

Tees Valley Local Action Plan



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Foreword By Indro Mukerjee



Innovate UK is the UK's innovation agency. We work to drive productivity and economic growth by supporting businesses to develop and realise the potential of new ideas.

We are living in a time of change, a time of challenge, but also of great opportunity to create a positive future for everyone.

We want to help create that future, a future in which businesses realise their potential, generate high quality jobs, and drive prosperity. A future in which our planet is protected, with a stable environment that encourages healthy living and protects nature.

By driving UK Innovation, we will help to achieve this future, accelerating the deployment of the technologies that are needed to overcome the challenges of today. The benefits of achieving this future are global and national, and of vital importance to the places where we live.

Place is a key strategic priority for Innovate UK and our Plan for Action outlines our commitment to work with leaders across the UK to develop innovation strategies that recognise the strengths and opportunities in their regions and nations.

I am therefore pleased to launch this Tees Valley Action Plan, which we have co-created with Tees Valley Combined Authority.

Tees Valley has an incredibly important part to play in helping us to create the future we would like, building on its industrial heritage and innovation strengths, to commercialise the technologies that are needed. Working with innovation-led stakeholders and local talent, we seek to realise the benefits of these technologies sooner by investing in impactful ideas that will drive sustainable growth and increase productivity.

This Action Plan provides the framework for how we will collaborate with our partners across the Tees Valley research and innovation system to drive the regional and UK economy. The Innovate UK team is ready to play its part in achieving a future in which all places benefit from the opportunities that innovation will enable.

Indro Mukerjee Innovate UK CEO



Foreword By Mayor Ben Houchen



Teesside, Darlington and Hartlepool are currently leading the UK's charge in the most innovative industries and schemes of the future.

At Teesworks, global firms are pioneering projects in the cleaner, healthier and safer technologies of tomorrow – carbon capture, utilisation and storage, blue and green hydrogen development and offshore wind. Teesside Airport is working with firms across the region on the development of Sustainable Aviation Fuel, as it also becomes home to a new 5G Digital Test Bed to break down trade barriers.

Bioscience and digital firms across the region are working at breakneck speed developing life-changing projects to improve the prospects of not just our area, but the world. That's just the tip of the iceberg.

The region is also home to fantastic R&D organisations including CPI, TWI, the Materials Processing Institute and Teesside University. All of these are producing cutting-edge research to support our businesses and work to become a forward-thinking area that

isn't afraid to do things differently. Our manufacturing cluster, too, is actively engaging and supporting these sustainable and groundbreaking projects.

To really grab with both hands the emerging opportunities and take advantage of Government initiatives and funding, we need joined-up thinking that sees innovators, job creators and researchers working hand in glove.

That's why we've been working with Innovate UK to create this Local Action Plan, which sets out how we're going to capitalise on our assets, experience and industry to go further, faster as a powerhouse in new technologies.

This ambitious plan will not only get our area working together for its own good, but it will seek to position us as a national centre for excellence, putting us on the map and, ultimately, creating jobs for local people for years to come.

Mayor Ben Houchen

Tees Valley Combined Authority



Foreword By Siobhan McArdle



Innovation is key to keeping our businesses competitive, agile and ahead of the curve, but listening to feedback from industry, it is clear Tees Valley faces its fair share of challenges in this field. These are issues our Business Board is facing head-on, to ensure all of our companies have the support and tools they need to thrive.

Innovate UK has long been a backer of our region, investing in our SMEs and vital research and development institutions that they heavily rely on. They too understand the unique business landscape of the area and are perfectly positioned to work with us on developing our offer.

This document sets out how Innovate UK has helped support our business community in the past, and how we can better work together for a future in which embraces opportunities in key sectors such as Digital, Bioscience and Net Zero.

It recognises the value of large-scale multinational investment to our supply chain SMEs but understands this isn't a panacea and that direct and targeted actions are also vital to their success. It also highlights the need for further collaboration and partnerships, not just to

bring our organisations together for their own good, but also to give weight to their offer, drawing attention from the wider UK to what we're doing here.

The Action Plan is another string to our bow in growing our SMEs and institutions, and I look forward to working alongside Innovate UK and the Combined Authority to make our brilliant skilled businesses flourish.

Siobhan McArdle

Chair of Tees Valley Business Board



Introduction

This Innovate UK Tees Valley Action Plan is co-created with Tees Valley Combined Authority and the innovation leaders of Tees Valley. It is a plan for how we will support each other's efforts to drive innovation-led economic growth. It is tailored towards opportunities for business innovation in Tees Valley.

Principles and Core Areas: We will draw on the principles set out in Innovate UK's Plan for Action and work with local leadership and wider partners across Tees Valley to deliver our innovation ambitions by:

- Inspire: Inspiring more businesses to undertake all forms of innovation and to generate commercially valuable intellectual property (IP)
- Involve: Working together across the Tees Valley ecosystem to have a greater impact than we can separately
- Invest: Aligning our existing resources and investments to ensure that we build on the insights, assets, and capabilities from across Tees Valley

Innovate UK will work with Tees Valley
Combined Authority and local partners
to deliver our joint ambitions for innovation
driven economic growth, through three
core areas:

- Strategic Partnerships: Enhancing regional collaboration, connecting clusters to the UK innovation system, and supporting future skills development
- Innovation Support: Growing technology clusters, supporting businesses, and tailoring support to meet local needs
- Communication and Promotion: Raising the profile of Tees Valley's innovation strengths and coordinating inward investment efforts



The collaborative efforts of partners will propel Tees Valley into a leading innovation hub. By focusing on strategic partnerships, targeted support, engagement and communication, we will drive significant economic growth, increase productivity, and create sustainable, high-value jobs.

Innovate UK

Innovate UK is the UK's innovation agency. Its mission is to help companies to grow through their development and commercialisation of new products, processes and services, supported by an outstanding innovation ecosystem that is agile, inclusive and easy to navigate.

Innovation involves taking cutting-edge ideas to market, doing things differently and embracing diverse thinking. Innovation is about addressing real-world challenges using the power of people who can create and deliver transformative solutions.

This requires working in partnership to create a diverse ecosystem that values differences, inspires future innovators, and provides a solid foundation for new ideas to thrive.

Innovate UK's Plan for Action for UK businesses 2021-25 outlines its commitment to deliver an outstanding innovation ecosystem and the Strategic Delivery Plan 2022-25 expands on how Innovate UK implements new programmes and initiatives with partners that support the UK's ambition to be a global hub for innovation by 2035.

The delivery plan sets our strategic objectives for how we will achieve that vision, that includes the development of

'world class places'. It sets out how we will work with local leadership to deliver strong local capabilities, and to realise the full potential of local strengths, in order to enhance UK capabilities and increase the impact of innovation clusters both regionally and nationally.

Innovate UK is dedicated to working with local and national partners to align national and local plans and strategies. Leveraging the extensive reach of UKRI collaborations to drive greater innovation, resilience, productivity, and economic growth locally.

We work with partners across government to ensure that the record levels of public investment in R&D foster increased private sector co-investment and that those benefits are felt everywhere. This gives all regions and nations across the UK the potential to become prime locations for inward investment, attract talent and expertise, and new operations.

Tees Valley has many strengths, and with this Local Action Plan we will work with the innovation leaders to build on those strengths. Building greater coherence between national industrial strategies, local growth plans and the missions of the UK Government.





Tees Valley Strengths and Future Outlook

At the heart of this Local Action Plan lies the relationship between Tees Valley Combined Authority (TVCA) and Innovate UK. This partnership will enable us to drive collaboration across the research and innovation ecosystem, and collectively invest in support of business innovation for the benefit of Tees Valley and the UK.

Tees Valley is made up of five unique boroughs, creating one remarkable region. With a population of 688,800 (2022), Tees Valley forms a compact, well connected, functional economic geography with significant economic assets.

Since its inception in 2016, TVCA has made substantial investments, particularly in local infrastructure, which gave the region strong foundations for future growth. This growth will develop from continued support to people, business and place. Innovation is central within this support and Tees Valley has significant innovation assets and capabilities it can leverage.

Historically, Tees Valley innovation has had major impacts across the world. The strength of assets coupled with a spirit of inventiveness have created an outstanding reputation for engineering and manufacturing excellence.

Whether it's the Syndey Harbour Bridge (manufactured in Redcar), the development of the first mycoprotein for human consumption (manufactured by Marlow Foods in Billingham), or the manufacture and export of half of the UK's current Hydrogen supply – Tees Valley has long been on the world map for innovation, engineering and manufacturing.

United by a history of industry and innovation, passed down through the generations, these capabilities now place Tees Valley at the forefront of the clean growth agenda.





Tees Valley has strengths in technologies and sectors such as clean energy, low carbon & hydrogen, digital, chemical & process, and bioscience. These strengths underpin industries of national and international significance.

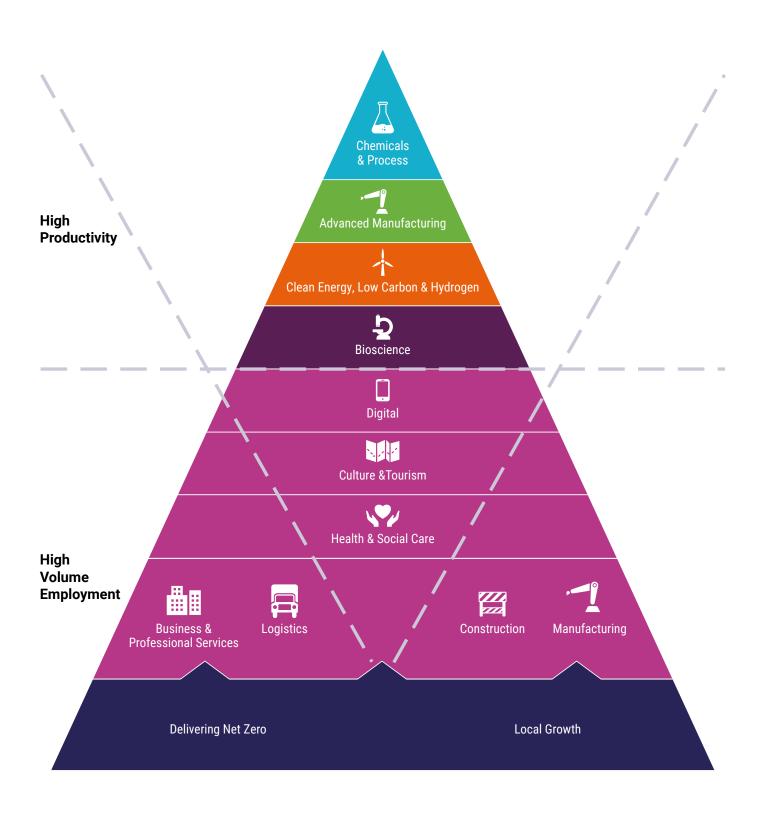
These strengths also enable business growth in sectors which have above national productivity rates and which account for one in ten of Tees Valley's jobs.

Tees Valley's sectors are testament to its robust exporting record, where

goods exports are currently equivalent to 30% of Tees Valley GDP, more than double the UK's (14%). 79% of Tees Valley's goods exports are also from manufacturing, compared to 55% nationally.

Boosting employment in sectors which can contribute to aggregate productivity and generate economic growth are key, and a rebalancing of sectoral employment towards high productivity sectors will close both Tees Valley's productivity gap and the output gap.

Local Economic and Sectoral Strengths



Future Focus

Tees Valley aims to be a strong economy that is diverse and balanced. This can be achieved by:

- Further anchoring the region's globally competitive sectors
- Developing emerging sectors and their clusters
- · Encouraging jobs growth
- Enhancing output and addressing the productivity challenge

This Action Plan will focus on the following clusters to help enable this:

- Net Zero
- Digital
- Bioscience
- Manufacturing

These clusters have great potential to deliver increased employment and increased productivity, and we need a skilled local labour force which supports this – creating a diverse and balanced local economy.

We have a strong supporting research and innovation ecosystem. Our heritage paved the way for CPI (the Centre for Process Innovation, part of the High Value Manufacturing Catapult), MPI (the Materials Processing Institute) and TWI (the Welding Institute). These organisations, alongside Teesside University and Durham University, have established a strong Tees Valley research and innovation ecosystem that will enable our future innovation ambitions.

Science, innovation and technology is also a key focus and thematic of Tees Valley Business Board. The board represents the voice of local business in the work of Tees Valley Mayor, Combined Authority and Local Authorities. The members advise on, establish and help lead projects, schemes and programmes of change within the local economy.

The Business Board will grow the relationship between Innovate UK and Tees Valley, convene the wider research and innovation ecosystem, and support delivery of the actions to grow Tees Valley and UK economy.





Tees Valley has a strong and integrated economy. Major investment at Teesside Freeport, Teesside International Airport, Hartlepool and Middlesbrough Development Corporations and Tees Valley Investment Zone provide the foundations on which to build and grow.

This Local Action Plan aligns with the region's strategies for growing technology clusters in net zero, digital, bioscience and manufacturing.



sets out the ambition for Tees Valley to become home to the world's first net zero industrial cluster by 2040. Already home to one of the biggest industrial clusters in Europe, it is a clear location to advance

the UK's net zero ambitions.

Ongoing research and innovation is required to make zero emission products and services more affordable and appealing, and to retain our national position as a leader in net zero. We need to continually develop and support the new technologies which both power our industry and move people and goods around our region and further afield.

Crucially, the Net Zero Strategy represents a collective move towards a net zero Tees Valley, fuelled by a revitalised economy built on clean energy. Tees Valley has already gained a national and international reputation as a primary location for clean energy, low carbon, and hydrogen technology innovation. For our region, achieving net zero can be broken down into five distinct decarbonisation challenges:

- Industry and Energy
- Public Organisations and Commercial Businesses
- Homes and Communities
- Transport
- Nature and Resources

What the Cluster Offers

At the heart of Teesside's industrial zone and freeport is Teesworks. Teesworks is a diverse, multi-sector development site, bringing together industry leaders to power Britain's carbon capture and hydrogen ambitions anchored by Net Zero Teesside, a nationally significant power plant with carbon capture and storage capabilities.

Tees Valley has published a ten-point plan for realising its net zero ambitions and the five key innovation priorities are:

1. Industrial Decarbonisation

Decarbonised chemical production and wider industry is key to the net zero journey and to achieving Tees Valley's ambition to have a net zero industrial cluster by 2040.

Tees Valley contains one of the UK's six industrial hubs with the ability to enable large scale industrial decarbonisation. There are 66 industrial companies located within a six-mile radius, making Teesside one of the most compact industrial clusters in the UK.

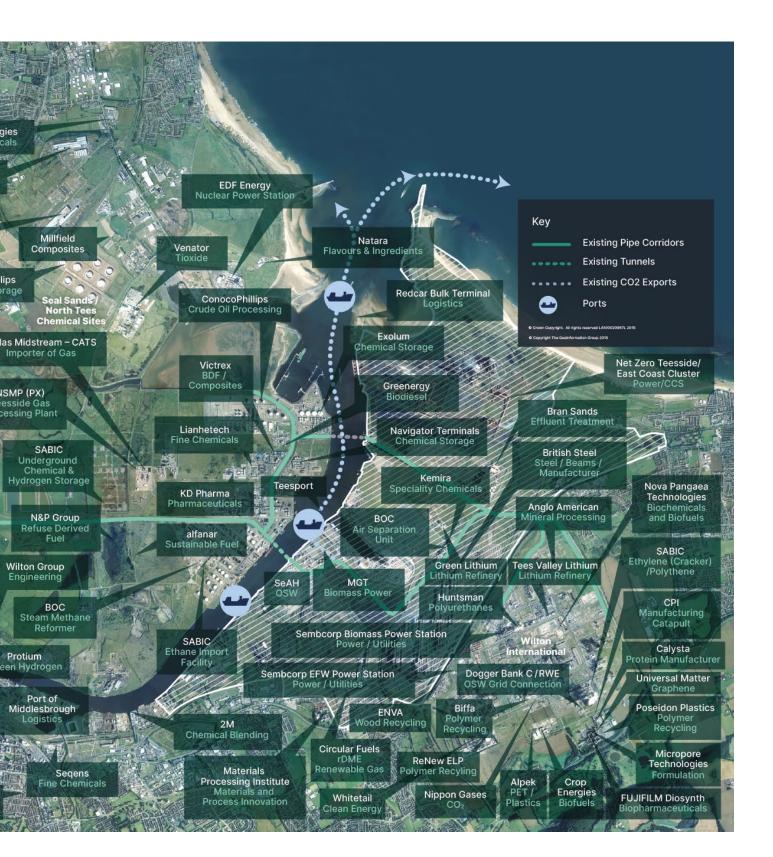
Tees Valley industrial cluster contains five of the UK's top 25 emitters and is single-handedly responsible for 5.6% of the UK's total industrial carbon emissions.

To tackle this issue, several existing industries already have plans to decarbonise their operations, either by adoption of Carbon Capture, Utilisation and Storage (CCUS) technologies or by fuel switching to alternatives, such as hydrogen. Companies on this journey include:

- Alpek
- BOC



- British Steel
- FUJIFILM Diosynth Biotechnologies
- Lianhetech
- Marlow Foods
- Mitsubishi Chemicals
- PX Gas processing



- SABIC
- Sembcorp
- Seqens
- TATA Steel
- Venator
- Verdant Health

We need to decarbonise our industry to achieve net zero and do so in a way which attracts investment, futureproofs our major businesses and secures well-paid, skilled jobs local people can access.

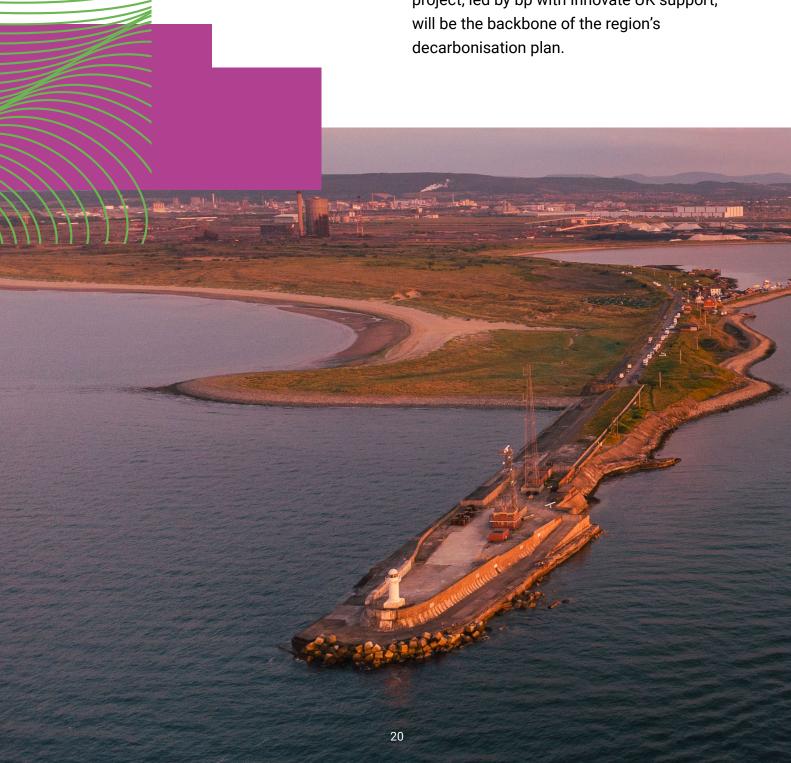
2. Net Zero Energy

Net Zero Teesside is a £4 billion investment and is the anchor project to deliver carbon capture, utilisation and storage in Tees Valley's industrial cluster. Led by bp, it is the UK's premier CCUS project and part of the Northern Endurance Partnership's East Coast Cluster.

3. Carbon Capture, Utilisation and Storage

CCUS is widely acknowledged as the only viable technology able to reduce industrial CO₂ emissions and achieve cost-effective decarbonisation across industry sectors.

Several multinational oil and gas companies have been attracted to Teesside to develop the UK's first CCUS equipped power station and build a network of pipes to transport CO₂ captured at industrial plants. This project, led by bp with Innovate UK support, will be the backbone of the region's decarbonisation plan.



4. Hydrogen

Tees Valley is a leading place for hydrogen production and storage, with a significant proportion of the UK's hydrogen produced here. The investments being made encompass both blue and green hydrogen for delivery over the next five to ten years.

More than half of the UK's hydrogen is produced in the region, stored in cavities, transported across Tees Valley via 17km of pipes and supplied to the rest of the country.

Removing CO₂ from hydrogen production via a CCUS network will provide a supply of low-carbon fuel for the UK. Future markets for hydrogen include transport and displacing natural gas to heat our homes. The UK's first hydrogen trains are also being piloted in Tees Valley by Northern Rail through a successful £1.3 million bid from the Office for Low Emission Vehicles (OLEV).

Circular Economy and Bioenergy

Tees Valley demonstrates all the major elements of the circular economy, from recycling steel from decommissioned oil platforms to using CO₂ from industry for soft drinks, through energy from waste in industrial processes to anaerobic digestion using industrial effluents.

With opportunities to use large-scale renewable energy to recover and recycle CO_2 from industry via CCUS, the region is at the forefront of deploying these innovative concepts to tackle climate change.

This is closely linked to our Bioscience cluster as many of the feedstocks, processes and products of this innovation priority are biobased. The volume and depth of this activity in Tees Valley is a significant component of delivering the UK's Net Zero Strategy.

This has helped create Tees Valley's national and international reputation as a primary location for clean energy, low carbon, and hydrogen technology innovation.

Net Zero Research Community

The Net Zero Industry Innovation Centre (NZIIC) is a £13.1 million innovative facility, a key component of TVCA's regional innovation strategy, which will position Teesside firmly at the heart of the UK's green industrial revolution. It will work across net zero for industry in circular economy, hydrogen, CCUS, smart energy and digital technologies.

N5 Universities is a collaboration between Newcastle, Northumbria, Durham, Sunderland and Teesside universities, producing a powerhouse of research.

Teesside University is a strong regional asset for net zero with the NZIIC and £4.8 million Research England Hydrogen Innovation Project, researching the impact of hydrogen; heat, power, transport and the just transition.

UK Industrial Decarbonisation Research and Innovation Centre (IDRIC) is a research



consortium led locally by Durham University engaging with Teesside Industrial Cluster. Projects include an integrated energy system planning tool for net zero industrial clusters (Durham); CPD module development on industrial heating and cooling (Durham); and Smart Decision Modelling tool for industrial cluster decarbonisation (Teesside).

CPI is part of the High Value Manufacturing Catapult. It runs multiple industry led programmes developing industrial decarbonisation technology, seeking to realise the circular economy, and applying new materials for hydrogen infrastructure and new energy systems.

The Materials Processing Institute (MPI) has had >£30 million investment for innovation projects over the past decade and almost all aligned specifically to themes within this Action Plan. This includes major initiatives on low carbon steel and metals production (including the UK's first hydrogen reduced steel), zero carbon cement and recycling of critical raw metals and materials.



IDC Cluster

Innovate UK funded the development of a Cluster Plan and Model for Tees Valley as part of the Industrial Decarbonisation Challenge. This project created a unique model and approach for plotting the journey to a net zero future in terms of CO₂ emissions, considering the broader business environment and integrating existing and future investments. The tool incorporated input and data from approximately 46 major carbon-emitting industries within the cluster, as well as known future investors and projects. While the Innovate UK funded phase concluded in early 2023, the cluster model remains active and is now collectively led by Tees Valley Industry through the Net Zero Industrial Leadership Group.

Digital Cluster

As set out in Tees Valley Digital Strategy (2022-2032); digital technology is increasingly becoming a driver of employment and productivity growth. This is why Tees Valley is committed to establishing itself as a global centre of digital innovation, research and practice. This will enable Tees Valley to be a truly Smart Region by 2032, and businesses to make technology-led decisions that enable growth.

Digital innovation is an essential part of driving the success of industry clusters and supporting the transition to net zero, enabling clean energy production, intelligent transportation and smart manufacturing.

The £160 million investment in the Tees Valley Investment Zone focuses on digital and creative technology cluster growth in both Middlesbrough and Hartlepool, and will provide significant levels of investment and business opportunities in the emerging DigiTech sector right across Tees Valley.

Digital innovation and technologies will also be pivotal to the new Tees Valley Care and Health Innovation Zone.

The Digital Strategy recognises the primary technologies that will enable and transform Tees Valley's rate of growth. We are embedding digital through greater connectivity across sectors and clusters leveraging cross disciplinary research and innovation.



What the Cluster Offers

Digital infrastructure, innovation, inclusion and skills are woven throughout the work the Combined Authority undertakes in employment and skills, transport, creative place, business support as well as clean growth and innovation.



Tees Valley is home to one of the fastest growing digital sectors of any Combined Authority area, with figures from the ONS showing a rise in jobs of 78% between 2019 and 2022. The local sector now employs around 8,000 people.

Digital innovation plays a crucial role in supporting the digitisation of all sectors and the Digital and Creative Investment Zone will provide specialist support to businesses to boost productivity, create jobs and help transform communities across the region.

The Tees Valley digital cluster includes international leaders in gaming, and rapidly growing e-commerce and technology solution firms such as:

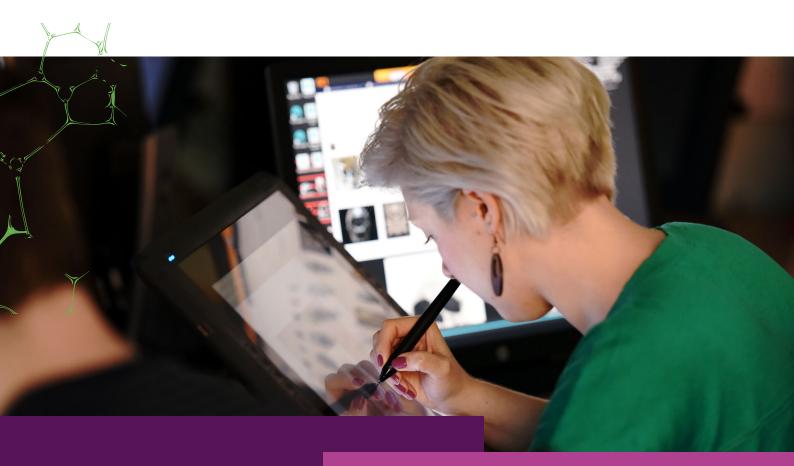
- Double Eleven, one of the top three independent games publishers and developers headquartered in the UK
- Behaviour UK (North), formerly SockMonkey. It is now part of an international leading games and immersive technology company
- BigBite, internationally recognised as a leading WordPress agency, works with brands such as Amnesty International, Wall Street Journal, NewsCorp and The Times
- Cubic, in Stockton, develops technology solutions for transportation and defence
- Visualsoft is one of the UK's largest e-commerce service providers

- Communicate Technologies' services include IT, telecoms and cyber security
- Northgate Public Services, in Hartlepool, provides smart technology for the emergency services

The development of 5G infrastructure will improve future connectivity across the region and link Tees Valley to digital hubs in London and Manchester.

The ambition is to catalyse digital innovation across the entire innovation ecosystem in artificial intelligence (AI), digital trade, film and screen, net zero, med-tech, and indie games supporting Tees Valley creative industries.

The 5G Testbeds and Trials Programme, launched by DCMS in 2020, created testbeds in areas where the UK has a competitive advantage. 5G testbeds and trials in Tees Valley are focused on priority industry sectors as demonstrated in the infographic.



5G Use Case Examples

Chemical Process

Remote access, maintenance and monitoring

Sensor technology - IoT enabled units

Augmented/virtual reality in engineering and design



Clean Energy, Low Carbon & Hydrogen

Al powered climate research

Smart meters/grids - ultra-low latency smart monitoring for energy consumption

Intelligent street lighting



Bioscience

Robotic imaging medical devices

Remote collection of medical clinical trial information

Automated supply chains for key medicines



Health & Social Care

Remote patient monitoring - health wearables/home sensors

Connected ambulances

Augmented/virtual reality consultations



Culture & Tourism

Augmented and virtual reality tourism

5G augmented events

Virtual reality cinemas



Construction

Holographic building visualisation

Real time design display

Remote inspections



Advanced Manufacturing

Seamless integration of wired and wireless components for motion control

Automated quality control

Predictive Maintenance



Digital

Virtual reality cloud gaming

Augmented and virtual reality goggles

Multiplayer augmented reality gaming



Business & Professional Services

5G cloud computing

Fintech 2.0

Blockchain and smart contracts



Logistics

Autonomous vehicles/drone delivery

Digital twins/real time tracking/ digital trade

Augmented reality windshields/windows



Public Sector 5G Testbeds: To Support the Development of a Tees Valley Smart Region

Traffic management systems and public transportation, smart lighting, waste management, environmental monitoring.

The digital workforce is embedded into many sectors across Tees Valley. For example TUI and Johnson Matthey have their technology headquarters located here. There are local plans to drive innovation in health and social care that will require a digitally skilled workforce and strong links to the wider digital cluster.

Reliable and fast digital infrastructure is a key enabler for digital innovation and an essential component for the performance of Tees Valley and UK economies. Digital innovation will drive the success of many key clusters and support the transition to net zero, including clean energy production and advanced manufacturing.

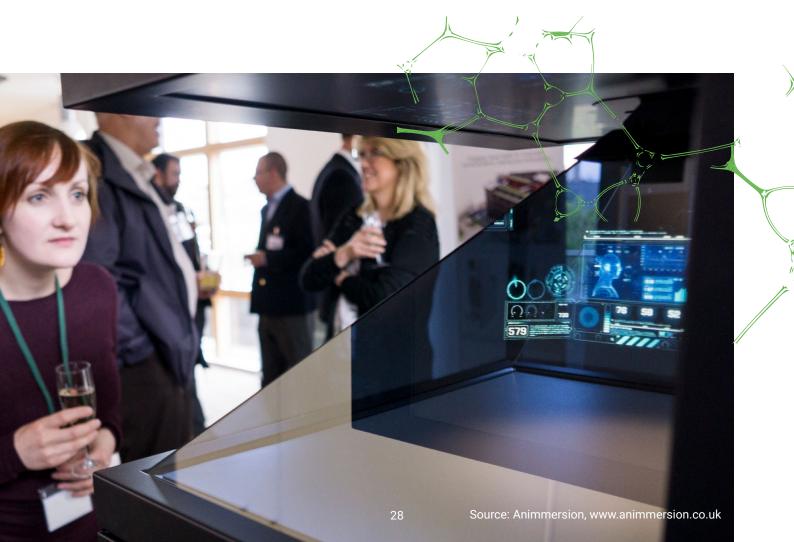
There are also strong links between the digital cluster and the growing creative sector in Tees Valley, which features animation, fashion, textiles, film, immersive experiences

and photography spheres amongst others, and is catalysed by key education institutions, such as The Northern School of Art, the leading provider of further education for art and design in Tees Valley.

Digital Research Community

Tees Valley partners have supported the digital cluster to grow over the past 20 years. Institutions such as Teesside University and Durham University have grown the indigenous digital sector through globally renowned brands and technologies, and offer an array of research strengths and technical capabilities and facilities.

Teesside University's current digital and tech innovation base consists of initiatives including Launchpad, the International Chamber of Commerce (ICC) Centre for Digital Trade and Innovation (C4DTI), the





The Physical assuRance fOr diGital tRadE SyStems (PROGRESS)

The Physical assuRance fOr diGital tRadE SyStems (PROGRESS) project is developing a core capability for testing the physical assurance of digital trade systems by tracking the physical location and transit of consignments and enabling interoperability with international digital trade data-handling systems. Housed at Teesside International Airport, the project is led by the ICC – Centre for Digital Trade and Innovation (C4DTI) working with Teesside University and the Digital Catapult.

This project focuses on creating a digital supply chain management system that reliably links the physical state, location, and digital representation of consignments. It emphasises the importance of physical assurance of location, origin, and condition of supplies for efficient, sustainable, and ESG-compliant supply chains. Using digital technologies including 5G and remote tracking, the project enables the team to mimic the movement and treatment of goods in anticipation of including such innovation in integrated digital environments in the future.

Industrial Digitalisation Technology Centre (IDTC), the National Horizons Centre and the Net Zero Industry Innovation Centre.

Teesside University produces 1,200 graduates in digital-related courses annually, providing a steady stream of skilled workers and start-up founders to fuel the cluster's expansion.

Durham University's research strengths and digital capabilities are highly complementary and are a strategic asset to Tees Valley's economy.

Durham University is one of four universities which operate a part of DiRAC, providing high performance computing (HPC) services to the UK's scientific research communities, funded by the Science and Technology Facilities Council (STFC), part of UK Research and Innovation (UKRI).



Bioscience, and the products of the bioeconomy, are playing a critical part in tackling the climate emergency. These are the UK's need for new forms of clean energy, bioderived materials, lower carbon food, new medicines, and enabling the circular economy.

The UK Government's National Vision for Engineering Biology was published in December 2023. Engineering biology underpins much of the biosciences sector and is a key technology driving the bioeconomy. This UK vision points to a \$2-4 trillion opportunity globally for bioproducts in health, agriculture and food, chemicals and materials, and low carbon fuels.

Tees Valley has a thriving bioscience cluster and bioeconomy, which is underpinned by key local infrastructure, a skilled workforce, and a strong, connected ecosystem. We have the building blocks needed to ensure Tees Valley benefits from this global opportunity.

Tees Valley is developing new to world products in energy, medicines, food, agritech, chemicals, and sustainable materials. By strengthening collaboration across the bioscience cluster and linking into national capability, we can capture new opportunities from products in this technology area.



What the Cluster Offers

Tees Valley has a long-standing history of globally leading research, innovation and manufacturing of bio-based products.

As early as the 1960s it was predicted there would be a global shortage of protein food sources in the future. ICI in Tees Valley developed the Pruteen process to produce bacterial protein for animal feed, a milestone in the development of the fermentation industry. Since then, we have seen many revolutionary bioprocesses developed across Teesside.

For example, in 1985 Marlow foods developed the first mycoprotein process for human food consumption. This product is now a market leader and a household name under the "Quorn" brand and manufactured here in Billingham.

booby biome

BoobyBiome's innovative probiotic supplement, informed by breast milk microbiome research, represents a significant leap forward in promoting infant wellbeing. Collaborating with CPI enabled the optimisation of the culture conditions for individual strains of aerobic and anaerobic bacteria, and the development of methods to co-culture a consortium of bacteria, establishing a robust and efficient manufacturing process for a multi-strain probiotic product. Together, they created an analytical toolbox for product characterisation and demonstrated the scalability and robustness of the manufacturing process at the 10L scale.

Easily added to formula or breast milk, the supplement enhances newborn gut health, supporting early immune system development and providing lasting health benefits from infancy through childhood. This groundbreaking solution holds immense promise for infant health, and will soon be available in supermarkets and hospitals.

Ensus operates one of Europe's largest production plants for renewable ethanol at Wilton, delivering more than 400 million litres of renewable ethanol and 350 thousand tonnes of high-protein animal feed annually.

Additionally, Ensus cleans and liquefies up to 250 thousand tonnes of carbon dioxide from the production process each year, which is used in drinks, food production, and industrial and medical gases.

Tees Valley was also recognised during the response to the UK's COVID pandemic, with Fujifilm Diosynth Technologies in Billingham winning a contract to manufacture 60 million doses of the Novavax vaccine.

National development and manufacturing capacity for novel vaccines was also built at CPI in Darlington, which helps develop new vaccines, upskill the UK's biopharmaceutical workforce in new technology areas, and provides future capacity for improved UK pandemic resilience.

There are major manufacturers within the region, and a strong network of highly innovate SMEs manufacturing and developing established and new products, contributing to a vibrant bioeconomy. Businesses in the cluster are diverse in scale and product type, and in addition to Fuji, Marlow food and Ensus, they include:

 Calysta, a world leader in cellular agriculture, has a research and development hub in Tees Valley and has attracted more than £128 million private investment

- Greenergy is Europe's largest manufacturer of waste-based biodiesel, and the UK's biggest biodiesel refinery
- Azotic developed and is now manufacturing a novel sustainable biofertiliser which is selling around the world
- Nova Pangaea converts biomass into sustainable chemicals and fuels
- Cambridge Research Biochemicals manufactures custom made peptides, peptoids, peptide-PNA, peptide-PMO and for tailor-made antibodies

With a rich heritage of developing products and processes for a multitude of industries, we believe Tees Valley is an ideal location for innovative developments in the bioeconomy. We will leverage local strengths to realise opportunities in biopharmaceuticals, biomanufacturing, novel food and feed, biobased chemicals and fuels, sustainable materials and the circular economy.

Bioscience Research Community

There are more than 8,000 highly skilled workers employed in Tees Valley biosciences industry. The five leading universities in the wider North East provide strong bioscience research capability and produce more than 2,000 graduates every year specialising in chemistry, biology and engineering.

The region contains major, nationally relevant, innovation assets which support businesses to develop and scale new products for the bioeconomy.



CPI provides companies with support from multidisciplinary experts and connects them to its network of investors and partners. It also enables access to world-class innovation facilities.

The National Industrial Biotechnology Facility at CPI Wilton, is a £24 million asset dedicated to helping businesses assess, develop and scale-up their innovative biotechnology products and processes.

The National Biologics Centre at CPI Darlington aims to significantly increase the UK's manufacturing capability in biologics promoting industry collaboration across the supply chain, from research through to manufacture and commercialisation.

The RNA Centre of Excellence at CPI
Darlington is a multi-million pound GMP
facility which is the only UK-based site with
the capability to develop and manufacture
lipid nanoparticle encapsulated messenger
and self-amplifying RNA vaccines and
therapies ready for use in early-phase

The National Food Innovation Centre at CPI Wilton, is a first-of-its-kind facility that will operate at the forefront of process development and scale-up for novel foods, feeds and nutraceuticals, funded by the Tees Valley Combined Authority.

The National Horizons Centre (NHC) at Teesside University, is a £22.3 million centre of excellence for the biosciences and healthcare sector with research, partnerships and training at its core.

The NHC brings together industry, academia, talent and world-class facilities to create real-world impact. The NHC works to discover diseases earlier, develops novel treatments and delivers life-saving medicines quicker, safer and more affordably. It has specialisms in disease-specific research, biomanufacturing and biotechnology and digital analytics and machine learning.

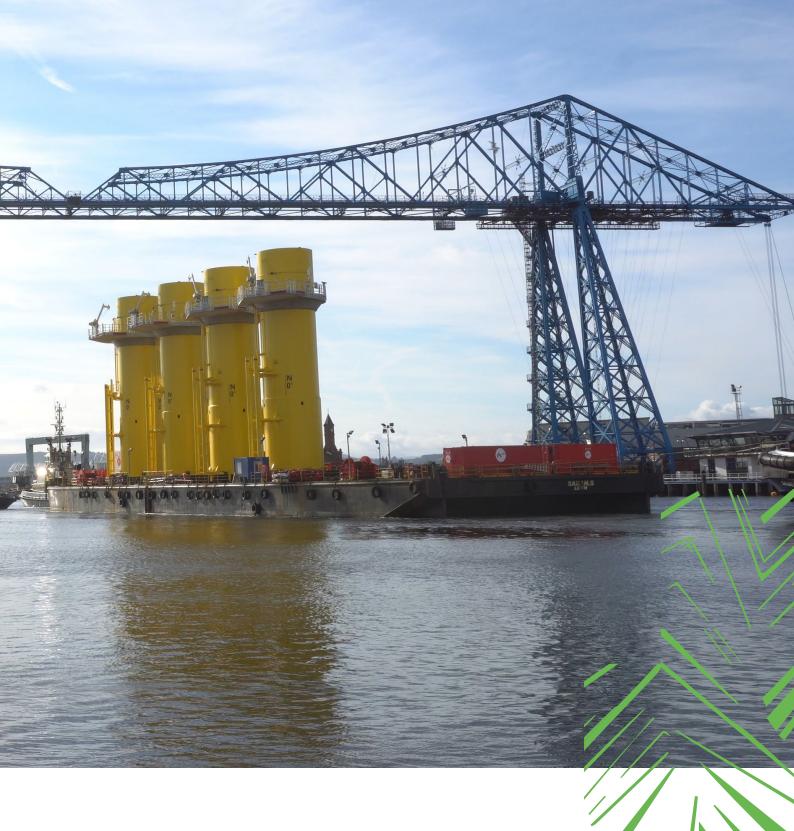




Manufacturing Cluster

Tees Valley has a rich and lengthy history as a centre for manufacturing and engineering excellence, with its root in the arrival of the railways, the development of the Port of Middlesbrough and the development of the region's chemical and steel industries. It was built upon both favourable local geology and geographies (salt, coal and iron ore) and the arrival of the Stockton and Darlington Railway.

Today's manufacturing cluster will both support the full clusters' journey towards net zero and, as it reduces its own carbon footprint, will play a part of that journey. Manufacturing the necessary plant and equipment at scale will be essential to support and deliver the region's bioscience ambitions. Advanced manufacturing will take input from, and be supported by, an active digital cluster to deliver the advanced manufacturing products and services which are relevant to the needs of today's markets.



What the Cluster Offers

Across the region, manufacturing activities can be divided into three sub-clusters.

There are the many large engineering companies who manufacture both individual components and assemblies, as well as fully engineered products which range from engine manufacture; large

fabrications and offshore structures; high value single large component manufacturers (steel sections, tubes and pipes) and the precision assembly/ manufacture of parts and components in support of both local and wider national and international supply chains. These have been, and remain, well matched to the immediate supporting needs of the Industrial Cluster. There is engagement and development work underway as the region's engineers prepare for future net zero opportunities and challenges.

Spanning across onshore and offshore activities, the region's process, energy and heavy manufacturers also rely on locally sourced personnel and expertise who provide the skilled inspection, maintenance, and process operations staff.

There is a strong local professional engineering services sector, including organisations that provide inspection and integrity assurance for the region's high value manufacturing assets and plants, and in many cases, also provide these services further afield.

The professional engineering services companies range in size from local SME to large international players offering a wide range professional engineering service, including plant and process design, costs engineering, and project management.

Tees Valley manufacturing cluster is actively engaging with the future opportunities and challenges which come from the journey towards net zero. Opportunities include sustainable processes and products, alongside AI and machine learning as well as large scale industrial decarbonisation.

The region is embedded in both local and national supply chains and is internationally recognised. Having supported the region's evolution to date, from the heavy process and steel intense background to today's more diverse and energy intensive cluster, the manufacturing cluster is well placed to continue to evolve through innovation.

Manufacturing Research Community

The five universities in Tees Valley and the wider North East each have capabilities to support Tees Valley's manufacturing businesses with best-in-class technology adoption, development, and bringing new manufacturing technologies to the market place.

In addition, the capabilities of TWI, MPI and CPI can support manufacturing businesses to improve their current processes and develop new, more sustainable processes.

Increased collaboration between these ecosystem players has also expanded the offer to industry. For example, Teesside University and TWI have established Innovation Centres covering both the circular economy and industrial decarbonisation, both of which combine the research power of the University with the specialist skills of TWI.





Marlow Foods, which manufactures Quorn meat-substitute products. undertook a two-year Knowledge Transfer Partnership (KTP) with Teesside University to drive the sustainability and quality of its protein.

The successful collaboration was then transferred as part of an R&D project into the company. Marlow Ingredients supply other food manufacturers with the high-quality mycoprotein which is used across Quorn products.

The KTP has also resulted in the permanent establishment of a mass spectrometry analytical laboratory at its base at Billingham in Tees Valley, helping the company to embed new skills vital to ensuring that its products remain at the forefront of quality and supporting their continuous improvement. In particular, it helped the development of mycoprotein fermentation process, as well as making the production more sustainable and cost effective.

The firm develops more than 100 different Quorn products such as pieces, sausages and mince, which are sold primarily in Europe and the USA, and available in 18 countries.

Innovate UK in Tees Valley

Innovate UK works closely with strategic regional partners and stakeholders, engaging with business and innovation groups, to develop opportunities aligned with regional strengths.

Innovate UK has a strong strategic relationship with Tees Valley Combined Authority, participating in local governance structures such as the Business Board and working with local partners more widely to create this plan. The relationship is built on a history of engagement through multiple Innovate UK teams.

For the period 2019/20 to 2023/24, Innovate UK invested £52 million in innovation projects in Tees Valley. £21.5 million (41%) was awarded to businesses and, of that, £16 million – 31% of the total – was awarded to SMEs.

£30.5 million (59%) has been invested through academic, research and public sector organisations, including the Innovate UK Catapult Network, for supporting business innovation and strengthening the relationship between industry and academia.

The Industrial Decarbonisation ISCF challenge funded the regional



cluster decarbonisation plan, supported by TVCA, regional stakeholders and industry, to set out the regional emissions and how decarbonisation efforts will achieve net zero by 2040.

This challenge also funded the first decarbonisation projects in the region, such as the onshore and offshore infrastructure delivered by bp and partners, which included pipeline routes, development consents, and costed engineering designs.



The Transforming Foundation Industries ISCF challenge invested £37.5 million in a national consortium to de-risk materials innovation and commercial scale-up.

As a member of this consortium,
MPI were funded to develop new,
sustainable materials, including improving
the recyclability of materials to ensure
recovered materials are fit for purpose,
and develop new manufacturing processes
which adopt recycled raw materials.

It is also leading on the identification of alternative materials from sustainable sources to reduce reliance on mined raw materials.

Alongside these investments, Innovate UK has strengthened relationships with local stakeholders so that its domain teams in Net Zero, Healthy Living and Agriculture, and Digital Technologies are integrated into the local ecosystem.

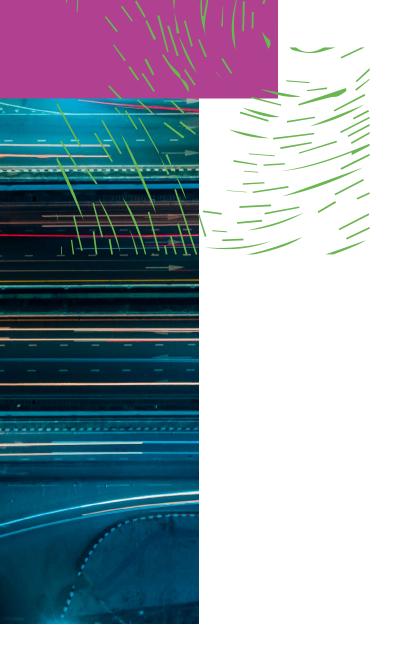


The UK's universities, research technology organisations and Catapults provide access to expertise and equipment, and are critical innovation infrastructure that supports businesses to develop and commercialise their ideas. Innovate UK support two key Catapults within Tees Valley region, CPI and the Digital Catapult.

CPI, a founder member of the High Value Manufacturing Catapult, is headquartered in Tees Valley and has key centres and facilities across the region. These include the National Biologics Manufacturing Centre and RNA Centre of Excellence in Darlington, and the National Biotechnology Centres and National Food Innovation Centre at Wilton Centre, Redcar.

CPI is a strong supporter of the local research and innovation ecosystem, enabling local partners to benefit from the wealth of knowledge and experience the Catapult has in relevant technology areas. CPI plays a valuable role in connecting local businesses to national and international innovation initiatives and priorities, convening partnerships and delivering significant technical projects and programmes.

CPI's centres have had significant economic impact in Tees Valley. CPI has



delivered £70 million of R&D projects in partnership with businesses in Tees Valley, helping those businesses go on to secure £62 million of further private investment. 77% of CPI's employees are based in Tees Valley and the wider North East region in high value jobs, anchoring a research and innovation ecosystem for Tees Valley alongside Teesside University and the other Research and Technology Organisations (RTO).

CPI's areas of expertise are:

 Healthcare Innovation – including medicines manufacturing innovation and healthtech

- Net Zero Innovation including sustainable materials and future food production
- · Digital and data enabled innovation

CPI has also played an active role in partnership with Innovate UK in Tees Valley. Most recently partnering with local businesses to deliver impactful projects in the Innovate UK/Tees Valley Launchpad programme.

Digital Catapult has supported both SMEs and large corporations in Tees Valley through an array of initiatives, including projects targeted at building skills and capabilities in the local ecosystem, organised networking events, industry roundtables, and cluster-related activities, with a particular focus on the immersive, gaming and process sectors.

In the last two years, Digital Catapult has helped multiple scaling startups and SMEs in Tees Valley with support linked to the RTO/Catapult grant focusing on technical consultancy and investment readiness, helping organisations on their growth journey.

Digital Catapult is also leading and partnering on strategically important projects with organisation in Tees Valley. Digital Catapult is a partner on PROGRESS (Physical assuRance fOr diGital tRadE SyStems), which aims to develop core capability for testing the physical assurance of digital trade systems, utilising the 5G-enabled Freeport Digital Trade Testbed being built by Teesside Freeport at Teesside International Airport.

Digital Catapult is also leading the **Critical** minerals flagship project as part of its

Digital Supply Chain Hub to improve the sustainability and resilience of supply chains through informed sourcing decision making.

SME-Focused Support

Innovate UK supports Tees Valley businesses on their journey from start-up to scale-up. In 2023, Innovate UK worked in close partnership with TVCA to design Tees Valley net zero Launchpad which provided dedicated support and £7.5 million of grant funding into the net zero innovation cluster.

This launchpad supports the specialist knowledge and expertise in the Tees Valley industrial cluster to commercialise innovative solutions and, in doing so, is helping the cluster to attract investment, future proof major businesses and create skilled jobs local people can access.

The projects funded through the launchpad are helping businesses in the net zero cluster to commercialise the innovations that will contribute to achieving the local ambitions for decarbonisation and deliver the solutions that are needed across the UK and globally.

By accessing Innovate UK's Business
Growth Service, innovative SMEs can gain
tailored coaching and mentoring support to
grow and scale their business. The support
focuses on the core areas of exploiting
innovation, accessing funding and finance
and entering new markets. This can include
IP management, commercial strategy,
business model, accessing grants, becoming
investor ready, finding collaborative partners
and market intelligence.



Between April 2020 and November 2023, Innovate UK's innovation and growth specialists supported 203 companies in Tees Valley. 110 were provided with intensive one-to-one support which created 68 new jobs and maintained 79 further jobs. £685,000 of investment was raised by two of the companies.

Innovate UK Business Connect delivered eight business-facing events in the area, including Innovate Locals, briefing events for Innovate UK funding, and introductions



to organisations. These reached more than 1,260 people with an attendance of more than 800 people meeting together.

For nearly 50 years, Knowledge Transfer Partnerships (KTPs) have been helping businesses innovate for growth. They do this by connecting businesses that have a challenge or opportunity with the academic expertise to help deliver it. KTPs are collaborative, transformative, three-way partnerships creating positive impact and driving innovation.

Since 2019, 12 of these have started in Tees Valley, with a total grant of £1.47 million. These encompass a wide range of businesses, from Scott Brothers to Marlow Foods, Clinkards to Lionweld Kennedy, and have included Classic and Management KTPs. Each project is supported by Innovate UK Business Connect Knowledge Transfer Advisers who provide expertise and guidance to all partners at every stage of the KTP journey.

Aligning **Ambitions**

Working together to embrace the aims of the Action Plan and aligning TVCA and Innovate UK ambitions, we will deliver our core strategic priority to embed Place into everything we do.

The Tees Valley Net Zero launchpad was set up in 2022 as one of two pilots to provide small and medium-sized enterprises with grants to develop energy and renewables projects.

In close partnership, Innovate UK worked with the Tees Valley Mayor and Combined Authority to support 23 projects with funding of between £60,000 and £800,000.

The Launchpad funding was designed to build on innovation clusters which have significant growth potential and to deliver jobs, growth, and higher productivity. A dedicated Cluster Manager, embedded within the region, has been appointed to collaborate closely with Innovate UK, ensuring seamless integration between regional clusters and national innovation initiatives and networks.





Underpinning these ambitions is the collaboration across the ecosystem in developing and recognising the varying needs of innovative businesses. This works together with innovation leaders in Tees Valley to:

- Become a net zero industrial cluster by 2040
- Support the uptake of technologies that reduce carbon emissions and help restore biodiversity, giving local businesses the digital tools to reduce their own emissions
- Expand the bioscience cluster's critical role in tackling the climate emergency and realising the UK's ambitions for new forms of clean energy, smarter cheaper materials and chemicals, and plastic waste reduction
- Strengthen the digital cluster to be a global centre of innovation, research and practice, enabling Tees Valley to be a truly Smart Region by 2032
- Continue to support innovation in engineering and in manufacturing technologies – the lifeblood of many of Tees Valley's key industries and sectors

Working across the ecosystem we will align our products and services to better support Tees Valley businesses to innovate, and to commercialise solutions to significant industrial and societal challenges. We will help businesses to adopt new knowledge, skills, and cutting-edge technologies to deliver greater economic impact.

Core Areas and Actions

Innovate UK will work with Tees Valley Combined Authority and local partners to deliver our joint ambitions for innovation driven economic growth, through three core areas:

- Strategic partnerships, ensuring the Tees Valley innovation ecosystem is highly connected and networked with the necessary relationships in place at all levels to grow the local economy
- Innovation support, targeted at priority clusters and meeting the needs of local businesses and entrepreneurs, sharing expertise and data so we can take more informed actions
- Communication and promotion, to ensure we are reaching, engaging, and inspiring more entrepreneurs and business leaders to innovate





Strategic Partnerships

Through open and transparent partnerships, based on the mutual trust that has enabled us to co-create this plan, we will:

- Support a cross-sector, whole system approach to R&D and innovation that strengthens the culture of regional collaboration
- Help to connect Tees Valley clusters and its ecosystem to other relevant parts of the UK innovation system
- Facilitate further engagement between Innovate UK's domain teams and networks focusing on Tees Valley priority clusters in net zero, digital, bioscience and manufacturing
- Support activities that amplify the work of Tees Valley's research and innovation centres and their contribution to national capabilities
- Work with existing Innovate UK programmes within the region to support knowledge transfer and follow on activities
- Work with Tees Valley's ecosystem on future skills and talent, that support the growth of priority sectors and identified innovation clusters
- Support Tees Valley's ambition to be a net zero industrial cluster by 2040 leveraging the priority clusters in this plan of net zero, digital, bioscience and manufacturing

Innovation Support

Aligning innovation support across the Tees Valley ecosystem, we will:

- Grow Tees Valley innovation clusters through national and local business innovation programmes and funding
- Collectively tailor support so that we meet the needs of innovative local businesses and entrepreneurs, including how we support SMEs to overcome barriers to commercialisation and growth
- Support activities that amplify and help businesses engage with Tees Valley's research and innovation support ecosystem, such as the R&D capabilities at Teesside University, and the innovation capabilities at CPI
- Work with the clusters to understand the supply chain landscape
- Support the clusters to connect with private investors





By collaborating on captivating communication campaigns and promotions that reach, engage, and inspire more entrepreneurs and business leaders to innovate, we will:

- Ensure the attraction, development and availability of high-level knowledge and skills that businesses need
- Develop and maintain the national and international status of Tees Valley R&D and innovation assets, ensuring they are fully aligned to the local economy
- Amplify local communications and marketing to raise the profile of Tees
 Valley's research and innovation strengths

- Support the development of a local civic engagement programme to raise the profile of Tees Valley's research and innovation strengths
- Engage with a co-ordinated approach to inward investment for Tees Valley innovation clusters with ecosystem partners
- Support and highlight scale-up programs supporting businesses to grow within the region



The plan is intended to be an agile and evolving document, which responds to local needs and economic opportunities over the next three years.

Reviews will take place annually. At each review we will assess progress against the actions and create a delivery plan for the subsequent year, evolving existing and creating new actions as appropriate, in line with the principles and core areas in which we have agreed to work.

Our collective goal for impact in Tees Valley is that we will support local businesses in becoming more resilient, supporting, and encouraging innovation to grow Tees Valley economy contributing to national economic growth.

The high-level impacts for Tees Valley are:

 More resilient and innovation active businesses



- · Business density growth
- · Jobs growth
- Supporting greater diversity of skills and talent involved in innovation
- Increased levels of public and private finance for businesses to innovate and grow
- More attractive for inward investment and stronger international trade
- · Reduction in carbon emissions

And contributing to national impacts:

- More innovative businesses developing solutions to national and global challenges
- Supporting scale-up and positioning innovative businesses in supply chains of the future
- · Higher national productivity
- A stronger UK-wide research and innovation ecosystem cementing the UK's position as global science powerhouse



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