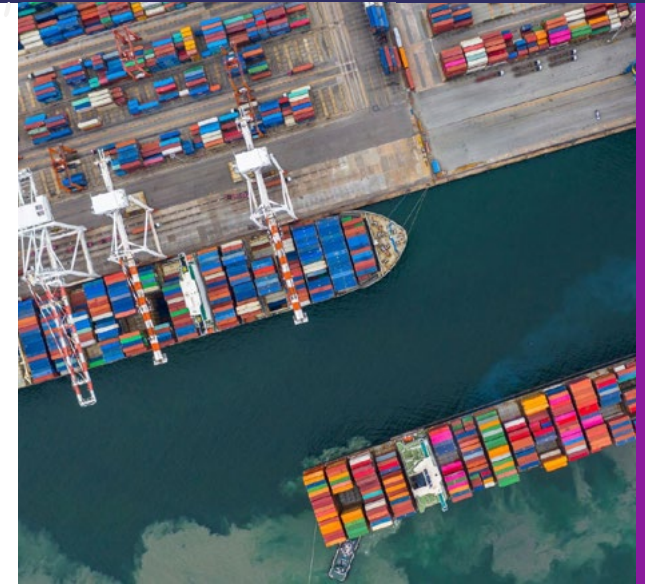
The offshore wind-on turbine electrical vessel charging system, delivered through the DfT's £206 million UK SHORE programme, aims to expand this range by allowing electric crew transfer vehicles to charge while working at offshore wind farms.

With support from Innovate UK and funding from the DfT, MJR Automation was able to develop, install and test a prototype electric charging point for offshore wind turbines for use in real-world field trials.

Offshore wind forms a cornerstone of UK decarbonisation plans and with capacity set to more than triple by 2030, the number of crew transfer vehicles used in maintaining offshore wind farms is projected to rise.

The ability to charge an electric vessel in the field allows them to be deployed up to 30 nautical miles from the shore, meaning 82% of currently commissioned offshore turbines could be serviced as opposed to 34% with shore power alone.

Since completion, the project has experienced successful testing with a major wind farm operator and the prototype charging unit is now operational at a wind farm in the North Sea, demonstrating the feasibility, scalability and impact of the system.



Advancing the adoption of net-zero maritime transport

DfT's UK SHORE programme, delivered in partnership with Innovate UK, helps to create innovations that will ripple out into future changes for the maritime sector, while demonstrating zero-emission technologies in current, real-world environments.

UK SHORE initiatives such as this are all about creating innovations that will ripple out into future changes for the maritime sector, while demonstrating zero-emission technologies in current, real-world environments.

Each project in the programme works to scale up demonstrator capacity and build towards putting these innovative technologies into use to help us achieve our 2050 Transport Vision.

Objective

Delivering growth for UK aerospace through transformative technologies and innovation

In 2022, Aviation accounted for 2% of all global CO2 emissions, and while modern aircraft are more fuel efficient than their predecessors, the increasing demand for air travel has made this number hard to reduce.

Innovate UK is contributing to reducing aerospace emissions through investment in transformative technologies and innovation.

Investment in aircraft technologies that enable the use of both sustainable aviation fuels and hydrogen fuels will be a vital part of achieving Net Zero by 2050.

In addition, investment in the UK's aerospace sector will ensure UK companies in the sector remain competitive and the UK can benefit from an increased market share in energy efficient commercial aircraft.

£1.9b

invested by the ATI programme in UK aerospace projects since 2013

Case Study

Enabling a rapid transition to electric actuation systems

Within aerospace, traditional actuation and braking systems are too heavy and existing electro-magnetic solutions are not suitable to support new advancements in aerospace technology.

As part of a £300k NATEP funded grant, coordinated by Innovate UK through the ATI Programme, Domin Fluid Power Ltd and Apex Additive Technologies have worked together to develop the solution to this problem.

The MANIFEST project leverages Domin's innovative digital motion technologies and Apex's additive manufacturing expertise to develop a highly compact, electrically signalled and powered brake actuator system.

Using generative design and high speed motor control, the project consortium was able to demonstrate weight reductions of 30kg per aircraft and deliver significantly higher bandwidth and lower weight than competing electro-mechanical or hydraulic systems.

The development of this new brake powerpack enables significant improvements to build time, cost and mass improvements, and will help to improve fuel efficiency and reduce emissions in aircraft as well as having the potential to create efficiencies across other modes of transportation.



Electric brake actuators allow for lighter aircraft

With the support of the ATI Programme, Domin and Apex Additive Technologies have been able to develop and validate a disruptive aerospace technology that performs better against all criteria compared to current top range products.

Launched in 2013 through a partnership between the Department for Business & Trade, Innovate UK and the Aerospace Technology Institute, the ATI Programme has invested over £1.9 billion of funding in UK aerospace projects such as MANIFEST.

This includes zero-carbon emission aircraft technologies, ultra-efficient aircraft technologies and cross-cutting enabling technologies.

It sets a clear path towards achieving Net Zero carbon emissions for commercial aircraft by 2050 and supports the competitiveness of the UK industry in the sustainable design, manufacture, assembly and operation of future aircraft.

Make and Use

UK manufacturing is responsible for over 40% of the total emissions associated with the UK's consumption of goods.



Bruce Adderley
Director of Make and Use



Combined with the growing scarcity of resources, rapid pace of technological change and increasing global competition, this presents an urgent need for the UK materials and manufacturing industries to progress to a more sustainable future.

Innovate UK aims to achieve this through Make and Use innovation programmes that create opportunities for companies looking to decarbonise products across their entire life cycle.



Our vision is for UK materials and manufacturing in 2050 to be sustainable, safe, agile, resilient and adaptable to rapid advances in technology, with clear opportunities for growth.

Bringing this vision to life will require systemic economic and societal change allowing organisations to embrace emerging technologies, develop skills, encourage diversity, embed resilience and build sustainability.

Innovate UK is helping to materialise this change by enabling companies to adapt and evolve to deliver the right products and services for a sustainable, digital world.

We believe the UK already has the talent and innovation infrastructure needed to realise its goal of being a world-class destination of choice for manufacturing.

Through the Make and Use programmes, we aim to stimulate diverse cross-sector debate, promote transparency and inspire the creative and transformative action that will help reach this goal.

Net Zero Make and Use programmes aim to achieve the following objectives:

- Increase productivity and competitiveness through resource efficiency across UK industry
- Develop innovations in sustainable bio-based materials and manufacture
- Make the UK a global leader in the design, development and manufacture of Power Electronics, Machines and Drives (PEMD)
- Drive cleaner growth across UK plastics, packaging and retail supply chains

In the last 5 years, SMEs receiving Net Zero Make and Use grants from Innovate UK have:

£2.5bn

Raised over £2.5bn in private investment

£1bn

Generated over £1bn GVA

£2.9bn

Exported over £2.9bn of goods and services

Objective

Increasing UK industrial productivity and competitiveness through resource efficiency

Efficient use of material resources in manufacturing has become more vital than ever in the face of growing concerns around environmental impact and the nation's net zero commitments.

Innovate UK will support the development of new materials that reduce emissions, energy use and costs; developing efficient and effective design methods to maximise through-life value; strengthening supply chains to boost sustainability; boosting production capacity and adaptability; and extending the life of products to keep them in use and reuse longer.

Through interventions like Resource Efficiency for Materials and Manufacturing (REforMM), Innovate UK will pave the way for the UK to be a leader in resource efficiency and deliver solutions that will be fundamental to UK and global net zero ambitions.

15-20%

of material is wasted on the manufacturing floor

Case Study

Exploring the viability of sustainable garment production

Garment production is just one of many manufacturing areas where smarter use of material resources will be essential in reducing carbon emissions.

15-20% of material is wasted on the manufacturing floor alone due to outdated methods, while greater globalisation has led to offshoring that diminishes the UK's manufacturing capabilities.

Finding a solution to this challenge has driven technology startup, Weffan, to develop a low-waste, localised whole-garment production system using 3D weaving technology.

Through the Innovate UK REforMM programme, Weffan was awarded funding to undertake a feasibility study investigating ways to optimise machinery and develop a business case for 3D woven garments.

The company partnered with the University of Leeds' 3D Weaving Innovation Centre to explore both immediate commercial goals and long-term technological solutions.

Undertaking this feasibility study allowed Weffan to test its technology concept, market and commercial viability while engaging with UK and EU industrial partners to understand how their technology could integrate into existing supply chains.



Enabling net-zero garment production

Participation in the study has accelerated Weffan's journey towards revolutionising garment production in the UK fashion industry, providing crucial insights, partnerships and systems.

Through REforMM programme support, Innovate UK was able to play a critical role in enabling Weffan's journey towards commercialisation.

The programme is paving the way for the UK to be a leader in resource efficiency and helped provide a safe space for the company to explore different directions before committing to full execution.

Objective

Developing innovations in sustainable, bio-based materials and manufacturing

Biomanufacturing is critical to both societal and economic stability, and offers vast potential for the UK in reaching net zero emissions.

Innovate UK is funding and supporting the design and delivery of disruptive bio-based solutions to help develop new manufacturing processes that are both sustainable and scalable.

If harnessed to its maximum potential, biomanufacturing can play a critical role in achieving the UK government's ambition to reduce all greenhouse gas emissions to net zero by 2050 while helping to secure the UK's future economic prosperity.

Innovate UK programmes like Sustainable Bio-based Materials and Manufacture (SusBioMM) are enabling the UK's global competitiveness by supporting development across different industries and sectors, including bio-based feedstocks, alternative bio-based chemical replacements, and innovative bio-based products.

£12m

total budget of SusBioMM programme

Case Study

Accelerating the development of bio-based road materials

Derived from fossil fuels, petroleum-based bitumen is a significant contributor to the emissions causing climate change.

A key challenge facing the road construction industry is finding the point where supply and demand meets the right price to drive wider adoption of sustainable solutions and more effectively address environmental impact.

Bio-bitumen offers a sustainable solution without compromising quality or performance while also decoupling the road industry from geopolitically controlled sources of crude oil, potential supply constraints and price.

Securing grant funding through the Innovate UK SusBioMM programme, bio-bitumen startup, CO2CO, undertook a feasibility study to create a carbon-negative and economically viable bio-based binder for asphalt.

The feasibility study opened the project to experts from across CO2CO, other UK businesses, universities and the wider industry, allowing the exploration of ideas through new partnerships.

Funding and support provided by Innovate UK was instrumental in accelerating CO2CO's roadmap to commercialisation, facilitating research and development, further feasibility studies and market assessments.

The outcomes of this project will also help to influence sustainable practices and policies and

raise awareness of eco-friendly alternatives for the green technology sector.

Following participation in the SusBioMM programme, CO2CO has been in discussion with other catapults about scaling and engaging with stakeholders in other industries about potential applications in the UK and overseas.

Support through SusBioMM is providing an essential framework around which innovative new technologies can be explored and developed to advance the UK's biotechnological capabilities and drive manufacturing closer towards net zero.

Exploring the potential of bio-based bitumen



Objective

Making the UK a global leader in power electronics design, development and manufacturing

Innovate UK is investing in business-led innovation projects that enable the growth of the UK's supply chain and manufacturing capability in power electronics, machines and drives (PEMD).

Innovation Challenges like Driving the Electric Revolution are ensuring the UK leads the world in the design, development and manufacture of PEMDs across multiple sectors through projects that improve supply chain capability, productivity, capacity, quality and efficiency.

The aim of this is to drive demand for £5 billion more PEMDs by 2025 and up to £80 billion by 2050, creating growth and highly skilled jobs across the UK.

This is part of a larger effort to catalyse the government's green industrial revolution in transport, energy and industrial sectors while seizing economic opportunities in the global transition to clean technologies and electrification.

Case Study

Driving more efficient manufacturing for electric vehicle drives

With the UK moving towards greater adoption of electric motors in the push to net zero, growing demand requires refining and improving battery technology to take advantage of more efficient and reliable advancements.

Under the EB-eDrive project, Cambridge Vacuum Engineering and Ford have partnered to explore the use of electron beam welding as an alternative joining process to simplify the manufacturing of electric vehicle drives.

Securing over £380k through the Driving the Electric Revolution Challenge, the project consortium aims to reduce the time it takes to manufacture the electromagnet system central to the smooth running of electric vehicle engines.

Electron beam welding is significantly faster and less carbon intensive than conventional laser welding techniques.

Over

£380k

of funding secured through the Driving the Electric Revolution Challenge



Advancing electric vehicle manufacturing

With the funding granted by Innovate UK, the EB-eDrive project is working to demonstrate how this technique might accelerate the green transformation of the UK automotive industry to keep the country at the forefront of global vehicle production and innovation.

Preliminary test results show that this electron beam welding method surpasses the state-of-the-art quality specifications and have generated significant process insights that will be instrumental in driving the development of the EB-eDrive machine.

The team aims to validate the superiority of EBW in e-motor manufacturing in Q3 of 2024 with a full-scale demonstration.

Even before the completion of the project, Ford has already begun to produce EB-eDrive motors in the UK and is looking to take the technology to Europe and the USA.

This shows first-hand the impact of the Driving the Electric Revolution Challenge in accelerating the development and adoption of revolutionary new technologies.

Objective

Driving cleaner growth across UK plastics, packaging and retail supply chains

A key challenge of progressing net zero in manufacturing is addressing the impact of plastic packaging, which is used globally across everything from food to clothing.

Innovate UK is contributing to the UK's drive for clean growth and industrial decarbonisation by funding ground-breaking research and innovation to make plastic packaging fit for a sustainable future.

Through interventions like the Smart Sustainable Plastic Packaging Challenge, Innovate UK will reduce unnecessary and single-use plastic packaging, increase the viability and uptake of reuse and refill systems and support new and improved recycling technologies and systems.

80k

tonnes of waste plastic set to be recycled annually

Case Study

Enabling a circular economy for food-grade plastic packaging

Eliminating plastic waste is a well known and urgent global issue, with the twofold challenge of addressing both plastic pollution and the use of fossil fuels in the manufacturing of plastic packaging.

Aiming to tackle this challenge, Mura Technology has developed an advanced plastics recycling solution that will provide a sustainable method for plastics previously considered 'unrecyclable'.

Grant funding through Innovate UK's Smart Sustainable Plastic Packaging Challenge enabled Mura to construct a world-first commercial scale facility in Teeside, North East England, which is currently in the final stages of commissioning, and on completion will place 20 kilo tonnes per annum of circular hydrocarbons onto the market.

The facility uses Mura's innovative hydrothermal technology Hydro-PRT® to convert waste plastic packaging into useful raw materials for the manufacture of virgin plastics.

Innovate UK recognised the commercial-scale feasibility of the technology and potential of the advanced recycling sector to help meet ambitious plastic recycling targets.

Alongside the Innovate UK programme funding of £4.42 million, the new process has been supported by investment from blue-chip companies across the plastic recycling value chain, including Dow, KBR and CP Chem.

Since taking part in the Smart Sustainable Plastic Packaging Challenge, Mura, via Licensing and Engineering Partner KBR, have sold technology licenses to Mitsubishi, LG Chem and CS Caltex. Two of these sites are under development in Japan and South Korea.

The commercial viability and early success of the technology has given it close to a billion dollar valuation, with the project helping to create a circular economy for plastics that will support progress towards net zero.

Through the Smart Sustainable Plastic Packaging Challenge, Innovate UK's support is helping projects like this lower commercial barriers by enabling greater testing and validation of the technologies being developed.

The ReNew ELP facility at Wilton, Teeside



Agriculture and Food

For the UK to reach net zero by 2050, it must reduce emissions from agriculture and land use by 64%.



Andy Cureton
Director of Agriculture and Food



However, across many parts of our agriculture and food system, there is a significant gap between this target and what is possible with existing technologies.

Innovate UK's Agriculture and Food Systems programmes look to apply revolutionary, emission-reducing technologies to explore how the UK might produce food more sustainably and reduce waste.

Initiatives span from agricultural input - fertilisers, crop protection, livestock feed and medicines- all the way through to primary production and processing of agricultural products into food manufacturing.

Our food system exists as a whole, so finding the right solutions means looking at how each part connects together across the whole food supply chain, from farm to plate.

This requires the development of technologies that deliver novel food production methods, monitor and control livestock emissions and reduce our reliance on meat through alternative protein sources.

Innovate UK aims to help the companies developing these technologies benefit from access to funding, expertise and that will help to accelerate the adoption of new solutions across the agriculture and food supply chain.



Net Zero Agriculture and Food programmes aim to achieve the following objectives:

- Develop agri-tech solutions to reduce emissions from crop production
- Develop agri-tech solutions to reduce emissions from livestock farming
- Accelerate the development of new low emission protein sources

In the last 5 years, SMEs receiving Net Zero AgriFood grants from Innovate UK have:

£1.1_{bn}

Raised over £1.1bn in private investment

£651_m

Generated over £651m GVA

£960_m

Exported over £960m of goods and services

Objective

Developing agri-tech solutions to reduce emissions from crop production

The UK food system is responsible for 35% of greenhouse gas emissions, which makes it crucial to find solutions that can reduce this output across all aspects of food production.

Innovate UK is investing in projects to transform crop production, supporting new ways to produce food that reduce emissions and pollution while helping to feed a growing world population.

Improving the efficiency and sustainability of crop production and reducing its environmental impact will contribute to the UK's Net Zero commitment.

35%

of greenhouse gas emissions are a result of the UK food system

Case Study

Evaluating the efficacy of fertilisers using carbon capture technology

A growing number of agri-tech companies are exploring more sustainable methods for producing commercial fertiliser that avoids synthetic, fossil-fuel derived materials.

The challenge comes from being able to demonstrate the effectiveness of these low-carbon fertilisers when it comes to crop yield and improving soil nutrient efficiency in different environments.

CCm Technologies Ltd is an award-winning company developing fertiliser that uses captured CO2 and nutrients from organic waste products to help drive resource optimisation and carbon capture across the agri-food supply chain.

Securing grant funding through the UKRI Transforming Food Production Challenge, the company was able to evaluate the efficacy of their fertiliser pellets in real-world farm environments while refining their production processes.

Innovate UK's support allowed CCm Technologies to establish research and development work streams to further enhance the commercial benefits of their fertiliser, which has been instrumental in helping them secure the necessary approvals to expand and engage their customer base.

Following their participation in the Transforming Food Production Challenge, CCm Technologies has continued growing its product research and development to better tailor and improve the application of the fertiliser to different farming environments across the UK.

While remaining UK-based, the company has expanded its market opportunity internationally to potentially licence their technology for applications across the global agriculture and food sector.

Through the Transforming Food Production Challenge, Innovate UK has helped CCm Technologies access validated data to help improve their engagement with the farming sector and inform discussions with regulators around scaling up low-carbon fertilisers.

Helping raise in excess of £68 million of investment for a wide range of projects, the programme has accelerated our food system's transition to net zero by creating a platform for new technologies that address key decarbonisation challenges for the sector.

Analysing CCm fertiliser crop yield



Objective

Developing agri-tech solutions to reduce emissions from livestock farming

Livestock farming is one of the highest intensity sources of greenhouse gas emissions globally. While other parts of the food system have been able to decarbonise through easy gains around energy supplies and transportation, traditional agriculture like livestock farming is harder to shift.

This challenge has led to the development of a new industry exploring the use of novel solutions that can be produced at scale to reduce livestock farming emissions through better monitoring of animal health and lower carbon food sources.

Innovate UK is helping to reach this goal by funding projects that enable more efficient assessment of animal welfare and reduce the waste associated with livestock farming through circular economy techniques.

£90m

total budget of Transforming Food Production Challenge

Case Study

Enabling net zero dairy farming through AI and machine vision

Within the dairy sector, reducing emissions from livestock begins with being able to effectively monitor, assess and respond to changing animal health and productivity.

This can be a significant challenge for farmers, with previous efforts using basic CCTV being costly and impractical, meaning a more innovative and effective solution is needed so farmers can make decisions and interventions to improve and maintain the welfare of animals.

Peacock Technology hopes to change this, bringing advanced engineering, data, AI and robotics into the UK agri-tech sector to provide more effective monitoring of livestock.

In 2021, Peacock was awarded funding through the Transforming Food Production Challenge to advance their innovative software towards deployment at scale in the market.

With Innovate UK's support, the company was able to move from the pilot stage to research and development, allowing them to carry out real world trials of its robotic automation and vision-based livestock monitoring.

They were able to establish, develop and test automation and analysis software to improve effectiveness for monitoring both cow health and fertility.



AI-enabled livestock monitoring in action

Peacock is now rolling out its automated vision technology to smaller farms and working closely with other parts of the dairy supply chain to support the sector as a whole in its aims to realise net zero emissions.

Funding through the Transforming Food Production Challenge allowed Peacock to scale its team for wider expertise across sales, installations and logistics while expanding the business internationally through new pilot sites.

The Challenge plays a crucial role in aligning Innovate UK grant funding with private equity investment to help companies scale up and create a pipeline of innovation to drive increased adoption of new technologies for a more sustainable and resilient food system.

Objective

Accelerating the development of new low carbon protein sources

UK food production faces increasing pressure to meet growing consumer demand while improving sustainability, boosting efficiency and reducing ecological impact.

Developing new, sustainable sources of protein is a key method by which we can reduce the environmental impact of the UK's agricultural sector, while still meeting the nutritional needs of a growing population.

Innovate UK is investing in projects that are innovating with plant-based meat alternatives and cultivated protein sources to help reduce our reliance on livestock and introduce more low-carbon food products into the market.

Lab-grown meat presents a potential net-zero solution



Case Study

Developing a pilot plant for cultivated pork

Cultivated meats present an innovative solution to the problem of livestock emissions by allowing for the production of less carbon-intensive protein sources.

However, the technological requirements of cultivated meat production can make it difficult to develop cell cultures at a commercially viable scale for the UK and global markets.

Uncommon is a food producer looking to address this challenge, pioneering a cutting-edge technology to produce fully formed, cultivated pork products from animal cells.

Having proven the viability of this technology in a lab environment, in 2021 the company was awarded Innovate UK grant funding through the Transforming Food Production Challenge.

This enabled the company to develop a pilot plant that would allow them to further test, refine and demonstrate their process on a commercial scale, establishing itself as a leader in the novel food sector.

The company has since gone on to raise a further \$30m in funding and advanced towards the stage of commercialising its cultivated pork for UK consumers, while driving increased consumer knowledge and trust in cultivated meat.

Innovate UK's support and resources have been crucial in helping Uncommon grow in size and expertise to bring on the key talent needed to help secure regulatory approval.

Introducing a radical new product such as this to a traditional and well-established food market requires a shift in perceptions.

The Transforming Food Production Challenge helped Uncommon complete product research and testing, opening the door to crucial private investment while demonstrating their cultivated meat products would be both profitable for suppliers and affordable for consumers.

Throughout its duration, the programme has helped to drive the development and adoption of innovative new agri-tech solutions by providing the resources and research opportunities needed to demonstrate their viability and scalability.

\$30m
private investment raised

Systems Integration

Reaching net zero requires a systems-first approach, integrating different sectors to deliver the best outcomes for society.



Rob Saunders
Director of Systems Integration



Innovate UK's Net Zero Systems Integration programmes join up solutions from across our themes, and accelerate the adoption and scaling of novel net zero products and services across the economy and the UK.

These programmes not only unite efforts across Innovate UK, but work across UK and international governments to enable the scale-up of net zero businesses and unlock market demand on a national and global level.

Many net zero businesses can struggle to scale, so we work closely with the investment community to unlock more consistent funding and bring investors on board earlier on in the innovation cycle.

Working together with large financing institutions set up by the UK government, we connect systems of innovation, support and growth to create a better flow of finance across the whole journey of net zero projects in the UK.

Looking further afield, many of the Systems Integration programmes we are helping to fund and develop focus on international collaboration and the sharing of innovations and resources.

Solving the climate crisis is a challenge for all nations, so taking a collaborative, systems-led approach is crucial in reaching net zero globally.

Net Zero Systems Integration programmes aim to achieve the following objectives:

- Accelerate the adoption of net zero solutions through better use of design and digitalisation
- Enable net zero businesses to access finance, scale, and commercialise
- Accelerate delivery of local net zero strategies across the UK
- Collaborate internationally to accelerate and prosper from our transition to net zero

In the last 5 years, SMEs receiving Net Zero Systems Integration grants from Innovate UK have:

£1.1_{bn}

Raised over £1.1bn in private investment

£454_m

Generated over £454m GVA

£223_m

Exported over £223m of goods and services

Innovate UK is accelerating net-zero adoption at a systems level



Objective

Accelerating the adoption of net zero design and digital solutions

Enabling consumers to live in a net zero way requires taking a whole-system approach to developing the best products and services.

Innovate UK is accelerating the UK's transition to net zero by supporting businesses who develop net zero products and services that respond to the needs of their entire ecosystem of users and stakeholders.

The projects we support are developing products and services with great potential for additional benefits to physical health, wellness, running costs, safety and more.

Considering the interconnectivity between these end-user benefits is vital in developing solutions to transition our society to a better net zero and helping net zero products and services be more widely adopted.

Case Study

Enabling more efficient heating for commercial buildings

With heating, ventilation and air conditioning (HVAC) set to contribute 18% of the world's CO2 emissions by 2050, there is a clear need to develop occupant-centred systems that lower waste energy and emissions.

Cosysense provides a net zero energy monitoring service to commercial buildings like office, retail and hospitality spaces to reduce operational costs, lower emissions and improve the comfort of those using the building.

Innovate UK awarded Cosysense a £100K grant through the Net Zero Living programme due to the product's potential to scale and unique, user-centric approach to energy efficiency.

Cosysense's indoor environment sensors correlate the electricity consumption and footprint of a building's HVAC system with the comfort of building users, enabling the system to be controlled remotely for increased energy efficiency.

Through the support of the Net Zero Living programme, Cosysense was able to develop a solution that not only helps to reduce waste energy, but also solves issues around the safety, comfort, health and wellbeing of its users.

Focusing on people's thermal satisfaction to create power and emissions savings allows the Cosysense system to meet a wide range of needs in one business model and provide benefits across the ecosystem of building users.



Cosysense project development session

Designing a user-focused system such as this is an essential step in reaching the right outcomes for consumers and increasing the adoption of innovative net zero technologies.

The Net Zero Living programme provides businesses with access to crucial design thinking, enabling them to better integrate the needs of their target users into the design of their products.

Cosysense awarded

£100k

Innovate UK grant through the Net Zero Living programme

Objective

Enabling net zero businesses to scale up, access finance and commercialise

While early stage investment into net zero solutions is strong, more consistent later stage investment is required to adequately support solutions to scale.

Innovate UK is working to remove commercialisation barriers and accelerate financing for innovators whose products can support the UK's commitment to achieving net zero.

We are developing the investment landscape while helping companies improve their investment readiness, providing funding to de-risk solutions and showcasing net zero investment opportunities.

This includes programmes focused on Innovate UK's broader role within the innovation space and activities that can help to accelerate investment, from developing thought leadership on economic opportunities to creating strategic partnerships with investors, corporates and other net zero stakeholders.

Case Study

Showcasing innovative net zero businesses to investors

Companies developing net zero products must be enabled to grow by pulling in private investment earlier in the cycle to give investors a greater stake in new products.

Innovate UK's Financing Net Zero programme aims to boost private finance into net zero businesses to help them scale through to commercialisation and beyond.

Over the last 12 months, the programme has supported around 130 businesses, and engaged with 405 investors.

A key element of Financing Net Zero involves running showcases around the UK, introducing investors to businesses participating in the programme to hear them pitch, talk about their products and services and discuss their growth ambitions.

Following these showcases, participating businesses have had 40% more private investment than ones who applied but didn't get to showcase.

Another aspect to Financing Net Zero is the Capital to Climate investor engagement programme, helping to share knowledge and engage investors around net zero initiatives to try and upskill them in the dynamics of particular technologies.

Early results from Capital to Climate events show that 90% of investors coming out of them feel much better informed about the sector and 50% more likely to invest as a result.

Each of these activities run by Innovate UK's Financing Net Zero programme are paving the way to greater investor confidence and longer-term backing for crucial net zero innovation projects throughout their lifecycle of development and business growth.

Driving net-zero project investment



405

investors engaged with
through Financing Net Zero

Objective

Removing barriers to and accelerating the delivery of local net zero strategies

While many of the immediate solutions needed to transition towns and cities to net zero already exist, challenges are often encountered when trying to deliver these solutions at scale.

These challenges include coordinating stakeholders, engaging with citizens, attracting finance or navigating procurement and governance processes.

With £500 billion required to decarbonise towns and cities across the UK over the next 20 years, this presents a huge opportunity not only for investors but also local communities.

Innovate UK aims to remove the non-technological barriers to demand, enabling the rapid scale up and adoption of new solutions by investing directly in net zero ecosystems at the local level.

These projects help to unlock significant value and socio-economic growth while improving skills, growing organisational capacity and securing critical finance.

Case Study

Investing in net zero ecosystems at a local level

Among the UK towns and cities pursuing decarbonisation, Bristol has served as an exemplar in progressing its journey towards net zero.

Bristol Mission Net Zero is a project aiming to generate demand for net zero products and services at a community level while developing the skills needed to help deliver them.

Through over £5m in grant funding from the Net Zero Living programme, Innovate UK is helping the project deliver an investment plan that will be attractive to private investors and enable change at scale.

The project team is engaging with local communities to deliver three climate investment plans, working with business, higher education and skills partners to expand Bristol's decarbonisation efforts beyond the public estate.

Innovate UK is supporting them to work with finance organisations and the broader West of England region to develop a Regional Climate Investment Plan and net zero neighbourhood investment model, which aims to be replicable by other local authorities across the UK.

With around 400 local authorities across the nation, the learnings from Bristol Mission Net Zero will be key in creating a system of insights that will help them reach the first milestones of their own net zero delivery.



Bristol is helping lead UK decarbonisation

Bristol Mission Net Zero is the largest locally-led project that Innovate UK has supported and it demonstrates how investing directly in net zero ecosystems at the local level can unlock significant socio-economic growth and value.

Through the Net Zero Living programme, Innovate UK equips communities and local authorities with the skills and capabilities to accelerate local pipeline development and take advantage of the large investment opportunity in delivering net zero.

Over

£5m

awarded to Bristol Mission Net Zero in Innovate UK grant funding through Net Zero Living

Objective

Collaborating internationally to achieve and prosper from net zero

Businesses pioneering and testing solutions in the UK need opportunities for international collaboration to access a wider pool of funding and shared knowledge.

Innovate UK is contributing to the UK's aspiration to be a global leader in net zero and to benefit economically from this position by opening up global export opportunities through existing net zero city networks.

Our international programmes within Net Zero Systems Integration enable the UK to profit from this leadership position while allowing UK innovators to work with businesses in other countries to solve as many net zero issues globally as possible.

Allowing UK businesses to benefit from international collaboration and shared knowledge, this will further drive the UK to become the fastest transitioning economy to net zero.

Case Study

Tackling climate challenges internationally

South Korea is a global priority market and consistently ranks highly for innovation, but factors like distance, time zones and business culture make it difficult for UK innovators to know how and where to engage.

Through Innovate UK's Global Business Innovation Programmes, we are helping innovative SMEs to collaborate and explore international markets like South Korea to accelerate their business growth and the development of net zero solutions.

We have developed a bilateral programme with our corresponding funding agency in South Korea, KAIA, to fund the results of this collaboration. The programme will invest £4m across two phases of activity and has funded eight partnerships between UK and South Korean companies as of October 2024.

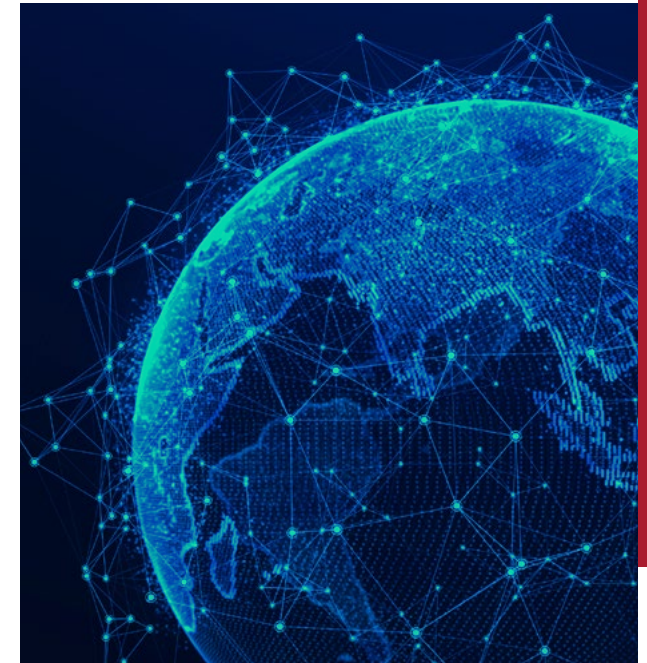
The Global Business Innovation Programmes focus on specific markets and technologies or sector areas, aims to help ambitious UK businesses explore future opportunities and to better understand what is needed to be successful on the global stage.

Each business is supported by an Innovate UK Business Growth specialist to help maximise the potential of being part of the programme and beyond.

This initiative in South Korea has provided participants with detailed market knowledge, cultural insight, introductions and connections to open opportunities that they might not find otherwise.

Through our Global Business Innovation Programmes, Innovate UK is combining multiple activities to create a coherent net zero programme focused on real market challenges and a broad spectrum of engagement.

Assisting other countries in their net zero journeys allows the UK to strengthen business relationships globally while furthering our own ambition of being the fastest economy to make the transition.



8

**international partnerships
funded by Innovate UK**

Net zero is an opportunity that can only be realised through the collaboration of policy makers, investors, and innovators.

Policy makers

Innovate UK is achieving demonstrable impact in the mission to net zero. Our programmes deliver growth, jobs and help deliver net zero by 2050.

[Read more about Innovate UK's outcomes and impact here.](#)

Investors

Innovate UK is working to build the investment pathways needed to scale new climate tech businesses and technologies.

Connect with our [Investor Communities team](#) to find out more about what we do and engage with our investor programmes, and sign up to our [Financing Net Zero LinkedIn group](#) to be kept up to date with all our investor focused events.

Innovators

Innovate UK is the biggest funder of climate technology in the UK. But we offer so much more to support your business' growth journey.

Connect with our [Business Growth team](#) to find out how we can help.

Find out more about the programmes and funding available at

ukri.org/councils/innovate-uk

References

- Page 04: Grant values, number of companies and grants awarded are taken from Innovate UK data of Net Zero projects with a start date between 01 April 2023 and 31 March 2024 categorised by Net Zero Theme (Heat and Power, Mobility, Make and Use, Agriculture and Food and Systems Integration)
- Page 04: Total figures for GVA, Private Investment, Jobs and Exports reached by using Pitchbook (Private Investment), Data City (GVA, Jobs) and Beauhurst (Exports) to review the Small and Medium Sized Enterprises that have received Net Zero Grants over the last five years, with the figures aggregated and presented by Net Zero Theme
- Page 07: Government Mission Control - Clean Power by 2030
- Page 09: Electricity Demand Growth by 2035
- Page 11: UK Buildings requiring retrofitting to reach Net Zero Target
- Page 15: Transport contributes over 25% of the UK's carbon emissions. Official Statistics: Transport and environment statistics: 2023 - Published 19 October 2023
- Page 19: In 2022, Aviation accounted for 2% of all global CO2 emissions. International Energy Agency (IEA) – Tracking Aviation
- Page 19: The ATI Programme has invested over £1.9 billion of funding in UK aerospace projects since 2013
- Page 21: 15-20% of material is wasted on the manufacturing floor alone due to outdated methods
- Page 26: For the UK to reach net zero by 2050, it must reduce emissions from agriculture and land use by 64%
- Page 28: 35% of UK emissions are a result of the UK food system
- Page 29: Livestock farming emissions in the UK
- Page 34: While early-stage investment into net zero solutions is strong, more consistent later stage investment is required to adequately support solutions to scale. Cleantech for the UK: Powering Up the UK's Cleantech Advantage
- Page 35: While many of the immediate solutions needed to transition towns and cities to net zero already exist, challenges are often encountered when trying to deliver these solutions at scale