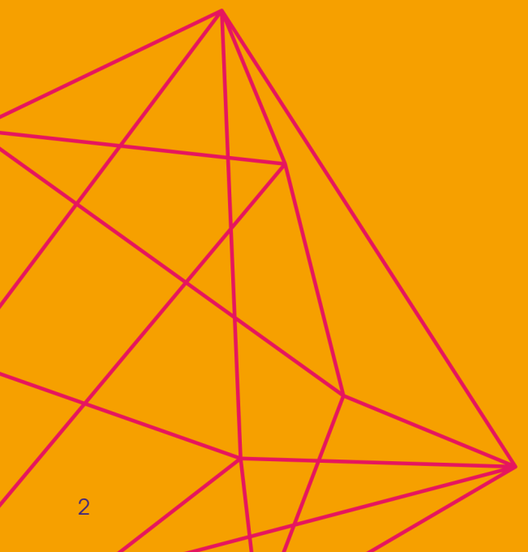
NP11

# Innovation Clusters in the North of England

cambridge econometrics
clarity from complexity

# Contents







# Introduction

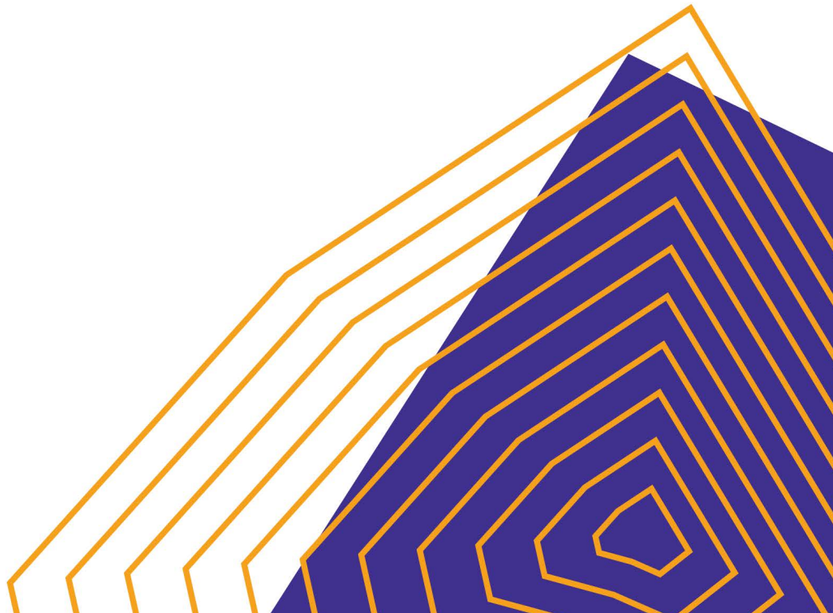
The North of England has a long history of innovation, built on nationally and internationally recognised assets centred around innovation clusters with strong research capabilities and partnerships with business. They raise the profile and global footprint of the North, enabling increased trade and investment, productivity, jobs and growth. Our innovation clusters range from globally recognised centres of innovation excellence, to fast emerging clusters and those which are key significance to their local economy.

At a national level, there has been renewed interest in the UK on regional cluster development to support innovation, and the Government commitment to developing innovation clusters across the UK was outlined in the Innovation Strategy (2021) and the Levelling Up White Paper (2022).

Over the last decade Combined Authorities, Local Enterprise Partnerships and others have been supporting innovation clusters in their areas. These can be at different stages of development and therefore need tailored support packages. There is an opportunity to use their experience to inform new policy.

With this in mind, the NP11 group of Northern LEPs has commissioned eleven case studies which explore innovation cluster development across the North. Together they provide a window into the wealth and depth of innovation capability across the North. They also provide insights on how the public and private sector have come together to support established and emerging innovation strengths in their areas. We have based our analysis on data from the **cluster mapping tool** undertaken by the Department for Science, Innovation and Technology, plus detailed interviews with local stakeholders in each area.

This publication summarises our case studies and offers some recommendations for future UK policy development. The in-depth analysis was undertaken by Cambridge Econometrics and is available **here**.



# What is a regional innovation cluster and why are they important?

Regional innovation clusters refer to localised groups of businesses of different sizes in related specialisms that produce innovative goods and services. They concentrate people with specialised skills in one place and are distinguished by extensive collaboration and interaction among entrepreneurs, researchers, and innovators. An innovation ecosystem enables people, markets, culture, finance and infrastructure support to work together to enable innovation.

These clusters also include research institutions, suppliers, and service providers, and are supported though economic policy by local public bodies such as Mayoral Combined Authorities, Councils and national Government. Clusters are important because of their potential to boost the innovation and productivity of places.

The advantages of clusters stem in part from different types of businesses working together with local and national public institutions and the networks that form as a result. These denser concentrations of economic activity increase productivity, jobs and economic growth - and can lead to the development of enhanced infrastructure, such as communications and transportation systems, and business support services around the cluster to help it develop.

While the presence of specialised businesses is a prerequisite for clustering, it is the degree and nature of interactions between these cluster elements – whether through formal partnerships, supply chain linkages, informal knowledge exchange, social networks, and more – that are the vital fuel for innovation. A cluster is more than just a critical mass of "the right ingredients" – such as firms and assets – but also includes these networked relationships and flows and exchange of knowledge, ideas and people throughout the cluster.



# Observations and implications for cluster policy

From our research on these case studies, and through talking to people working within each cluster, some cross-cutting themes have emerged:

- With the right environment and support, clusters can anchor local growth
- Cluster geographies are complex and transcend administrative boundaries
- Funding and finance challenges come in a variety of forms and impact on the ground can vary
- Skills gaps remain one of the most common challenges across all clusters
- Research capacity can be effectively translated locally serving as a conduit of knowledge and practice, attracting high-quality talent, and raising the profile of local industrial activity abroad
- Clusters are increasingly positioned as more than just a tool to deliver economic levelling up to reduce inequalities, increase social mobility, and improve quality of life for residents

As a result, we are making the following headline recommendations for future innovation cluster policy, particularly when set at a national level:

- Recognise different types of innovation cluster will require tailored packages of support at different stages of development
- Supporting emerging, rather than just existing clusters, is crucial to the objectives of levelling up
- Incentivise working across administrative boundaries to increase the speed and reach of cluster growth
- Clusters and innovation policy should be better integrated into devolution policy to allow local leaders, academia and business to link up to local priorities
- Combine different types of policy support such as direct R&D funding, business support programmes, planning and infrastructure, education and skills to build an integrated environment for clusters to grow
- Provide long-term consistent funding and flexible funding pots to accelerate cluster growth and send a positive signal to businesses and the investment community on the value of clusters.

# Innovation Cluster Case Studies in the North

Our eleven case studies span the entire geography of the North, and many show complex interaction beyond administrative boundaries. Although these areas have strengths in clusters across many sectors and specialisms, we have chosen to focus on the clusters below, recognised in the DSIT cluster mapping data and spanning a broad range of cluster types, ages and stages of development, technology bases, and sizes:

- Liverpool City Region: Infection Prevention and Control
- North East: Space
- Hull & East Yorkshire: Net Zero
- Lancashire: Cyber-Physical Defence and Security
- Cheshire & Warrington: Life Sciences
- Greater Manchester: Artificial Intelligence/Digital
- West Yorkshire: Artificial Intelligence/Healthtech
- Cumbria: Clean Energy
- York & North Yorkshire: Bioeconomy
- South Yorkshire: Metallurgy
- Tees Valley: Chemicals




# Liverpool City Region: Infection Prevention and Control

**Strong leadership from the public institutions and leading businesses within and beyond the Liverpool City Region has allowed it to build on a rich history in life sciences, with a focus on tropical and infectious diseases, biotechnology, and pharmaceutical manufacturing.**

This has led to success in attracting Government funding and private sector investment. The LCR's life sciences focused Investment Zone announced in July 2023 was seeded with £160 million in government funding. The Infection Innovation Consortium (iiCON) is a key player in this growing cluster, aiming to accelerate research and development in infectious diseases. iiCON was founded in 2020 with an £18.6 million government grant from the UKRI Strength in Places Fund and has since leveraged that to attract over £256 million in additional investment.

## Evolution

Liverpool City Region currently hosts manufacturing operations for some of the largest multinational pharmaceutical companies (including AstraZeneca, Lilly, Elanco, Bristol-Meyers Squib, Seqirus, and Allergan) as well as broad ecosystem of nearly 200 SMEs working on drug discovery, chemical engineering, advanced materials for infection prevention, data analysis, and diagnostic technologies, among others.

The cluster is supported by universities, research hospitals, and associated research centres. In addition to iiCON, support for the growth of the industry in the city region, resulting in a significant amount of life sciences employment in this area. The SciTech Daresbury science and innovation campus also provides support to the broader life sciences industry. In 2022, the LCR was awarded status as an area of High Potential Opportunity (HPO) for Vaccines Discovery, Development and Manufacture. The Liverpool Freeport opened for business in January of 2023, which aims to boost biomanufacturing and export.

## Impact of cluster approach

The recent success in capturing government funding and attracting private investment has been attributed to the strong leadership and focus of LCR Combined Authority, the Local Enterprise Partnership and Liverpool City Council. Authorities have focused on and promoted life sciences in their development strategies and have engaged in a variety of partnerships with stakeholders in the region to support the industry. This coordination centres on the UK's oldest sub-regional Innovation Board, established in 2013 with a top level strategic advisory remit, geared towards realising the headline goal to invest 5% of the LCR's GVA in R&D annually by adopting an Asset Based Cluster Development approach.

The life sciences cluster in Liverpool does not stop at the city-region's borders – a fact that is readily acknowledged by cluster participants. However, national public investment does not flow easily across those boundaries. Despite this challenge there has been significant effort to increase cross-border collaboration with other life sciences clusters and areas across the wider North, including into neighbours in Cheshire & Warrington and Greater Manchester. This has led to strengthened flow of knowledge and people between firms, universities and supply chains necessary to grow an internationally renowned cluster.

# North East:
## Space

**The North East has become a notable player in the UK's space industry, thanks to the efforts of Space North East (formerly NESACoE), established in 2014. The region's leaders in the sector have taken a consistent, collaborative approach to building on initial seed funding to develop a North East space cluster that is now paying off.**

### Evolution

The region's space cluster has seen rapid growth, with 54 organisations generating £113 million in annual income and employing around 1,365 people by 2020. The cluster leverages historical expertise in terrestrial communications, electronics, advanced manufacturing, and optics to excel in space situational awareness, secure satellite communications, and earth observation.

The North East's space industry has evolved from the co-location of industries in advanced communications, computing, and electronics that were increasingly in demand in satellite and aerospace applications and that had evolved in parallel with research excellence in the area's universities.

Ongoing efforts to raise the profile of the industry and attract investment are paying off. Raytheon UK recently acquired a local company – Northern Space and Security Ltd (NORSS) – establishing a foothold in the North East space ecosystem. Lockheed Martin is also considering locating manufacturing capabilities in the area. In the meantime, it is investing in local assets, including a £630,000 commitment in 2022 to help Northumbria University develop engineering research and training facilities.

### Impact of cluster approach

The cluster is developing rapidly, with a foundation of SMEs and scaling firms but did not have any large space primes that have invested significantly in operations in the region. Raytheon's recent acquisition of NORSS and Lockheed Martin's continued interest are indicators that the North East is ready to attract that calibre of attention.

The NESACoE initiative is an example of a comparatively small initial investment but that has yielded large returns. Its success to date was due to sustained interest by local partners such as Business Durham and the North East Local Enterprise Partnership, plus its ability to craft a story about the North East space industry that resonated with stakeholders and pulled together diverse threads into a shared identity and vision that encouraged innovation. It has also shown that growth is not just about attracting or enabling startups but showing existing businesses that they can use and contribute to the space economy, providing an opportunity to expand the perception of what a space firm is.



# Hull & East Yorkshire:
## Net Zero

**The Hull and East Yorkshire region is undergoing a significant transformation in its innovation system, driven by a convergence of industries focused on achieving net zero and industrial decarbonization. This initiative is shaping up to become one of the most advanced net zero innovation clusters in the UK.**

### Evolution

The net zero sector encompasses various industries involved in low carbon energy generation, supply chain, and greenhouse gas reduction. The Humber region, specifically the Humber Industrial Cluster, is a key focal point for these efforts in response to its high carbon footprint. The Humber Industrial Cluster Plan (HICP) is leading collective action, supported by the UKRI's Industrial Cluster Decarbonization Challenge. While significant progress has been made through HICP initiatives, there is a considerable opportunity to accelerate synergies between industries beyond the goal of regional decarbonisation to export net zero expertise.

The evolution of a net zero cluster in the region is a result of the intersection of industries such as offshore wind, biofuels, hydrogen, carbon capture and storage (CCS), and innovative SMEs working on decarbonization technologies. The combination of policy push (from national incentives towards clean energy, decarbonisation, and industrial symbiosis) and industry pull (driven in part by consumer demand), has led to clean energy plans that are germinating in the Humber.

### Impact of cluster approach

This is an example of how taking a mission-based approach such as aiming to meet net zero targets cuts across sector divides. Companies are coming together that might not normally work in collaboration and there can be positive unanticipated consequences – one of which is innovation. And while large infrastructure projects often draw a lot of attention in the net zero space, much of the innovation that is occurring is more incremental. It is happening in SMEs that are developing better designs or materials to reduce or eliminate waste and in large manufacturers sharing resources or adopting new practices to increase efficiency. All of these types of innovation are crucial to growing the cluster and to progress towards net zero.

Although the Humber Industrial Cluster is certainly not immune to the challenges that face the net zero initiative nationally and globally, taking a local approach has offered an opportunity to join up policy levers on the ground. Skills shortages, especially in electrical and mechanical engineering, welders, project managers, and specialist plant operators, are a concern. The Humber currently benefits from two University Technical Colleges and further work is being considered to create a campus partnership. HETA, a Group Training Association established by local companies in 1967 has recently developed a further electrical/engineering apprenticeship training facility in Stallingborough. An essential ingredient is ensuring the future workforce understands the opportunities in their area and this is where the region has prioritised its activities. Both Humber-based LEPs are heavily invested in their Career Hub promotions within schools to inspire young people.

Finally, the region has been able to combine funding and opportunities from a variety of sources (for example the new Freeport and UKRI's Industrial Decarbonisation Challenge Fund) to create the foundations for a larger scale plan but would benefit from consistency of funding and more autonomy to tailor national funding calls to local objectives.

# **Lancashire:**
# Cyber-Physical Defence and Security

**Building on decades of investment in physical security assets, Lancashire is diversifying its strengths into the adjacent sector of cyber security using a clustering approach backed by major public and private sector players.**

## Evolution

Lancashire hosts a dynamic cyber-physical defence and security cluster centred around BAE Systems' aviation operations (notably BAE Systems Military Air and Information (MA & I) and the incoming National Cyber Force (NCF) headquarters. Increasingly, physical defence needs to be supported by strong communications and cybersecurity infrastructure. As a result, alongside aeronautical hardware, BAE has also branched into the development and strengthening of information and communication systems technologies to fulfil needs for leading edge, resilient networks and real-time data. These needs are supported by Lancashire's clusters in digital and cyber that developed, in part, out of the Lancaster University's expertise in computing and engineering. Lancashire is consolidating existing strengths in data security with the growing cyber industry and its R&D hubs are combining to create a Cyber Corridor of assets which enhance its innovation potential.

BAE is an important anchor to this cyber-physical cluster and has worked extensively with local authorities to increase access across the industry to local assets and those outside of the area. For instance, it worked with Lancashire LEP to establish an outpost of the University of Sheffield-based Advanced Manufacturing Research Centre (AMRC) – AMRC North West, to support businesses of all sizes to tap into the expertise of academics and research engineers, to develop new products and manufacturing techniques which they might not be able to do alone due to cost or lack of technical infrastructure. BAE was also involved in the consortium that was ultimately successful in attracting the National Cyber Force (NCF) to Samlesbury in 2021. A group of stakeholders, which included Lancashire Enterprise Council, BAE Systems, the University of Lancaster, the University of Central Lancashire and Lancashire County – collaborated closely on the bid, which is expected to generate at least £5 billion for the region's economy. The bid was won in part due to the strong expertise and reputation in computer science and cyber security at Lancaster University. Locally, the university hosts the Cyber Security Research Centre (CSRC) – a National Cyber Security Centre accredited institute and EPSRC Academic Centre of Excellence (ACE-CSR).

## Impact of cluster approach

Lancashire's Innovation Plan recognises and encourages innovation at the intersection of areas of specialism. For example, aerospace and advanced manufacturing are increasingly digitising, and digital capabilities have contributed to the evolution of digital health (and others) in addition to cyber security. As these industries converge, cross-fertilisation is more likely to spawn innovation.

The cluster also has been successful at building and strengthening connections with wider ecosystems, diversifying sources of contracts beyond BAE, innovating at intersections of areas of specialism, and persistently working together to attract investments. The greatest successes in Lancashire have come from partners working together to secure investments and pitches are most compelling when these groups are united behind a common goal.



# **Cheshire & Warrington:**
# Life Sciences

**Cheshire & Warrington's transition to a thriving, diverse life sciences hub was built on cross-border collaboration that recognised its interconnectedness with neighbours across the North West as part of the Cheshire Science Corridor.**

## Evolution

Cheshire and Warrington has emerged as a scientific hub, particularly in life sciences, data and AI, drug discovery, advanced therapies, diagnostics, medtech, and advanced pharmaceutical manufacturing. Cheshire and Warrington has a distinct USP in life sciences around drug discovery, and also recognises that it benefits from proximity to (and contributes to) life sciences activities in both Greater Manchester and Liverpool City Region. Cheshire and Warrington has been referred to as "a compact geography with a lot of drug discovery" with unique expertise "from molecules to medicines". Within the radius of a 10-minute car journey it is now possible to find the expertise, facilities, IP, and the money to discover new chemical entities, new cell therapies and get them validated, tested, and manufactured. The cluster actively sought to make the most of the benefits from proximity to Greater Manchester and Liverpool City Region, fostering a collaborative and interconnected life sciences ecosystem.

The evolution of the cluster is a story of transition from an industry dominated by a single firm to one with a diversity of life sciences companies that emerged from the departure of AstraZeneca's global R&D operations. Alderley Park, once the site of AstraZeneca's R&D operations, is the focal point of the cluster and now functions as science park and innovation campus, hosting over 250 businesses. The site, now part of Bruntwood SciTech, is part of the broader Cheshire Science Corridor, which spans 40 miles along the M56 and encompasses 1,300 advanced manufacturing businesses and around 160 life science companies. The recent addition of the University of Liverpool signals a strategic effort to formalise links into the LCR innovation ecosystem and to create a sense of identity among industry participants to provide contrast to neighbouring clusters.

## Impact of cluster approach

The region has leveraged its industrial legacy, support networks, and proximity to research assets in neighbouring regions. However, it faces the indirect consequence of missing out on significant place-based funding that tends to recognise city-regions.

The cluster has been effective at developing external networks, building a localised identity, and playing to the region's strengths. The transformation of Alderley Park serves as a valuable lesson for regions facing significant economic changes, emphasising the importance of collaboration and adaptation to foster innovation and growth.

# **Greater Manchester:** Artificial Intelligence/Digital

**Greater Manchester boasts the UK's second-largest digital economy, valued at £5 billion. It is the product of decades of investment, competency building, and diversification led by a persistent drive for success by the region's public and private sectors. One result has been the evolution of a highly diverse AI industry with many different and sophisticated local markets and applications.**

## Evolution

The cluster is characterised by historic strengths in advanced computing and pioneering work in AI by figures like Alan Turing and is integral to the region's economy, with 78% of local firms adopting advanced digital technology. The city region's Innovation Plan recognises the potential of digital capabilities to enhance innovation across various sectors, including sustainable advanced materials and Manufacturing (SAM&M), creative industries, and genomics & diagnostics. SAM&M, has been selected as the City Region's Investment Zone focus, with the intention to drive growth in both this and the AI sector by developing Industry 4.0 tools and adoption as a use case. This will build on learning from the successful pilot for the Made Smarter Adoption Programme, initially developed and delivered in GM and the North West to assist local manufacturing SMEs to understand and overcome operational challenges through digital technologies, and now rolled out nationally. Greater Manchester is also home to GCHQ and a key node in the North West Cyber Corridor.

Greater Manchester has been successful in attracting public and private funding, and key public institutions, that will feed into the growth of the AI industry. While distinctive investments in AI are a relatively recent phenomenon, they were made possible because of a range of investments – from media to health tech to digital security – that laid a broad foundation for and helped to develop expertise and markets for emerging digital technologies. For instance, the BBC's announced move to Manchester in 2006 led to the development of MediaCity, a complex which now hosts industries and AI-enabled businesses. In 2023 investment announcements included the DSIT, Innovate UK and Innovation GM designed Innovation Accelerator pilot programme, which supported the AI deep tech focused Turing Innovation Catalyst and Centre for Digital Innovation as well as the MediaCity Immersive Technology Innovation Hub, applying AI to immersive technologies and their wider applications within sectors such as entertainment, the built environment, manufacturing, health and arts and culture.

## Impact of cluster approach

Almost none of the projects mentioned above were initiated by a single organisation. The Greater Manchester Combined Authority (GMCA), universities, and research community have relentlessly pursued funding opportunities together, partnering with the private sector to upgrade infrastructure and build facilities to house innovation. These efforts have been successful in part because of the clear vision and strong leadership of GMCA and private and academic sector partners, and industry networks, bolstered by limited but increasing devolved powers for economic strategy, deployed to develop a place based, cross sector approach to innovation development.

Part of this role has been in seeking to address some of the challenges that a fast moving and globally competitive sector represents. Access to finance, talent acquisition, skills gaps and an expensive labour market are perennial barriers. Some of these can have locally derived solutions such as retraining, and in reaching people that do not consider digital/AI as a natural home for them to show them the variety of roles they could play in the industry.
In addressing other barriers to growth Greater Manchester draws on strong local leadership to lobby nationally and internationally for its position in this future-facing industry.

# West Yorkshire:
# Artificial Intelligence/Healthtech

**West Yorkshire is harnessing a transformation into a high-tech economy, marked by a shift from manufacturing to knowledge-intensive services over the last 40 years. There has been significant success in taking advantage of local strengths in Artificial Intelligence to attract and link up with national infrastructure in the region.**

## Evolution

The Artificial Intelligence (AI) cluster in West Yorkshire is closely intertwined with the broader digital industry, growing at 4.2% annually and is integral to the region's economic plans. While this case study primarily focuses on AI applications in healthcare, it is worth noting that AI capabilities are also thriving in sectors like fintech, legal services, smart cities technologies, and entertainment. These industries may differ substantially in outputs but share similarities in data intensiveness, high user security and compliance requirements, and potential for digital tools like AI to increase productivity by automating routine tasks. As such, they share a labour pool with similar skills sets and there is strong potential for cross-fertilisation of innovation. A key to accelerating the growth of the AI industry in West Yorkshire will be to ensure that knowledge and skills do flow between industries and combat tendencies towards exclusion or siloing.

West Yorkshire is now home to several significant government health headquarters, including the Department of Health and Social Care (which includes Health Security Agency and Office for Health Improvement and Disparities), NHS England (which now encompasses NHS Digital and NHSX, Health Education England and the NHS Leadership Academy), and NIHR Clinical Research Network. It has a mature and established integrated care system composed of hospital trusts, and initiatives like Health Innovation Yorkshire and Humber.



## Impact of cluster approach

The cluster has been effective at plugging into national infrastructure investments by the NHS, fostering communication and collaboration among stakeholders, and maintaining responsiveness to businesses' needs. The result is that the region has successfully implemented AI innovations in healthcare, exemplified by the AI-enabled hospital command centre at Bradford Royal Infirmary and the National Pathology Image Cooperative (NPIC).

Skills, the perennial challenge to all clusters, is a pinch point in West Yorkshire. While the growth of the tech sector has meant that graduate retention rates have improved, West Yorkshire businesses still report skills challenges. The West Yorkshire Digital Skills Plan estimates that over 80% of jobs require a minimum level of digital skills but only 59% are equipped with Essential Digital Skills for Work (WYCA 2022). Several initiatives are now underway to address this gap under the Digital Skills Council (formerly the Local Digital Skills Partnership supported by DCMS).

West Yorkshire's strengths have been recognised at a national level and as a Mayoral Combined Authority, has had access to a wide variety of place-based funding mechanisms. AI and healthtech businesses benefit from the £45m of Growth Deal funding for Enterprise Zones as well as £80m Investment Zone funding announced in 2023. West Yorkshire was also recently awarded a £7.5m HealthTech Launchpad from Innovate UK.

These have been welcomed but access to funding can be fragmented as can aligning mandates from different national funding bodies to contribute to a holistic development strategy. There is potential to explore a single pot of R&D funding that could offer more flexibility and transparency for long term economic development planning, reduce potential duplication, and enable authorities to more effectively tailor interventions.

# **Cumbria:** Clean Energy

**Rooted in its nuclear legacy, Cumbria is positioned to develop a robust clean energy cluster drawing from its strengths in offshore wind, nuclear capabilities and renewable energy sources including the hydrogen and carbon capture hub in Morecambe Bay. Using the region's natural strengths, local leaders are connecting up industries into a wider cluster development strategy to cement its position on a global stage.**

## Evolution

The evolution of Cumbria's clean energy landscape dates back to the construction of Calder Hall in 1956 establishing it as a stronghold in nuclear power. Decommissioning activities at Sellafield have given rise to expertise in nuclear materials and decommissioning, extending into research networks with Manchester, Warrington, and North Wales. The region hosts research facilities like the Dalton Cumbrian Facility and Robotics and AI Collaboration (RAIC) which is a partnership between Manchester University, UK Atomic Energy Authority, Nuclear Decommissioning Authority and Sellafield Ltd contributing to nuclear research and development. With plans for small modular reactors (SMRs) and advanced modular reactors (AMRs), and a green hydrogen project in progress, the region is strategically poised for clean energy growth.

Cumbria's clean energy potential extends to the offshore gas industry's shift toward carbon capture, storage, and hydrogen production. The Morecambe Bay gas hub is transitioning to a net-zero cluster focused on hydrogen and carbon capture. The offshore wind industry, invested in by multinationals, has spurred a local ecosystem in engineering and maintenance.

## Impact of cluster approach

The emerging cluster will coalesce around the Cumbria Clean Energy Plan, which provides a coherent vision and action items for stakeholders. Networking initiatives, such as the North West Nuclear Arc and the Offshore Energy Alliance also provide avenues to increase investment in, support for, and raising awareness of evolving projects.

Growth of the Cumbrian clean energy sector is influenced by the presence of international multinationals and firms from outside of the region, and high levels of regulatory and developmental uncertainty from national authorities. While multinationals and large firms based outside of the area bring considerable benefits to places through investment and employment opportunities, they can carry some risk, and so the established offshore wind industry has built up a network of local suppliers and has become embedded in the economic fabric of the region. This could provide a model for how cluster development could work in more rural areas.

Cumbria's research and innovation infrastructure is focused on nuclear research and training centres and although specialisation has been useful in developing ideas and a talent pipeline for the region it has also meant that a key focus has been on developing wider networks and partnerships with research institutions further afield. This level of connectivity outside of the county is a necessary strength and stands Cumbria in a good position to take advantage of future opportunities in clean energy.



# **York & North Yorkshire:** Bioeconomy

**York & North Yorkshire is emerging as a bioeconomy cluster in sustainability and addressing both economic and environmental challenges together, primarily focusing on chemicals, biomanufacturing, and agri/ aquaculture. It has been formed from strengths in the region's key research institutions working with local businesses, creating an exciting new field.**

## Evolution

The region's bioeconomy evolution is centred around research organisations like the University of York, hosting various research centres, and private sector entities like Fera Science, Centre for Process Industries, and bioeconomy consultancy NNFCC. These organizations are connected through BioYorkshire, a public-private partnership aiming to leverage bioeconomy research for green growth, job creation, and economic development. BioYorkshire plans to create a Global Bioeconomy Institute, business incubation hubs, and an accelerator, with an estimated investment ask of £171 million. Although emerging, and therefore harder to quantify and define, the potential for the cluster can be seen in its collective ability to attract Innovate UK grants, showcasing collaborative efforts among research organizations, including the University of York and public-private labs.

The area also hosts a set of national centres of excellence, including the Centre for Innovation Excellence in Livestock (CIEL) and the agritech innovation centre of Crop Health and Protection (CHAP) – two organisations that are currently being merged to become a national agritech Catapult.

## Impact of cluster approach

As firms increasingly adopt corporate social responsibility (CSR) priorities and practices there are opportunities to leverage these to serve local development priorities. For example, Anglo American, the international mining company active in Yorkshire, partnered with BioVale and the Biorewables Development Centre to provide business support to ten companies in the Scarborough District. This grew out of their Social and Economic Development Plan, which identified the bioeconomy as an area with great potential for growth and a key priority. Finding private sector partners with these kinds of objectives can help to catalyse business growth in key sectors and communities that need support.

North Yorkshire has a wealth of bioeconomy and related research, innovation, and commercial activities and BioYorkshire and its partners have a clear vision for growth that aligns with economic development, job creation, and environmental targets. However, while government has invested, and partnered in, many of the individual research and innovation assets and projects in the area, North Yorkshire has not previous had the financial mechanisms available for attracting national resources for place-based development that other areas in the vicinity of the cluster, such as the Mayoral Combined Authorities in other parts of Yorkshire, have had to bid for investment. The incoming York & North Yorkshire MCA offers an opportunity to bring together research and innovation assets, aligning initiatives with government priorities, and leveraging momentum from the business community.

# **South Yorkshire:** Metals and Metallurgy

**The metals and metallurgy cluster in South Yorkshire has retained its traditional characteristics but has also adapted into a supply chain for a bourgeoning high-value manufacturing sector. It is an exemplar of how to help traditional businesses to adopt new technology and practices, feeding into the region's wider strategy for advanced materials.**

## Evolution

While the steel industry faced decline in the 20th century, the metals and metallurgy sector has persisted and serves as a foundation for various industries, including advanced manufacturing, construction, medtech, infrastructure, and defence. Recent research identified 960 local firms employing over 27,000 people, contributing £1.5 billion of GVA. In South Yorkshire this includes a mix of innovative SMEs and larger firms contributing to the supply chains of local and global companies. Research centres, such as the Advanced Manufacturing Research Centre (AMRC) and the Nuclear AMRC, have chosen their base in the area.

## Impact of cluster approach

The industry has become increasingly high tech and sophisticated. Almost 24% of South Yorkshire companies classified as high value manufacturing enterprises operate in the manufacture of fabricated metals while the High Value Manufacturing Catapult (HVMC) recently concluded that metal was one of several industries that underpin advanced manufacturing in Yorkshire.

It has a high proportion of SMEs, many of which have been family owned and operated for decades and a key challenge has been to overcome some of the barriers to adoption and adaption that new innovative approaches can bring. Programmes such as Made Smarter are designed to reach these firms to upskill and grow through digitalisation and to encourage more collaboration between firms.

Opportunities for future development include focused support for foundation industries, building bridges across supply chains for increased knowledge exchange, and a more specific examination of skills gaps to tailor training efforts to industry priorities. These strategies can potentially unlock greater innovative potential and sustainability for the metals and metallurgy industry in South Yorkshire, leading to greater growth in advanced materials.



# **Tees Valley:** Chemicals

**The Tees Valley region has a historical significance in the global heavy industry and chemicals manufacturing that dates back to the 1820s. A homegrown and pioneering industry in areas like plastics, medication, textiles, fertilisers, explosives and refrigeration, it has shown the ability to pivot its growth strategy towards the industries of the future, contributing 50% of the UK's hydrogen production and attracting significant investment for clean growth transition, led by the efforts of the local public and private sector leaders.**

## Evolution

Building on its industrial legacy and proximity to materials and downstream industries, the Tees Valley has developed high specialisation in the manufacture of fertilisers and nitrogen, manufacture of organic chemicals, and manufacture of dyes and pigments. The region's chemical industry is concentrated in a small area with a well-developed infrastructure encompassing three main sites: Wilton International, Billingham and Seal Sands & North Tees. Tees Valley estimated that there are more than 1,400 companies in Tees Valley directly involved in chemicals and process industry and that the sector is responsible for exports of over £12billion contributing £2.5billion a year to the local economy (Tees Valley 2023), with wider links into the Humber.

## Impact of cluster approach

Narratives around the chemicals industry have been shifting. It is now difficult to discuss chemicals innovation and clustering without reference to net zero or the circular economy and much of the innovation funding being channelled to the industries is aimed at supporting this transition rather than supporting generalised investment or business growth.

Recent successes include the development of research and business support infrastructure focused on net zero and the bioeconomy, such as the Net Zero Industry Innovation Centre. The Teesside Freeport, a major investment, aims to create jobs and boost the local economy. While there is a strong foundation of workers with specialised skills a recent audit found that almost 50% of the workforce across relevant sectors related to chemicals is over the age of 45 (Northern Powerhouse 2019) and over 116,000 jobs will be needed to satisfy replacement demand in the area over the ten-year period (Tees Valley Combined Authority 2016).

Opportunities for development include government support for the green/low-carbon/net-zero transition, fostering inter-industry synergies, and leveraging relationships with neighbouring bioeconomy clusters. The region's commitment to becoming a net-zero industrial cluster by 2040 presents opportunities for innovation and growth in the chemicals industry.

# Cross-cutting themes

- **Cluster geographies are complex and transcend administrative boundaries:** Several cases exhibited strong innovation relationships across boundaries – particularly in areas outside of the major city-regions. They frequently spill over into neighbouring areas, following transportation networks and encompassing nearby employment centres. Taken together, these observations paint both an encouraging picture of existing and potential for cross-boundary collaboration and depict a daunting and tangled landscape of economic, knowledge, and governance relationships that resist simplistic classifications.
- **Magic happens at the boundaries between sectors:** Most of the "successes" among regions studied in this report have resulted from collaborative working across different sectors, and different kinds of entities, both public and private. The "magic" at these boundaries is the multiplication of opportunities for knowledge recombination – that is, learning and borrowing between different industries around shared inputs, technologies, processes, labour pools, value chains, or problems. This process has been identified as key to industrial path development and change and can be the source of radical innovation.
- **Funding and finance challenges come in a variety of forms:** It is no surprise that stakeholders across clusters identified funding as a barrier to development but their diagnoses of what underlies these funding challenges are informative, if familiar. The view from the private sector is that in the UK it can be difficult to secure the finances necessary to make big investments, particularly outside of the Golden Triangle. On the other hand, public sector stakeholders noted the proliferation of place-based initiatives meant that, in theory, a significant pool of funding was available to support innovation programmes, though access to these resources has been uneven across the North.
- **Skills gaps remain one of the most common challenges:** If there is a common thread across cluster cases it is that skills are a constant point of concern. Overall, stakeholders have mentioned that skills programmes offered were not always geared towards the specific need of their industries, not large-enough skills initiatives, and the pool of senior level professionals can be smaller.
- **Research capacity can be effectively translated locally:** Almost all of the clusters profiled in this report are anchored by research, business support, and technology transfer organisations. Many of these are national, or international, centres of excellence that engage with researchers, businesses, and collaborators far beyond the region. These organisations can be tremendous assets to their ecosystems – they serve as conduits of knowledge and practice, are attractors if high-quality talent, and raise the profile of local industrial activity abroad.
- **Clusters are increasingly positioned as more than just a tool to deliver economic levelling up:** In some cases, cluster development efforts were tied to developing economic diversity and increasing regional resilience by reducing employment dependence on a narrow set of industries. However, local authorities are beginning to seek more than economic growth outcomes and are exploring ways that cluster strategies can be leveraged to reduce intralocal inequalities, increase social mobility, improve quality of life for residents and enhance sustainability all while maintaining or achieving high levels of innovation, attractiveness, and prosperity.

# Recommendations

- **Recognise different types of innovation cluster.** They can range from globally recognised centres of innovation excellence, to fast emerging clusters and those which are significant to their local economy. These can be at different stages of development and will therefore need tailored support packages. It is important that any Government policy recognises these variations and is flexible enough to support each cluster in the most appropriate way
- **Supporting emerging, rather than just existing clusters, is crucial to levelling up.** We need to support innovation ecosystems in places beyond those that have traditionally done well out of R&D support. Business are already investing in R&D across a broader geography and the objective of new policy should be to support these clusters to grow faster
- **Clusters and innovation policy should be better linked into devolution policy.** Devolution conversations continue across multiple Government Departments, and although parts of the UK are at different stages on this journey, where there are mechanisms available for devolved decision-making it is essential that nationally-set clusters policy takes account of them to link politicians, academia and industry at a local level. Much of the added value of cluster development cannot be driven from Whitehall.
- **Combine different types of policy support.** Clusters tend to perform best when all of the elements of their innovation ecosystems are strong and well-integrated. This suggests initiatives that coordinate multiple types of support – such as direct R&D funding, business support programmes, planning and infrastructure, education and skills, etc. Devolved organisations may be better at this kind of cross-thematic approach than national departments. We have Investment Zones, freeports, other DSIT initiatives such as Innovation Accelerators and Launchpads – any new cluster policy should bring some coherence to this landscape.
- **The importance of working across administrative boundaries.** One of the early findings from our research shows how many clusters grow beyond local boundaries as businesses connect up and supply chains develop. For example, the life sciences cluster in Liverpool does not stop at the city-region's borders – a fact that is readily acknowledged by cluster participants. However, public investment does not flow easily across those boundaries and consideration needs to be given to how collaboration can be encouraged, particularly how knowledge flows between academic institutions and firms across borders
- **Long-term commitment and flexible funding pots could accelerate cluster growth.** Some clusters are successful because of major national and sustained funding directly to institutions in the R&I system e.g., national centres of excellence, universities, Catapults, etc. A variety of activity on the ground is needed to support the networks, collaboration and knowledge flows that a successful cluster needs.
- **Piecemeal funding decisions run the risk of a disjointed approach.** Government Departments and bodies will need to work closely together to reduce duplication and to ensure clusters are supported in a strategic way.
- **We need a shift away from small competitive grants.** A frequent observation of local development funding in the UK is that competitive grants create significant challenges, including difficulties in long term planning, encouraging localities to compete for the funding that exists instead of the funding they need, and punishing places with fewer resources and expertise in addition to rarely providing sufficient funding streams to move the dial.
- **Send a clear signal to businesses**, the investment community and funders, as well as identifying and connecting industry leaders who have strong interest in the success of the ecosystems in which their organisations are embedded. They can spearhead initiatives and help identify opportunities to link up programmes. Connecting leaders to each other can avoid duplication and strengthen competitiveness.

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