CBI Economics

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LLOYDS BANKING GROUP

REALISING REGIONAL POTENTIAL

In partnership with datacity

Identifying and assessing high-value, emerging clusters throughout the UK

Contents

Foreword Lloyds Banking Group

At Lloyds Banking Group, we are focussed on helping our customers and communities achieve their objectives. Our regional development strategy aims to stimulate increased investment to support economic growth and prosperity across the UK. By working closely with business leaders, community groups, and local and regional governments, we identify and prioritise the needs of the regions we serve.

Sector clusters have long played a pivotal role in shaping the UK's economic landscape. From the financial hub of London to the advanced manufacturing clusters in the Midlands, these sector-based ecosystems have propelled the nation forward on the global stage. As we collectively navigate the challenges and opportunities ahead of us, sector clusters continue to be key for economic growth.

Sector clusters contribute to regional development in many ways. By nurturing industries in specific geographic areas, clusters act as catalysts for regional growth, generating employment opportunities and fostering economic resilience. Clusters can revitalise declining areas, bridge the urban-rural divide, and create inclusive growth across the country.

Understanding clusters helps us target the flow of finance to high-growth businesses and geographical areas of maximum opportunity. Helping individual businesses succeed while fostering overall economic development and community well-being is the key goal.

As one of the UK's biggest lenders, with a presence in communities across the country, we want to be a partner in the economic development of the UK's regions. The insights in this report will help us continue to deliver on this ambition.

John Winter
CEO, Corporate Institutional Banking,
Lloyds Banking Group

Foreword CBI

As the Labour government embarks on a new industrial strategy, their work will undoubtedly centre around a critical challenge but also opportunity: How do we get the UK economy growing again? CBI Economics' latest research with Lloyds Banking Group highlights the importance of clusters and regional economies to solving this puzzle.

Growth has completely dominated both our economic and political debate in recent years. It unequivocally represents the central objective of our new government's policymaking, and its importance is ever-present in conversations we have with the UK business community.

Business clusters, and the world-class companies and institutions that comprise them, are engines of economic growth. Leveraging our economy's local strengths and specialisms is therefore crucial to fostering development and prosperity throughout the UK. Clusters play a fundamental role in driving innovation, investment, productivity and job creation – all essential for economic growth. They are also key to mitigating regional inequality.

To dig deeper into this, CBI Economics were commissioned by Lloyds Banking Group to identify the UK's high-value, innovative and productive clusters, with a focus on regions in the North and Midlands. This extensive data-driven exercise looked at how these clusters perform and their contribution to regional and national economies, aiming to build a clearer picture of the UK's competitive advantages and opportunities.

This research revealed a host of thriving clusters that are driving growth throughout our economy. The North West, with its strong business environment and rich natural resources, is leading the way in the Net Zero sector, especially in urban hubs like Manchester and Liverpool. Life Sciences is flourishing throughout the North East, whilst urban clusters have developed in the West Midlands thanks to key institutions and facilities in Birmingham and surrounding areas. Strong industrial bases in the West Midlands and Yorkshire have paved the way for successful advanced manufacturing clusters, as South Yorkshire leads the UK Government's investment zone programme.

Given the wealth of economic strength and opportunity identified across the UK's regions, we hope this research sparks a conversation about how we can utilise this, building on themes of devolution in Labour's industrial strategy. Continued cluster support would further amplify success in emerging, high-value sectors, driving equitable growth throughout the country.

Louise Hellem
Chief Economist, CBI

Glossary

Metric	Units	Description
Real-Time Industrial Classifications (RTICs)		RTICs are The Data City's solution to standard industrial classification codes. They describe them as 'accurate, dynamic classifications of industries, reflecting today's business landscape. By leveraging AI and machine learning, RTICs deliver precise insights into sectors like FinTech and CleanTech, ensuring you have real-time data at your fingertips.
Total Cluster Output	Gross Value Added (GVA), £m	Captures the overall scale and productivity capacity of a cluster, expressed as the total annual output produced by all businesses within an RTIC and the cluster area. This total GVA figure includes initial, direct, indirect and induced contributions, therefore reflecting the wider economy dependency on the cluster and its supply chain.
Cluster Employment	Full-time Equivalents (FTEs)	The total number of employees working for businesses within the given RTIC and cluster area, expressed via FTEs to account for both part- and full-time workers. This total FTE figure includes initial, direct, indirect and induced contributions, therefore reflecting the wider economy dependency on the cluster and its supply chain.
Cluster Business Population	Total Business Count	The total number of active businesses operating within the given RTIC and cluster area, indicating the overall business population within the cluster.
Cluster Labour Productivity	GVA per FTE, £	Average labour productivity of workers within the cluster, expressed as output (GVA) per unit of input (FTE employee).
Cluster Business Concentration	Business Location Quotient (LQ)	A ratio that reflects the proportion of total businesses in the cluster area (Combined Authority) that operate in the given cluster RTIC, relative to this proportion UK-wide. This metric captures the concentration of an industry via business count.
Cluster Employment Concentration	Employee Location Quotient (LQ)	A ratio that reflects the proportion of total businesses in the cluster area (Combined Authority) that occurs in the given cluster RTIC, relative to this proportion UK-wide. This metric captures the concentration of an industry via employment.
Aggregated Cluster Index	Index Score, 0-1	This index is calculated by taking each metric as a proportion/ relative to the maximum value for that metric throughout all UK clusters. All 6 metrics are weighted evenly (1/6th) then aggregated, thus the overall metric ranges 0-1.
Strategic Companies	Number of cluster companies with £100m+ turnover	By assessing the number of large companies in the cluster, designated here as those with over £100m in annual turnover, this metric aims to further capture the scale of a cluster. It also indicates the presence of substantial, anchor institutions.
High-growth Companies	Number of cluster companies with >20% annual growth rate	'Fast-growing' companies are defined as those growing at a rate in excess of 20% per year, either in terms of their revenue or employment (when data is available). This metric captures the prevalence of high-growth, successful cluster businesses.

Business Maturity	Number of cluster companies classified as 'scale-ups'	This metric follows the OECD definition of scale-ups, companies with both growth rates exceeding 20% and more than 10 employees. This metric captures business maturity within the cluster in addition to growing businesses.
Cluster Average Wages	Median Weekly Earnings, £	Average wages earned by workers in the given cluster area, expressed as a median figure. As discussed in the metric shortlisting process, wages are an important part of job quality, increasing worker wellbeing and also directly signalling labour productivity.
Cluster Wage Growth	Annual change in Median Weekly Earnings, y/y%	Wage growth in the cluster area, to provide extra context and information around how earnings (and by extension job quality) have changed in recent years.
Job Skill Level	Proportion of jobs that fall under SOC level 3 or 4, %	The **Standard Occupational Classification** provides an exhaustive list of different jobs, assigning all workers into occupations and categorising them by skill level. Levels 3 and 4 represent the highest-skilled jobs, and assessing the share of these categories aims to capture the prevalence of skilled jobs within the cluster.
Cluster Business Innovation	Number of cluster businesses with a 3* innovation score	Innovation scores are a proprietary The Data City metric, that uses a machine learning model (trained on 980 companies with known R&D intensities) to evaluate company information and produce a score ranging on a 1*-3* scale. This metric therefore aims to capture the innovative potential of businesses within a cluster.
Venture Investment	Total venture capital funding attracted by cluster businesses, £	The sum of all venture capital investment attracted by businesses within a given cluster, taken from The Data City's platform but sourced from Dealroom data. This metric reflects the ability of a cluster to raise capital and invest.
University R&D Funding	Total funding for R&D from universities in the cluster, £	The total value of research contracts and grants awarded to universities and higher education institutions within the cluster, from research councils and other sources. Total HE R&D funding captures the activity and investment by a cluster's academic institutions into R&D and innovation.
Graduate Labour Supply	Number of graduates in relevant subjects from cluster universities	The total number of annual graduates from universities within the cluster area, in subjects judged to be relevant to the cluster's RTIC. This captures the supply of talent and labour at a graduate level, and pool of local human capital that businesses can draw from.
Relevant University Spinouts	Number of spinouts produced by cluster universities	The total number of spin-off enterprises produced by universities in the cluster area, established by either staff, students or other social enterprises. This also includes spin-offs with differing levels of ownership from the higher education provider. Spin-off data aims to capture the entrepreneurship, innovation and intellectual property present at academic institutions within the cluster.
Apprenticeship Labour Supply	Total number of apprentices	The Department for Education collects data covering the total number of apprenticeship starts and completions per year in each local authority district of the UK, this includes intermediate, advanced and higher apprenticeships. Apprenticeship numbers aim to capture the labour supply within a cluster area, with a more vocational and practical skill perspective than graduate numbers.

Executive summary

CBI Economics were commissioned by Lloyds Banking Group to identify the UK's most innovative and high-value clusters and assess their contributions to regional economic growth. This report showcases the strengths and opportunities brought by these niche or emerging sectors, with a focus on their regional footprint and the local factors behind their success. The analysis aims to provide an in-depth understanding of the sectors with the greatest potential for investment and sustainable growth across the UK, with a focus on some of the regions that share in their challenges on productivity and investment, yet hold significant opportunities for growth with the right environment.

This report provides an in-depth analysis of the cluster economy in four major UK regions: the North West, the West Midlands, Yorkshire and the Humber and the North East. The research highlights the emerging and significant sectors driving economic growth in these areas, including particularly strong industries such as Net Zero, Life Sciences, Advanced Manufacturing, Marine and Maritime. These sectors are identified as crucial contributors to the UK and regional economies, in terms of Gross Value Added (GVA), employment, productivity and investment.

The UK's thriving regional Net Zero clusters are driving decarbonisation and economic opportunities, with most regions benefitting

The Net Zero sector, encompassing all activities related to decarbonisation efforts across the economy and reducing greenhouse gas emissions, contributes £84.2 billion in GVA, and represents 4.4% of the UK economy. With strong regional contributions in Scotland, Yorkshire and the Humber, North West, London, and the South East, this sector supports 21,540 businesses and 818,190 full-time equivalent (FTE) jobs, and demonstrates high productivity levels. The robust performance of the Net Zero sector implies significant investment opportunities in green technologies and sustainable practices. For instance, the North West's natural resources and industrial framework facilitate growth in the Net Zero economy, evidenced by the establishment of bodies such as Net Zero North West and HyNet. Investing in renewable energy projects and infrastructure improvements can drive regional growth and ensure the UK meets its environmental goals.

The Life Sciences sector is pivotal for innovation and healthcare advancements, with significant contributions to the UK's northern regions

The Life Sciences sector, covering pharmaceuticals, medical devices, and healthcare products, contributes £34.7 billion in GVA, accounting for 1.8% of the UK economy. This sector is particularly significant in the North East, North West, and South East, supporting 20,810 businesses and 461,900 FTE jobs. The North West, with substantial clusters in Greater Manchester and Liverpool, exemplifies how regional strengths can drive growth in this sector. Investment in research and development, coupled with fostering innovation hubs and partnerships with academic institutions, is crucial for bolstering the region's position as a leader in Life Sciences, attracting global companies and creating high-value jobs. Developing specialised facilities and increasing funding for biomedical research can enhance the sector, making regions like the West Midlands hubs for medical innovation and healthcare advancements.

The Advanced Manufacturing sector creates significant opportunities in the northern regions and midlands, with wider productivity and innovation benefits to the economy

Advanced Manufacturing, involving innovative technologies and processes in manufacturing, contributes over £16bn in GVA, equivalent to 0.8% of the UK economy. It is prominent in the East and West Midlands, North East, and Yorkshire and the Humber, supporting 11,830 businesses and 213,440 FTE jobs. The sector's ability to integrate cutting-edge technologies into traditional manufacturing processes showcases its transformative potential. Regions like Yorkshire and the Humber, with their historical industrial strengths, are well-positioned to leverage advanced manufacturing to create high-value jobs and boost productivity. Investing in advanced manufacturing technologies and skills training is essential for sustaining growth, ensuring these regions remain competitive in the manufacturing sector.

The North West boasts a thriving Marine and Maritime sector, with crucial benefits for trade and economic resilience in the region and for the UK more broadly

The Marine and Maritime sector, including shipping, port operations, and marine engineering, contributes nearly £23 billion in GVA, representing 1.2% of the UK economy. This sector has a strong regional presence in London, the South East and Scotland, supporting 5,840 businesses and 220,490 FTE jobs nationally. The North West's extensive coastline and port facilities allow it to serve as a major facilitator of shipping and trade, particularly through the Liverpool City Region. Enhancing port infrastructure and supporting marine engineering businesses can strengthen the North West's role in global trade and maritime industries, fostering economic resilience and diversification.

The West Midlands is known for its manufacturing base, but it also showcases significant opportunities in creative sectors such as Telecommunications and Media

The telecommunications sector in the West Midlands is important locally, contributing £834 million in GVA, which is 0.6% of the regional total. Birmingham generates the majority of this activity, accounting for £200 million, with significant contributions from Coventry and Stoke-on-Trent. The region's strategic importance is further highlighted by the high business concentration in Warwick, Solihull, and Stratford-on-Avon. Investment in digital infrastructure and support for tech companies can diversify the regional economy, creating new employment opportunities and boosting overall economic resilience.

The media and publishing sector, primarily driven by activity in Birmingham, contributes £148 million in GVA and employs 2,140 people. Despite its smaller scale, the sector is an essential source of employment in areas such as Telford and Wrekin, and Wolverhampton, demonstrating how smaller clusters can significantly impact local economies. Promoting creative industries and enhancing support for media and publishing businesses can further develop this sector, contributing to regional economic diversity.

The UK is also set to benefit from emerging and high-value activities with potential for future growth, such as the North East's Space Energy cluster

The North East is emerging as a hotspot for the space energy industry, which involves the research, development, and commercialisation of technologies for generating, transmitting, and storing energy in space. Although currently modest, contributing £109 million in GVA and supporting 1,300 FTE jobs, the region is poised for significant growth. Northumbria University's new Space Skills and Technology Centre, supported by public investment and industry partnerships, will equip the region with the skills needed to grow this sector. The recent launch of the 'Space North East' cluster aims to create 10,000 new jobs, indicating substantial future growth potential. Enhancing collaboration between universities and industry can further drive innovation and investment in this emerging sector, positioning the North East as a leader in space energy.

Regional analysis highlights diverse economic strengths and opportunities beyond traditional sectors, with potential for high-value growth in years to come

The North West contributes significantly to the UK's economy, supported by thriving urban centres in Manchester and Liverpool. Post-COVID, the region showed the strongest economic recovery among the UK regions, driven by robust Net Zero and Life Sciences clusters. This highlights the potential for regional revitalisation through targeted investments. The West Midlands, with its strategic location and young population, shows promise as a hub for Net Zero and Life Sciences, provided there is continued focus on infrastructure and SME support. Yorkshire and the Humber's rapid GVA growth, supported by strong Net Zero initiatives and advanced manufacturing, demonstrates the potential for economic transformation through sustainable and innovative practices.

The report therefore emphasises the critical role of strategic investments and policy support in driving the growth of these key sectors. By fostering innovation, enhancing infrastructure, and promoting sustainable practices, the UK can harness the full potential of these clusters to achieve robust, inclusive, and sustainable economic growth. The diverse strengths of the UK's regional economies are a testament to the country's capacity for resilience and innovation in the face of global challenges.

Introduction

Business clusters, anchored by world-class companies and institutions, are engines of growth and a driving force behind economic development in the UK. Specialised and innovative firms operating in high-value clusters have the power to drive investment, innovation, productivity and prosperity.[1]

UK policymakers have repeatedly recognised that clusters are key hubs of local economic activity and play a vital part in our economy. Clusters were central to the previous government's 'Levelling Up' agenda, while their importance was reiterated in the new Chancellor's Mais Lecture,[2] and they are a key driver of devolution themes that featured throughout Labour's manifesto.[3] Clusters offer high quality jobs that tend to pay above the average UK wage, and are also key to local supply chains.[4]

In partnership with Lloyds Banking Group, CBI Economics have undertaken an exercise to understand the clusters in the UK's regions, their job quality and growth potential. This has been a data-driven exercise for Lloyds Banking Group to understand the profile of competitive advantages and future opportunities across the UK.

What is a cluster?

Michael Porter's theory of clusters has predominantly informed this analysis. Porter said **'Clusters are geographic concentrations of interconnected companies and institutions in a particular field'** but noted they can also encompass **linked industries, suppliers, customers and infrastructure.**[5]

Key features of a cluster:

- **The presence of certain firms, on a large scale, plays a clear role in attracting further business to locate.** Together with **'foundational' factors,** such as specific **natural resources, assets, institutions, skills and infrastructure,** regional comparative advantages are generated.
- **Regional comparative advantages help to develop specialisation and build scale,** bringing important economic benefits such as increased business activity and productivity. This is part of a concept called **'agglomeration'.**
- **Innovation is key indicator of cluster formation and growth** and can help regions to develop areas of specialisation, compete globally and capture new market opportunities.
- The presence of growth clusters has also been found to **increase Foreign Direct Investment flows** into the region. This suggests that the agglomeration of human capital plays an important role in the ability of an existing cluster to attract FDI.
- **Anchor tenants are also a key feature of clusters.** These are R&D focused public and private institutions, such as Universities that generate and apply specialised knowledge to technological fields.

Given the lack of a standardised methodological framework for clusters, this research has devised a bespoke approach that is heavily driven by this relevant cluster theory, along with available data. This methodological approach is structured into three phases summarised hereafter, while a more detailed, in-depth methodology is presented in the appendix.

1

Constructing a geographic and industry framework to identify clusters

Given the **integral role of geography in cluster formation**, rooted in agglomeration and local sharing of capital, skills and knowledge, **setting geographic boundaries is crucial.** Boundaries were initially set at Local Authority District (LAD) level, subregional UK administrative and governance areas. LADs strike a good balance between capturing significant clusters while also providing granular detail. They are also compatible with ITL1 regions and combined authorities (CAs), the latter of which merge LADs in metropolitan areas, and were also incorporated into our analytical process to capture clusters on a broader scale.

As theory also dictates cluster development occurs within a core industry or group of related sectors, **constructing industry-related boundaries is equally as critical** in identifying clusters. The official, widely-accepted Standard Industrial Classification (SIC) framework has been rendered somewhat inappropriate by the significant emergence of new technologies and types of activity since their last revision in 2007. Our analysis therefore opts for The Data City's proprietary Real Time Industrial Classifications (RTICs). RTICs offer a more up-to-date perspective of the UK economy, driven by web-scraped data on how companies classify themselves, spanning 53 sectors such as Cyber, Net Zero and Advanced Manufacturing. The total combination of 53 RTICs and 361 LADs yields 19,133 potential clusters, or 530 potential clusters under the 10 CA units.

2

Generating a suite of core and supplementary metrics to assess clusters

After initially identifying clusters, our methodology progressed to a metric selection phase to evaluate cluster strengths and development, derived from comprehensive desk-based research and data collection. This began with an exhaustive long-list of potential metrics that were scored both on their conceptual relevance and data availability and granularity. After an iterative shortlisting process, we arrived at **six core metrics,** fundamental to the concept of clusters that capture both their **scale** and **concentration.**

Scale metrics incorporated a more **absolute perspective** to cluster assessment.

1. **Business count:** Total number of active businesses within a cluster, sourced directly from The Data City.
2. **Cluster output:** Measured through Gross Value-Added (GVA), reflects the total economic output of a cluster, derived from CBI Economics modelling.
3. **Cluster employment:** Measured via Full-Time Equivalent (FTE) jobs, captures total employment supported by the cluster, again derived from in-house modelling.

Concentration metrics supplement this with a **more relative perspective** of clusters.

4. **Business location quotient (LQ):** Captures the proportion of total businesses that a cluster constitutes within its local economy, compared to the UK-wide average. Sourced directly from The Data City.
5. **Employment location quotient (LQ):** Operates identically to business LQ, but reflects the concentration of employees instead. Sourced from The Data City.
6. **Labour productivity:** Expressed as GVA generated per FTE job, derived from CBI Economics modelling.

The equal weighting of absolute (scale) and relative (concentration) approaches ensures balanced consideration of both newly-emerging, specialised and more developed, mature clusters. An **additional 12 supplementary metrics were also incorporated** to provide **further context around the cluster environment,** but these were not utilised to rank clusters. These metrics were categorised into: Business Environment; Job Quality; Innovation and Investment; and Access to Talent and Skills.

3

Aggregating metrics to compare clusters and narrow down the sample

To compare clusters effectively, the **six core metrics were then aggregated and synthesised into a single index.** Initially each metric **was indexed by taking it as a proportion relative to the maximum value for that metric** in the overall cluster sample. For example, at 2,409 businesses the Westminster Net Zero cluster hosted the maximum total business population throughout our sample, producing an index of 1.000. In contrast, the Leeds Legal Services cluster, with a business population of 518 generated an index of 0.215. Employing a cardinal approach like this over an ordinal ranking approach provided more accuracy and nuance in cluster comparison.

All **six indexed metrics were then assigned equal 1/6th weights and summed, creating an overall, aggregated cluster index ranging from 0 to 1.** A cluster could hypothetically achieve a perfect value of 1 if it had the maximum sample value in all six metrics – the strongest performing LAD cluster in our sample had an index of 0.526. All LAD and CA clusters were ranked according to this index, as the 20,000-strong total sample was distilled into a variety of long-lists. An **iterative short-listing process narrowed this down to 40 clusters** that were particularly strong and notable to Lloyds Banking Group. Detailed **scorecards** were developed for shortlisted clusters, before 7 of these were extended into **detailed 'deep-dive' mini reports.** Subsequent analysis chapters will explore cluster development and strengths by region, extending beyond just the short-listed clusters.

General Cluster Results

The following section provides an overview of some of the UK's key clusters the cluster and their importance to the national and regional economies. We also provide a more in-depth discussion of notable clusters in four of the UK's major regions: the North West, the North East, the West Midlands and the Leeds City Region, Yorkshire and the Humber. This helps to showcase the growing opportunities available in parts of the country which have historically lagged on productivity and investment.

UK Overview

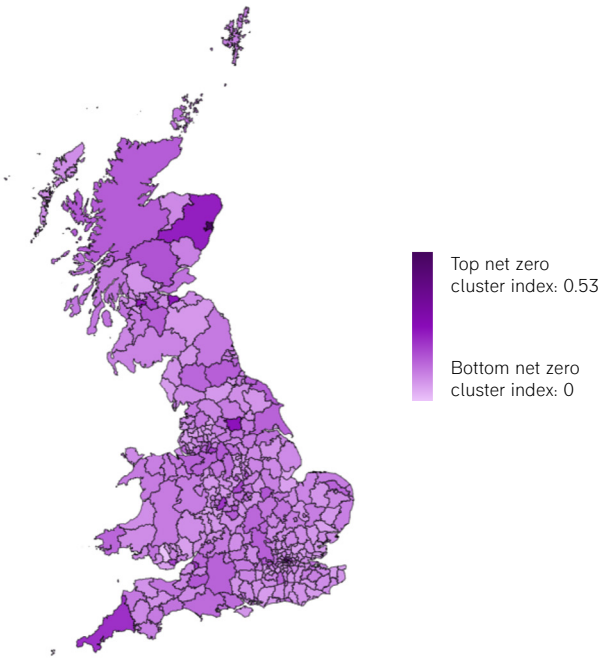
Given their modern, emerging nature, RTICs (herein referred to as 'clusters' or 'sectors') are growing rapidly and are of ever-increasing significance to the UK economy. Although all 53 RTICs classified by The Data City are undoubtedly important, for the sake of brevity this UK overview has picked out four in particular, carrying some of the strongest economic contributions. This section provides detailed insights into their total GVA and employment contributions, which includes the wider supply chain and employee spending enabled by their activity. It emphasises their importance to the UK economy and highlights the multitude of businesses driving these contributions.

Net Zero

This sector involves the entire ecosystem of companies and activity associated with decarbonisation and reducing anthropogenic greenhouse gas emissions. Covering the entire Net Zero supply chain, in total this sector contributes £84.2 billion in GVA, equivalent to 4.4% of the UK economy. Regionally, the Net Zero sector is particularly prevalent in Scotland where it contributes over £11 billion at 7.9% of the Scottish economy. Yorkshire and the Humber (£5.5 billion), the North West (£7.4 billion), London (£14.8 billion) and the South East (£12.6 billion) are also strong drivers of the Net Zero sector's contribution at a nationwide level.

In total, The Data City identifies 21,540 businesses operating in the Net Zero sector throughout the UK. This UK-wide business count is comprised of extensive local business populations in regions like the South East, South West and North West, hosting 3,060, 2,070 and 1,830 Net Zero businesses respectively. This business population supports a total of 818,190 FTE jobs – equivalent to 3.1% of UK employment. Net Zero jobs are also significantly more productive than the economy-wide equivalent, contributing £114,290 in GVA per FTE terms, 58% greater than all-sector average labour productivity.

Figure 1 Net zero sector footprint across LADs (aggregated index, Great Britain)



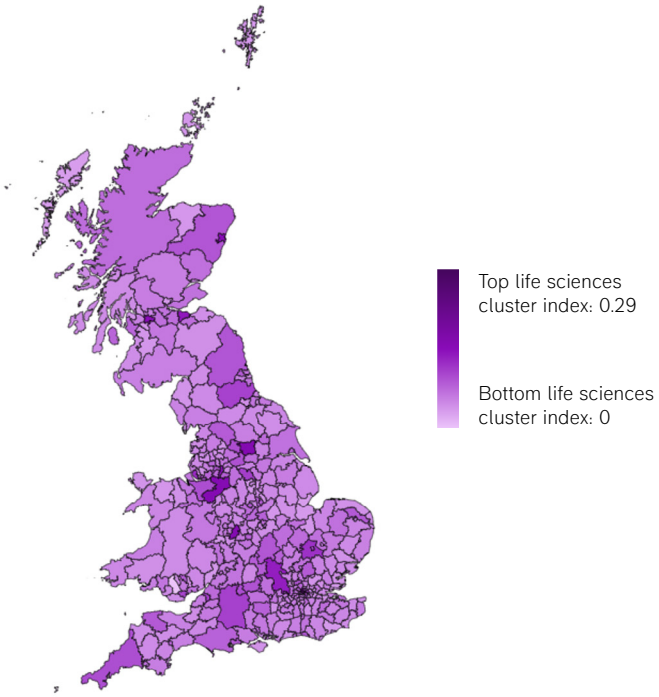
Source: CBI Economics modelling (2023)

Life Sciences

The Life Sciences sector covers a range of specialised businesses operating in the research, development and manufacturing of pharmaceuticals, medical devices and technology and other healthcare products. This activity makes a substantial economy-wide contribution of £34.7 billion in GVA, representing 1.8% of the entire UK economy. Life Sciences make particularly significant contributions across the regions in areas like the North East, North West and South East, constituting 2.1%, 2.0% and 1.9% of the total regional economies respectively. Although Life Sciences in London generates the greatest regional contribution in absolute terms (£7.3 billion), in relative terms the capital has one of the UK's weakest Life Sciences sectors (1.6% of the regional economy).

Life Sciences contributions to the UK economy are driven by a total of 20,810 businesses The Data City have identified operating in the sector. Regions like the South East, East of England and the North West host particularly strong local business populations, comprising over 3,200 in the former and almost 2,000 businesses in the latter two regions. Collectively, Life Sciences businesses support 461,900 FTE jobs throughout the UK, representing over 1.7% of UK employment. This includes over 60,000 FTE jobs in the South East and 50,000 in the North West. Life Sciences jobs have slightly above average labour productivity generating £76,110 in GVA per FTE, with specialised sub-sets of activities such as biopharmaceutical and pharma more than three times as productive as the UK average.

Figure 2 Life sciences sector footprint across LADs (aggregated index, Great Britain)



Source: CBI Economics modelling (2023)

Advanced Manufacturing

This sector encompasses businesses that are implementing innovative technologies and processes to increase productivity and total production in the manufacturing sector. In total, Advanced Manufacturing businesses contribute over £16 billion in GVA to the UK, equivalent to over 0.8% of the economy nationwide. Regionally, the sector is particularly prevalent in the East and West Midlands (over 1.0% of regional GVA in both), the North East and Yorkshire and the Humber (both almost 1.0% of regional GVA). Similarly to Life Sciences, the capital hosts a rather weak Advanced Manufacturing sector at less than 0.7% of the total London economy.

The Data City identified a total of 11,830 Advanced Manufacturers operating throughout the UK. Extensive local business populations were observed in the North West, Yorkshire and the Humber and the West Midlands, all over 1,000-strong as the West Midlands business population even exceeds that in the capital and South East. This Advanced Manufacturing business population supports 213,440 FTE jobs throughout the economy at 0.8% of total UK employment. The sector accounts for a substantial amount of employment in areas like the North West, West Midlands and South East, supporting over 20,000 FTE jobs in these regions.

Figure 3 Advanced manufacturing sector footprint across LADs (aggregated index, Great Britain)

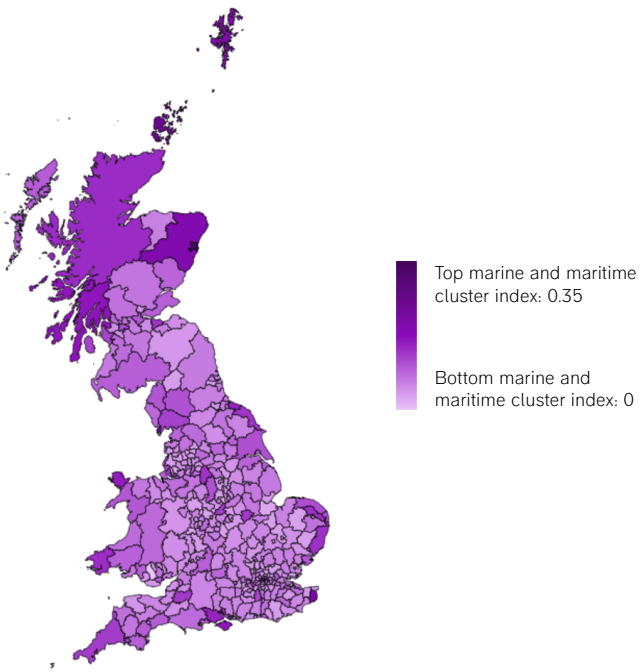
Source: CBI Economics modelling (2023)

Marine and Maritime

The Marine and Maritime sector is a highly diverse, productive industry covering businesses ranging across shipping, port operations, offshore energy, marine engineering or manufacturing and many more. Collectively, these businesses contribute nearly £23 billion in GVA to the UK, representing 1.2% of the total nationwide economy. In relative terms, contributions of the Marine and Maritime sector are particularly strong in London, the South East and Scotland, equivalent to 1.1%, 1.3% and 2.0% of the regional economies respectively.

A total of 5,840 Marine and Maritime businesses have been identified by The Data City operating throughout the UK. In line with the strongest regional sectors in GVA terms, the largest Marine and Maritime business populations were located in London, the South East and Scotland. The sector supports 220,490 FTE jobs throughout the UK or 0.8% of economy-wide employment. Although jobs are largely distributed in line with the business population, there is a slight skew towards the North West, hosting over 23,000 FTE jobs in the sector. Marine and Maritime jobs are extremely productive with labour productivity of £120,620 GVA per FTE, 66% greater than the economy-wide average.

Figure 4 Marine and maritime sector footprint across LADs (aggregated index, Great Britain)



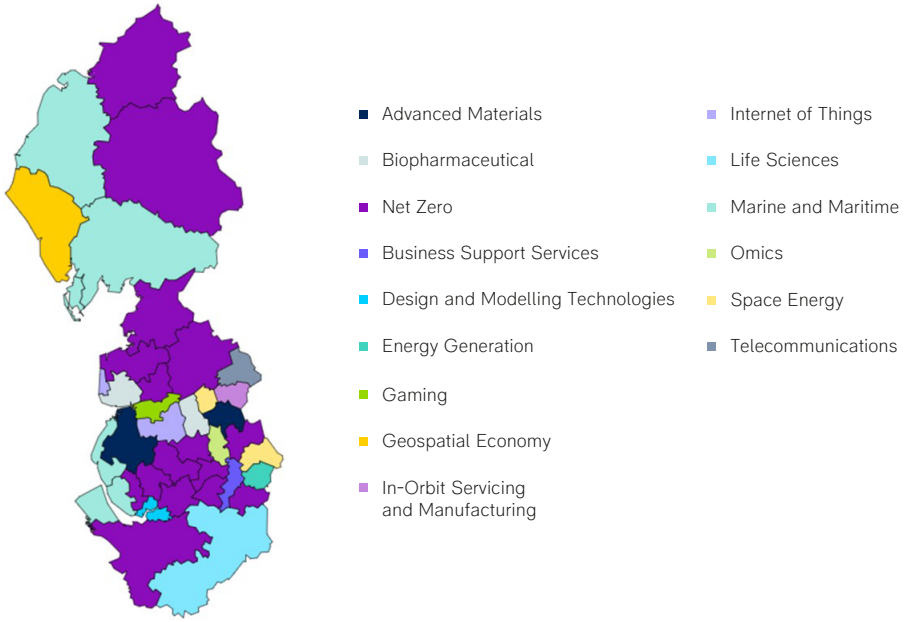
Source: CBI Economics modelling (2023)

North West

Economic Overview		
Working Age Population (% of UK)		4,639,400 (11.0%)
GVA (% of UK)		£219,700 million (9.8%)
Key Sectors	**GVA, (% of Region)**	**FTE (%, of Region)**
Net Zero	£7,424 million (4.0%)	89,210 (2.9%)
Marine and Maritime	£1,822 million (1.0%)	23,262 (0.8%)
Life Sciences	£3.,641 million (2.0%)	50,725 (1.7%)

The North West has grown extensively since its role at the heart of the industrial revolution to become one of the UK's most developed regions outside of the capital. The third-most populated region after London and the South East, the North West hosts more than one-tenth (11.0%) of the UK's working age population and is responsible for a similar proportion of nationwide economic output (9.8%). Thriving urban centres like Manchester and Liverpool have propelled the growth and success of the area, supported by a well-established devolved governance framework and some strong rural areas with deep specialisms. This diverse, dynamic local economy enabled the North West to have the strongest post-COVID economic recovery of all UK regions, as regional output (GVA) grew by 9.2% between 2020 and 2021, exceeding the 8.1% aggregate throughout England.

Figure 5 North West top clusters within a local authority by cluster index



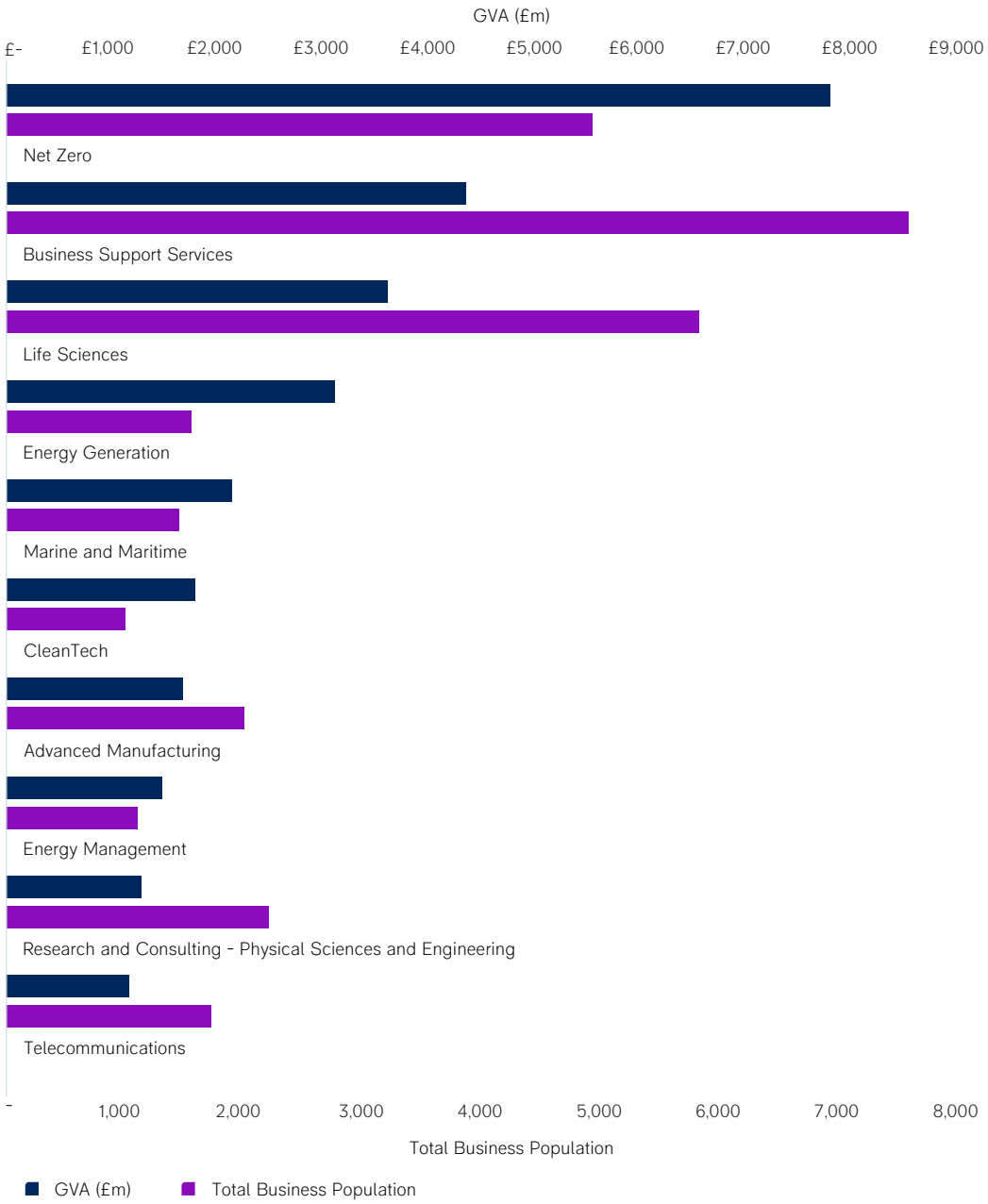
Source: CBI Economics modelling (2023)

Net Zero represents the strongest cluster within the region in terms of total economic output. Contributing over £7.4 billion in GVA, the region's natural resources and existing industrial framework are highly conducive to growth in the Net Zero economy, and the forming of bodies such as Net Zero North West and HyNet serves as a testament to this. Following this, the Life Sciences are also extremely valuable to the North West, contributing 2.0% of total regional GVA compared with a UK-wide average of 1.8%. Activity in this sector is driven by substantial Life Sciences clusters in both Greater Manchester and the Liverpool City Region, the latter of which also includes an advanced pharmaceuticals sector. Marine and Maritime represents another sector that has thrived in the region due to its geographic strengths. The North West's extensive coastline allow it to serve as a major facilitator of shipping and trade throughout the north, with a particularly strong maritime cluster and port economy in the Liverpool City Region, supported by activity in other LADs across the coast.

Net Zero

The significant contribution of the Net Zero sector to the North West economy is upheld by highly-developed urban clusters, along with some strong local authority clusters in more rural areas throughout the region. The 4,925 Net Zero businesses identified in the region support a total of 87,560 FTE jobs, as the sector in the North West contributes £7.8 billion in GVA to the UK economy, equivalent to 3.5% of the regional total. Overall, the strongest cluster in this sector and region is the Greater Manchester combined authority, merging 8 LADs in the metropolitan area that exhibit strong local Net Zero economies across the board.

Figure 6 Most significant Net Zero Clusters in the North West, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

Greater Manchester – Net Zero

Greater Manchester hosts one of the biggest clusters of Net Zero activity in the UK in scale terms, exhibiting particular strong total businesses, jobs and economic output. The city plays an important role in Net Zero NW, an industry-led cluster that coordinates decarbonisation projects across the region and its two main cities, intensifying investment and leveraging local strengths in manufacturing and chemical production. Greater Manchester also contributes to the HyNet NW cluster which is aiming to support 6,000 jobs and £17 billion of output throughout the region by 2035, via the hydrogen economy.

The formation and success of this cluster is supported by extensive access to both skilled labour and finance. Strong educational institutions like the University of Manchester are delivering cutting edge research in biotechnology and sustainable fuels to support this cluster, along with a healthy pipeline of STEM talent. Further to this, cluster businesses are supported by local facilities like the £21 million Net Zero Operational Hub that is nearing completion. The Greater Manchester Environment Fund (GMEF) has generated over £100 million of green finance funding, as the first regional environmental impact fund in the UK.

Metric	Value	Percentile
Output (GVA)	£3,618 million	99th
Business Population	1,786	99th
Employment (FTE jobs)	38,550	99th
Labour Productivity (GVA/FTE)	£128,517	95th
Business Location Quotient	0.8	20th
Employment Location Quotient	1.1	64th

Outside of the confines of this substantial combined authority cluster, there is some significant Net Zero activity and clustering in neighbouring LADs. South of Manchester, the Cheshire West and Chester and Cheshire East Net Zero sectors both perform very well in terms of aggregated cluster index, ranking in the top 5 LADs throughout the entire region. Cheshire West and Chester's Net Zero cluster comprises 310 businesses, that support over 4,200 FTE jobs and contribute a total of £394 million in GVA to the UK, equivalent to 3.5% of the LAD economy. Employment in this cluster is also extremely concentrated, as an employee location quotient of 3.46 indicates that the proportion of total employment in the Net Zero sector in Cheshire West and Cheshire is over three times the national average. The Net Zero business population is marginally smaller in Cheshire East at 307, but its contributions are significantly greater in both output and employment terms, measuring £447 million in GVA and 4,970 FTE jobs respectively. Labour productivity in this cluster measures 74% above the nationwide average at £126,136 in terms of GVA per FTE job.

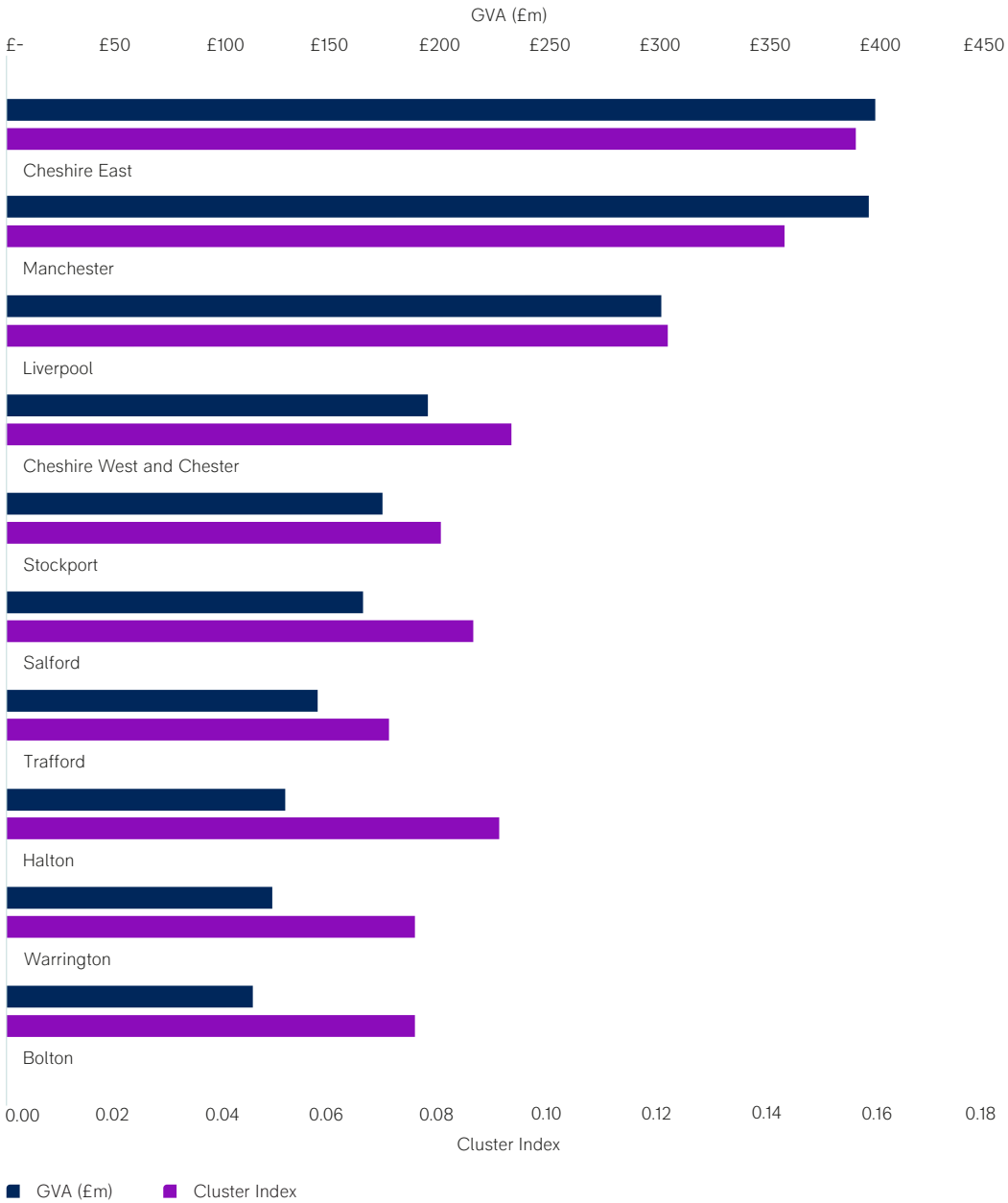
In very close geographic proximity, the Warrington LAD has also developed a thriving Net Zero cluster. Almost 220 Net Zero businesses operate in this area, supporting 4,460 FTE jobs and collectively contributing £347 million in GVA, an above-average contribution for the North West at 4.3% of the LAD economy. Similar to Cheshire West and Cheshire, employment is extremely concentrated within this cluster, as the location quotient indicates the proportion employed in Net Zero is 2.3 times the UK average. The strongest LAD clusters in the North West are all located near to the region's two urban centres, implying broader clustering and significant spillover as the Liverpool City Region also performs very well for Net Zero.

Although smaller than Manchester, Liverpool City Region hosts a very strong Net Zero sector that contributes almost £1.1 billion to the UK economy. The cluster is comprised of a 900-strong business population, including automotive manufacturers like Ford and Jaguar Land Rover that are making significant investments into electric vehicle capacity. Veolia also have a strong presence in the Liverpool City Region as their Garston site represents one of only two plants in Europe that can recycle lithium-ion batteries. The cluster supports 13,880 FTE jobs at a concentration 20% greater than the UK-wide average. It is supported by research centres like the Stevenson Institute for Renewable Energy, or the STFC Hartree Centre that has recently received £172 million funding from UKRI for a new project.

Life Sciences

Much like Net Zero, the North West's thriving Life Sciences sector is heavily driven by strong urban clusters in both Greater Manchester and the Liverpool City Region. 5,800 Life Sciences businesses operate throughout the region in total, supporting over 51,000 FTE jobs and contributing £3.6 billion in GVA to the UK economy, constituting over 1.6% of regional economic output. On balance, the Greater Manchester combined authority and its 8 constituent LADs are the most significant driver of Life Sciences activity in the region.

Figure 7 Most significant Life Sciences Clusters in the North West, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

Greater Manchester has combined an innovative business environment, advanced research capacity and a supportive governance framework to develop a thriving Life Sciences cluster. Displaying an aggregate cluster index in the 99th percentile of our sample, Life Sciences in the combined authority contributes £1.4 billion in GVA to the UK economy, with a business population of 1,240 that supports almost 33,000 FTE jobs in the city. Although the productivity of these jobs is somewhat lacking, they are concentrated at a rate 70% greater than the UK average. The business population comprises locally-based firms like Valtris Chemicals and Bestway Chemists, along with significant local presence of UK life science powerhouses like AstraZeneca and GSK, while also attracting global businesses like Qiagen, Kratos Analytical and Hologic. A comprehensive academic and research environment also supports the cluster with both skilled labour and innovation. Digital incubators such as Bruntwood SciTech intensify this innovation by promoting collaboration throughout the cluster, which also has access to one of the largest NHS trusts in the UK for clinical trials, sample supply and diagnostic collaborations.

Chester East, West and Warrington host strong Life Sciences clusters at LAD level in addition to their specialisms in Net Zero. Cheshire East ranks top of all North West LADs in terms of its aggregated Life Sciences cluster index, comprising 557 businesses that are responsible for 3,480 FTE jobs in the local area. This cluster contributes almost £400 million to the UK economy. This measures just over double the Cheshire West and Chester Life Sciences cluster, the contribution of which is nevertheless substantial at £194 million in GVA terms. Similar to Net Zero, the Warrington Life Sciences cluster also ranks very well in the region, while the Liverpool City Region Life Sciences sector is far more well-established than its Net Zero counterpart.

The strength of Life Sciences in the Liverpool City Region has generated attention from central government, as the region was designated a Health and Life Sciences investment zone in Summer 2023. With a total GVA contribution of £740 million, Liverpool Life Sciences ranks in the 99th percentile of all combined authority clusters, driven by a 1,000-strong business population that supports almost 10,400 FTE jobs. Local government have outlined 21 development projects as part of new strategy going forwards to leverage the investment zone. This includes a flagship regeneration scheme in the Knowledge Quarter Liverpool Innovation District that will see two new builds to help satisfy increasing demand for laboratories, a Mental Health Digital Research Centre and new high-containment Category Three labs at the Liverpool School of Tropical Medicine. Facilities and partnership such as the Liverpool Knowledge Centre, School of Tropical Medicine and Pandemic consortium further support research and innovation within the cluster.

Marine And Maritime

The North West's thriving Marine and Maritime sector is comprised of a diverse range of rural and urban clusters spread throughout the region. While both Liverpool and Manchester make strong contributions, some of the most concentrated local authority clusters are found on the more remote coastline in the north of the region, such as Barrow-in-Furness, Lancaster and Allerdale. Hosting one of the UK's largest shipyards and a critical location in the transportation of locally-generated energy, Barrow-in-Furness has the strongest overall cluster index of all local authorities in the North West. The 122 Marine and Maritime businesses operating in the area support over 400 FTE jobs, as employment in this sector is extremely concentrated at a rate 32 times greater than the UK average. Similarly, the proportion of total businesses in this sector measures over 15 times the national average, as Barrow-in-Furness' Marine and Maritime cluster contributes £76 million in GVA to the UK economy.

Figure 8 Most significant Marine and Maritime Clusters in the North West, by Local Authority (by GVA and Cluster Index)

Source: CBI Economics modelling (2023)

Additional developed clusters in nearby local authorities are a strong indication of clustering and spillover in the Marine and Maritime sector in this area. Lancaster and Allerdale host strong business populations of 38 and 46 respectively, accounting for a combined total of over 600 FTE jobs. In Allerdale, businesses and employment are concentrated in the Marine and Maritime sector at rates 3.2 times and 4.5 times higher than the UK average respectively, while location quotients for Lancaster indicate the concentration of both is around 60% greater than the nationwide equivalent. The two local authority clusters together contribute £68 million to the UK economy, while both exhibiting very strong labour productivity in the range of £190,000 GVA per FTE job.

In addition to more remote, concentrated clusters, both of the North West combined authority areas support the Marine and Maritime sector in the region. Greater Manchester's Marine and Maritime sector contributes £807 million in GVA to the UK economy and supports almost 9,700 FTE jobs. The area benefits from very strong transport links and the Manchester shipping canal, a crucial piece of infrastructure that connects the cluster to the coastline and has been subject to substantial increases in traffic and investment recently. This cluster however scores below the UK average in both business and employment concentration, as the Liverpool City Region arguably hosts a more thriving Marine and Maritime cluster.

Liverpool City Region – Marine And Maritime

Benefitting from the UK's fourth biggest port by freight volumes and traffic, the Liverpool City Region hosts one of the strongest marine and maritime clusters outside of London. This sector constitutes over 5% of local economic output and a significant share of employment, both directly and in other related or dependent industries. Sector strengths have been reinforced through substantial investment in projects like the Liverpool2 deep water terminal. Opened in 2016 at an initial cost of £400 million, this project significantly boosted shipping capacity and represents the only deep-sea container terminal in the North or West of England. In total more than £1 billion has been invested into transport infrastructure throughout the region.

Estimates have projected the city's maritime sector to grow 7.2% in real terms between 2021-2025, supported by recent initiatives like Cargo200 which has aimed to attract trade business to Liverpool away from ports in the South East. Both projects mentioned were primarily driven by Peel Ports Group, one of the most influential businesses in the cluster along with large shipping companies like Maersk and ABP. The cluster benefits from a thriving educational environment through the University of Liverpool and LJMU, along with the National Oceanography Centre and the Offshore Marine and Research Institute.

Metric	Value	Percentile
Output (GVA)	£476 million	91st
Business Population	380	84th
Employment (FTE jobs)	4,330	86th
Labour Productivity (GVA/FTE)	£197,850	99th
Business Location Quotient	1.5	66th
Employment Location Quotient	3.1	93rd

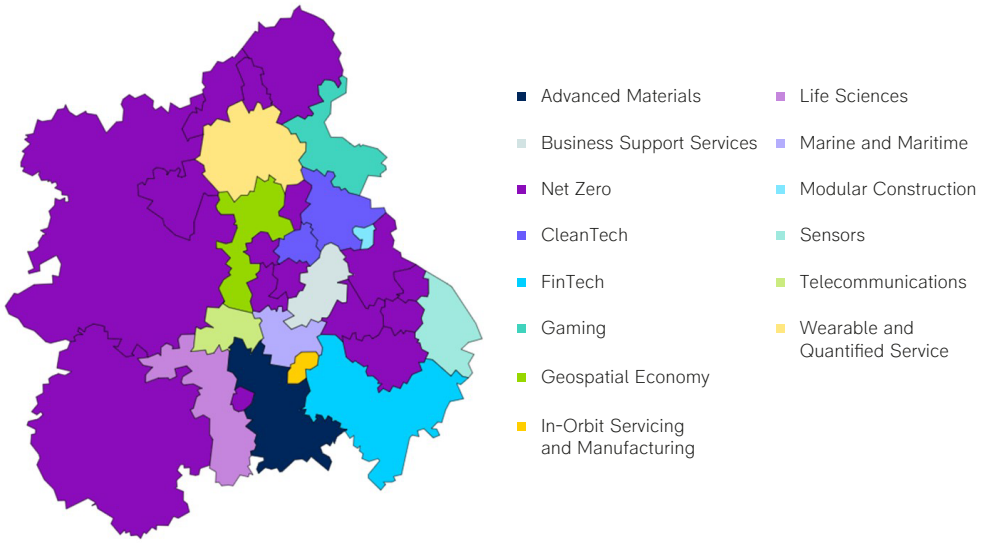
West Midlands

Economic Overview		
Working Age Population (% of UK)		3,685,000 (8.7%)
GVA (% of UK)		£160,370 million (7.1%)
Key Sectors	**GVA, (% of Region)**	**FTE (%, of Region)**
Net Zero	£6,239 million (4.5%)	69,434 (3.0%)
Business Support Services	£2,996 million (2.2%)	60,079 (2.6%)
Life Sciences	£2,282 million (1.6%)	37,985 (1.6%)

The West Midlands is home to almost 6 million people and has one of the UK's youngest regional populations with 24% of the population aged 0-19 (compared to 23% in the UK). Its geography places it at the heart of the UK. The region sits at the centre of a global air and nationwide rail network. High Speed 2, which will connect Birmingham and London, is anticipated to be transformational for the regional economy.

The region is comprised of both the West Midlands Combined Authority and other local authorities that are within the West Midlands region in counties such as Staffordshire and Shropshire. The West Midlands Combined Authority contains the local authorities of: Birmingham, Wolverhampton, Walsall, Dudley, Sandwell, Solihull and Coventry. There are a further 20 local authorities in the West Midlands region that are not part of the West Midlands Combined Authority. These include authorities such as Redditch and Tamworth. The largest city in the region is Birmingham, but there are a number of smaller cities in the West Midlands, namely Coventry, Stoke-on-Trent, Wolverhampton, Worcester, Hereford and Lichfield.

Figure 9 West Midlands top clusters within a local authority by cluster index



Source: CBI Economics modelling (2023)

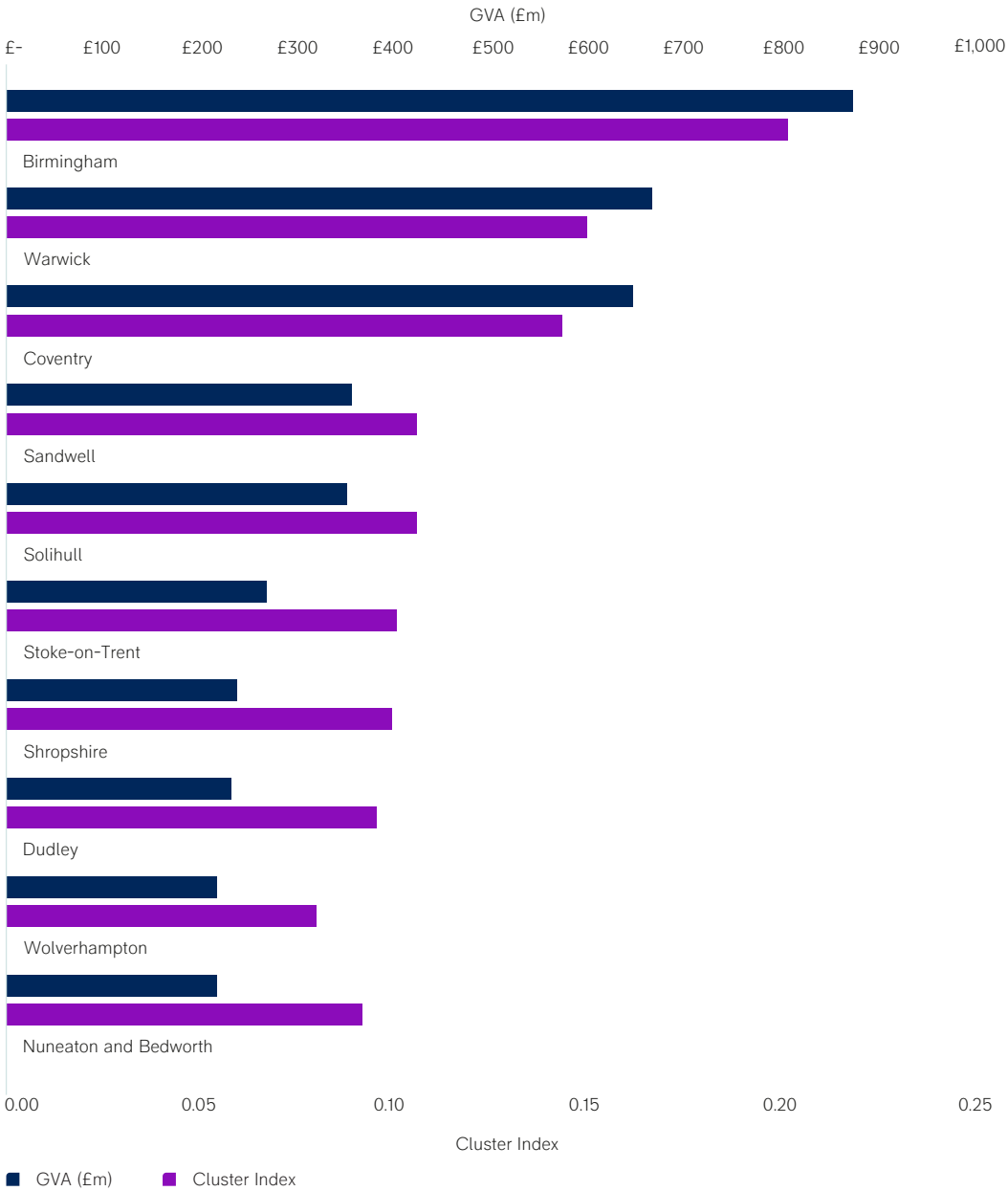
In GVA terms, the largest local authority economy within the West Midlands region is Birmingham, accounting for approximately £32.0 billion in GVA and therefore 20% of the region's output. This is followed by the Staffordshire county region (£22.7 billion; 14%) and the Warwickshire county region (£20.4 billion; 13%). Birmingham also holds a substantial number of the region's jobs, with approximately 555,000 people employed in the local authority. This means it accounts for 20% of the 2.75 million jobs in the region. The next largest local authorities, by employment count, were Coventry (165,000; 6%) and Solihull (150,000; 5%).

The three largest authorities in terms of the number of businesses located there are Birmingham, which is home to 136,215 businesses. This is 12% of the 1.1 million businesses in the region. Next is Coventry, home to 36,142 businesses or 3% of the regional total and following this is Sandwell (28,258; 3%). Estimates of the West Midlands Combined Authority economy size it at as being the largest economy of any combined authority. It is also the fastest growing, as the Combined Authority state that their economy had the highest GVA growth rate of any UK region outside London in the 10-year period from 2010 – 2020.[6]

Net Zero

The strongest cluster within the wider West Midlands region, in GVA terms, is Net Zero. This accounts for almost £6.2 billion of economic output which is circa 4.5% of the regional economy. This is driven primarily by local authorities covered by the West Midlands Combined Authority, namely Birmingham, Coventry, Sandwell and Solihull but also local authorities outside of the combined authority such as Warwick and Stoke-on-Trent.

Figure 10 Most significant Net Zero Clusters in the West Midlands, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

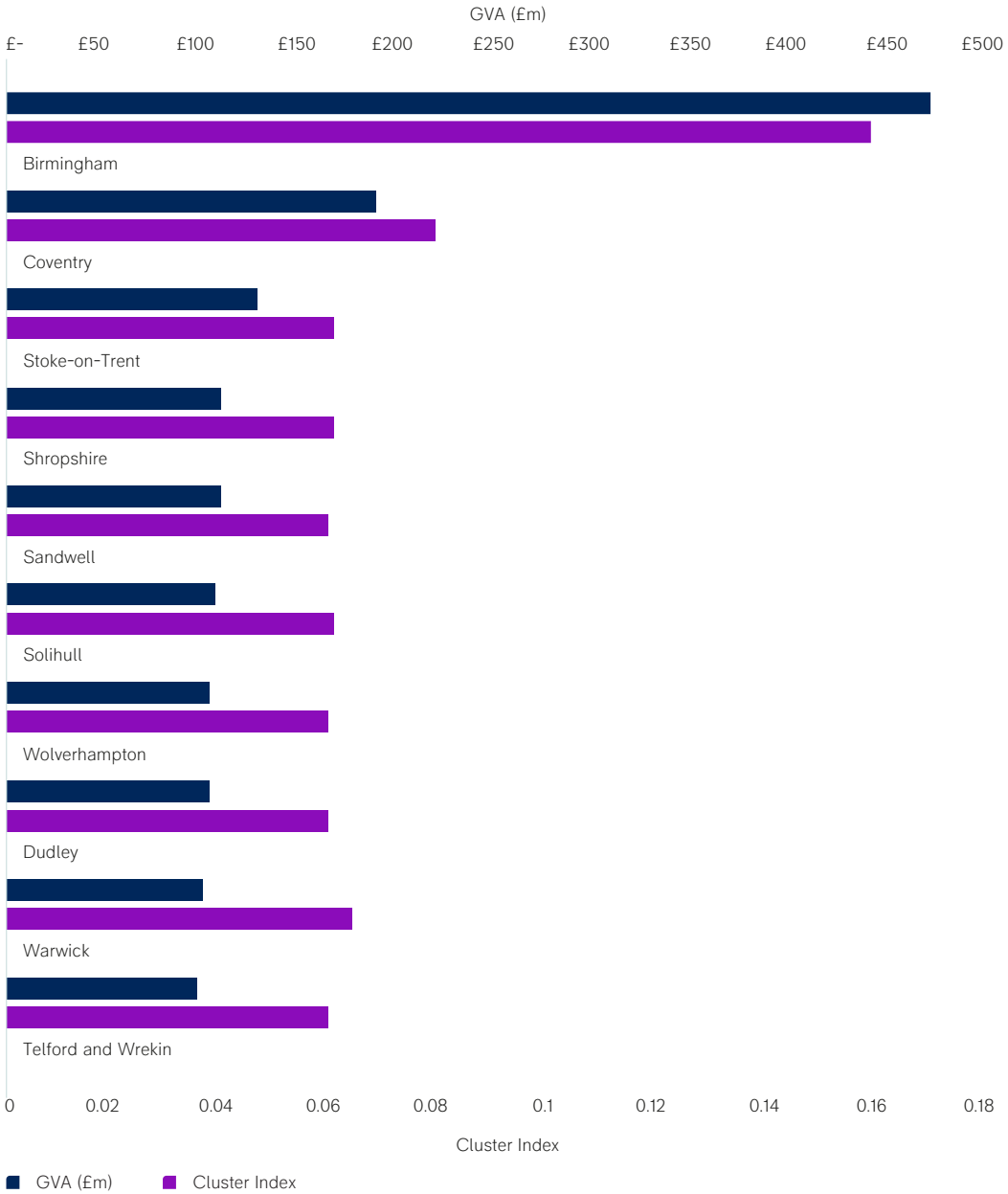
There are a series of large anchor businesses in the region, who are driving activity in the net zero sector. These include npower, National Gas and Uniper. Other institutions such as the University of Birmingham, who have renowned engineering centres and courses, play their part in this sector's strength. It has also been recognised that the West Midlands faces a unique challenge in decarbonising, owing to the large number of energy-intensive businesses operating in the metal processing and manufacturing sectors. As these are largely small and medium enterprises, local government has made addressing this issue a priority and alongside the UKRI, plan to create a number of smaller Net Zero industrial hubs.

Notably, the employee location quotient and GVA per FTE is somewhat lower in Birmingham for the Net Zero cluster, at 0.18 and £90,974, than in other authorities within the region. For example, these are substantially lower than in Warwick where there is an employee location quotient of 1.49 and a GVA per FTE of £168,450. Elsewhere in the West Midlands, there are similarly high concentrations of the Net Zero sector such as Rugby (7.89), North Warwickshire (2.22) and Stratford-on-Avon (1.87). There are also other areas where there is a notably high GVA per FTE such as Coventry (£157,200) and Nuneaton and Bedworth (£153,180).

Life Sciences

The Life Sciences cluster is similarly important within the West Midlands. Activity in this sector is primarily concentrated within the Birmingham local authority, generating £467 million of economic output and supporting approximately 7,700 FTE jobs in the area. This is followed by Coventry (£185 million of economic output and 2,500 people employed) and two authorities that lay outside the West Midlands Combined Authority, Stoke-on-Trent (£125 million output and approximately 1,900 people employed) and Shropshire (£108 million output and 1,750 people employed). Firms such as DWK Life Sciences occupy a 3,000sqm manufacturing plant in Stoke-on-Trent that specializes in glass manipulation and has tubular glass converting and post processing capabilities.

Figure 11 Most significant Life Sciences Clusters in the West Midlands, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

West Midlands Combined Authority – Life Sciences

The West Midlands Combined Authority's Local Industrial Strategy reported that life science businesses in the West Midlands were thriving, having generated £4 billion turnover. The cluster is buoyed by areas such as the Birmingham Life Sciences Park, a government-designated Life Science Opportunity Zone. It is set to deliver up to 3,000 jobs and generate more than £180 million GVA in its first 10 years. The Park will be critical for delivering key themes of the UK's Life Sciences Industrial Strategy that aims to make the UK a 'science superpower'.

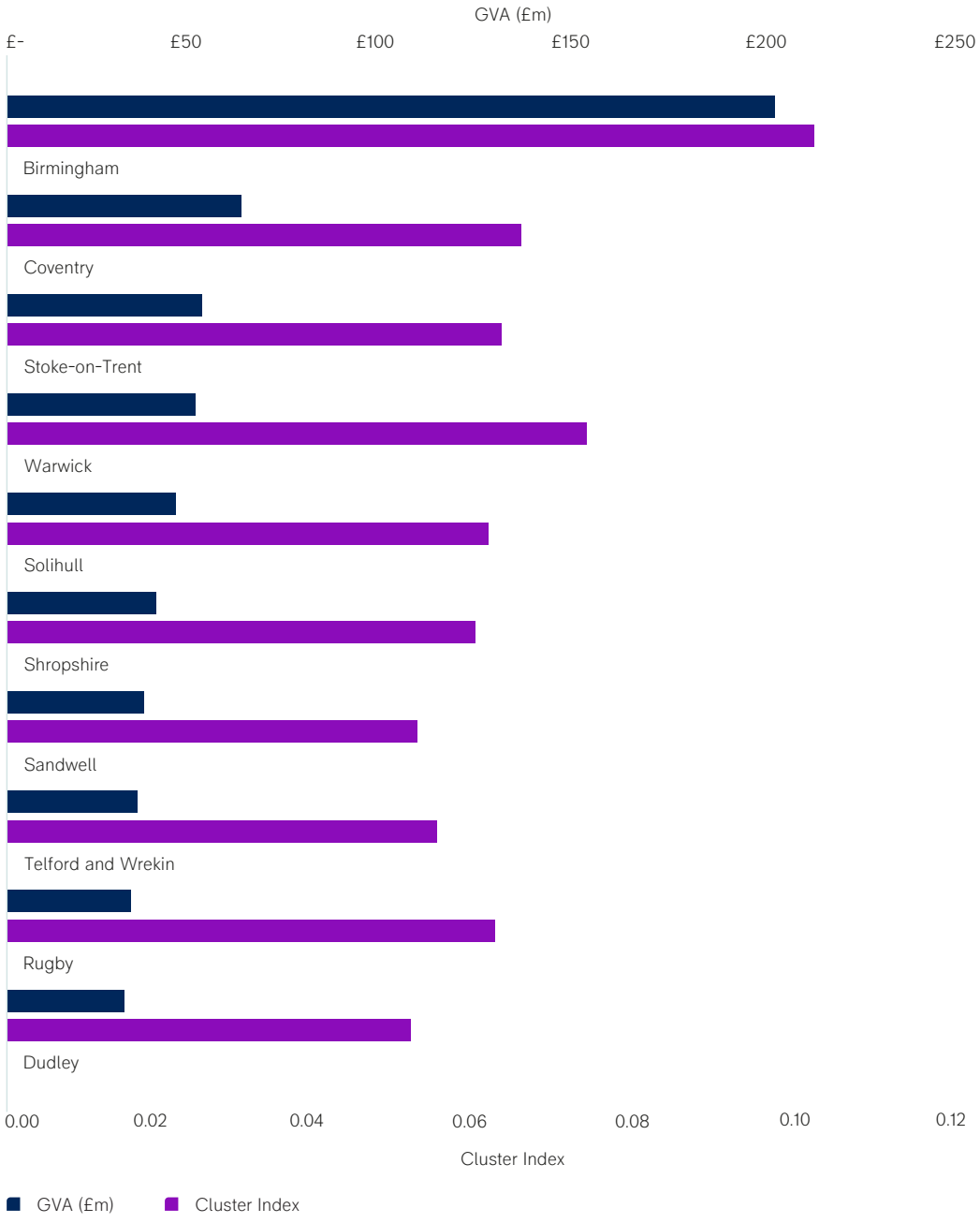
The Birmingham Health Innovation Campus (BHIC) is set to open in 2024. BHIC will provide state-of-the-art lab, office and incubation space and also provide co-location opportunities for health and life science businesses. It will be home to the Precision Health Technologies Accelerator, a business innovation facility, that will bring together the region's leading players in genomics and diagnostics for healthcare technologies and evaluation, clinical trials and healthcare data and informatics. BHIC is anticipated to act as a catalyst for the development of a new high-growth life sciences cluster for the city, building on existing assets such as the Binding Site which was acquired by Thermo Fisher Scientific in 2022.

Metric	Value	Percentile
Output (GVA)	£1,162 million	93rd
Business Population	1,633	94th
Employment (FTE jobs)	18,402	95th
Labour Productivity (GVA/FTE)	£64,983	27th
Business Location Quotient	0.8	19th
Employment Location Quotient	0.8	48th

Telecommunications

Telecommunications is another sector that is locally important in the West Midlands, contributing £834 million in GVA, equivalent to 0.6% of the regional total. While most of this is generated within Birmingham, which accounts for £200 million, there are also considerable portions of activity in Coventry (£61 million) and Stoke-on-Trent (£51 million). The next largest source of economic activity, by GVA, for this cluster that is located within the West Midlands combined authority boundary is Solihull which accounts for £45 million. Warwick is also home to the second largest number of businesses in its Telecommunications cluster at 116, second only to Birmingham that hosts 322. This produces a Business Location Quotient of 2.62, the largest in the region. Solihull, with 1.79, and Stratford-on-Avon, with 1.57, have the next largest business LQs.

Figure 12 Most significant Telecommunications Clusters in the West Midlands, by Local Authority (by GVA and Cluster Index)

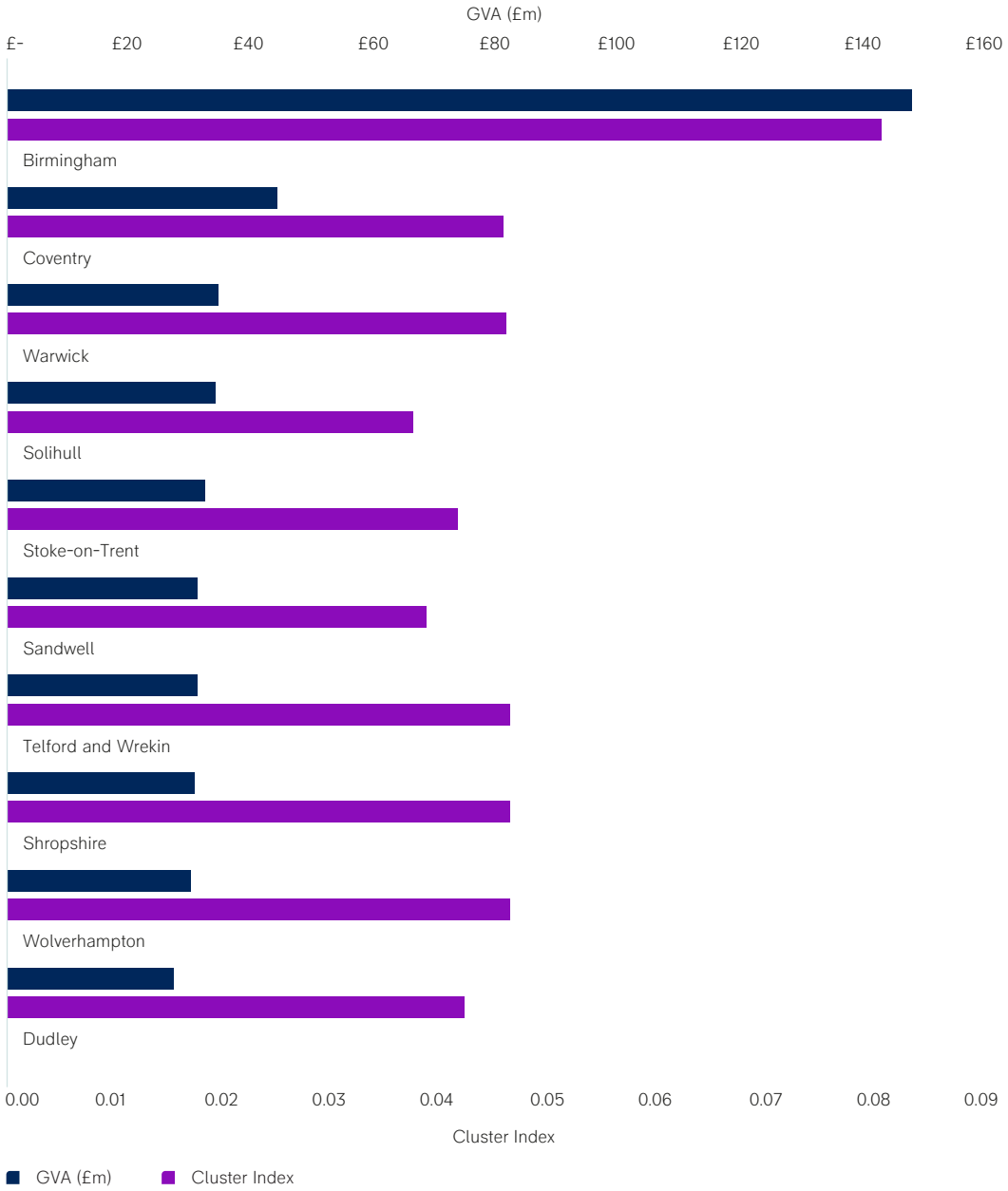


Source: CBI Economics modelling (2023)

Media and Publishing

The West Midlands region's Media and Publishing sector is also primarily driven by activity in Birmingham, which accounts for £148 million in GVA and employs 2,140 people. This delivers a complimentary employee location quotient of 1.23 showing that there is an above average representation of media and publishing activities in the area. Furthermore, while areas such as Telford and Wrekin and Wolverhampton have fewer jobs in this sector (449 and 428, respectively), their employee location quotients are considerably larger, at 2.8 and 3.3 respectively. This indicates that the sector is a locally important source of employment within these authorities. Therefore, although this cluster may not be one of the largest in the West Midlands, it does demonstrate how smaller clusters can have an outsized importance outside of the larger urban areas within a region.

Figure 13 Most significant Media and Publishing Clusters in the West Midlands, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

West Midlands Combined Authority – Media And Publishing

The West Midlands' media and publishing sector has developed significantly in recent years. The expansion of the BBC's local presence and a new regional HQ, in addition to the launch of the new Digbeth Loc studio and £18 million Creative Content Hub, also in Digbeth, have nurtured growth in the cluster.

The industry-led body Create Central have been a driving force behind collaboration within the cluster. They delivered an initial 3-year cluster growth plan in 2019 (with support from the BFI) followed by a longer-term 10-year plan in 2022. Work with the BFI continued in 2023, when they developed a skills strategy and accelerator. This identified skills gaps in the creative sector and implemented an industry-first model tailored to fill them. The body also works with regional partners like the BBC, ITV, Netflix, YouTube and Paramount.

Birmingham City University are one of the primary local providers of talent to the cluster through the Birmingham Centre for Media and Cultural Studies. They contribute significantly to the local research environment, hosting an interdisciplinary maker space called STEAMHouse, aimed at promoting collaboration between the arts sector and STEM disciplines.

Metric	Value	Percentile
Output (GVA)	£336.2 million	86th
Business Population	492	89th
Employment (FTE jobs)	5,017	88th
Labour Productivity (GVA/FTE)	£76,501	36nd
Business Location Quotient	0.80	18th
Employment Location Quotient	1.03	60th

Yorkshire and The Humber

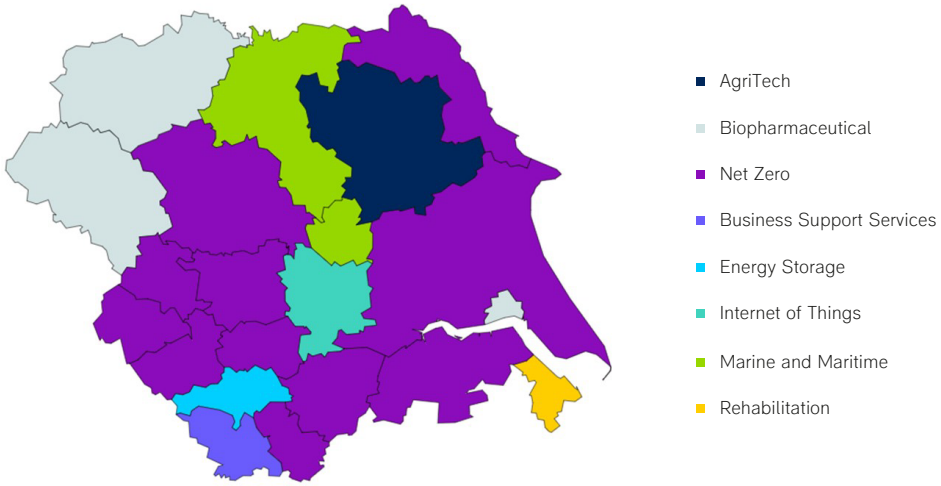
Economic Overview		
Working Age Population (% of UK)		3,416,400 (8.1%)
GVA (% of UK)		£151,325 million (6.7%)
Key Sectors	**GVA, (% of Region)**	**FTE (%, of Region)**
Net Zero	£5,529 million (4.4%)	61,288 (2.9%)
Energy Generation	£2,131 million (1.7%)	24,241 (1.1%)
Marine and Maritime	£1,248 million (1.0%)	15,928 (0.74%)

The Yorkshire and the Humber region has a diverse and dynamic economy with strengths in multiple traditional sectors such as manufacturing and agriculture, but also financial services and the digital industry. The region is home to 8.1% of the UK's working age population and it contributed 6.4% of the UK's economic activity in terms of GVA in 2022.

The region is home to the world-leading Humber Industrial Cluster, which focuses on sectors such as iron and steel, refining, chemical, energy, cement and glass – all of which are highly energy intensive, making the Humber Industrial Cluster is the largest CO2 emitting industrial cluster in the UK. This industrial cluster is now looking to decarbonise, creating huge demand for net zero businesses, who can provide the technology and processes these energy intensive businesses need to decarbonisation. It is not just the industrial cluster driving demand for net zero businesses in the region – the large concentration of energy intensive businesses across the region has led to a thriving net zero sector in the region. The net zero sector is estimated to contribute £5.5 billion in GVA, or 4.4% of the region's economy and support the employment of 61,288 full-time equivalents (FTE) jobs, making it the largest cluster in the region.

The Yorkshire and The Humber region boasts the highest renewable energy capacity in England. Approximately 48% of the region's renewable energy is derived from wind sources, while 41% comes from bioenergy. This not only helps to explain the region's commitment to achieving net zero emissions, but also sheds light on why net zero hotspots at the local authority level exhibit notable strength in energy generation. Regionally, energy generation contributes £2.1 billion in GVA, supporting 1.7% of the region's total economic activity and supporting 24,000 FTE jobs, 1.1% of total employment.

Figure 14 Yorkshire and the Humber top clusters within a local authority by cluster index



Source: CBI Economics (2024)

Net Zero

The net zero sector is notably strong within the region, owing to its specialisation in renewable energy generation, as well as the host of energy intensive businesses who are looking to decarbonise their products and processes, thus creating demand for clean technologies. Consequently, businesses within the net zero sector and their supply chain contribute significantly to the regional economy. Specifically, they support approximately 61,300 FTE jobs and contribute an estimated £5.5 billion in GVA to the regional economy.

Figure 15 Most significant Net Zero Clusters in Yorkshire and the Humber, by Local Authority (by GVA and Cluster Index)

Source: CBI Economics modelling (2023)

The efforts going into the decarbonisation of the Humber Industrial Cluster have led to multiple high value investments into the area, with a prime example being the Viking CCS project. Viking CCS is a carbon capture and storage investment programme that will capture CO2 emissions from the Humber Industrial Cluster and store them in caverns off the east coast of the region. The project is predicted to more than halve the amount of emissions from the Humber Industrial Cluster, and capture 30 million tonnes of CO2 annually bu 2030.[7] It is estimated that the project will support up to £7 billion in investment between 2025 and 2035, with capital expenditures expected to support the creation of 10,000 new jobs.[8]

The Humber Industrial Cluster is looking to further build on these initial investments. It is expected that to completely decarbonise the industrial cluster, a total investment of up to £20 billion may be need with £6 billion in capital expenditure.[9] To help raise this investment, the Humber Industrial Cluster has detailed a plan on how they can leverage the local freeports and investment zones in Hull, Goole and the wider Humber area to attract investment. It has also detailed three segments of investment opportunities, including CCS and energy storage, new technologies and network expansion in power generation.

Energy generation has been a long-standing strength of the region, especially renewable energy generation. The Yorkshire and Humber region is the largest producer of renewable energy in England, with strengths in wind and biofuel. Our modelling shows that energy generation in the region contributes £2.1 billion in GVA, equal to 1.6% of the region's total activity, and supports 24,200 FTE jobs.

The Selby local authority has a net zero employee location quotient of 4.05 and a net zero business location quotient of 2.05, making it one of the most concentrated areas of net zero activity in the country. This is largely driven by the presence of Drax Power Station, their site housing the UK's largest renewable power station which uses biomass to produce energy.

The region is also home to world's current largest offshore wind farm, Hornsea is located off the east coast and is operated by Ørsted. It has also been announced that development of Hornsea will continue with a third phase having received a Development Consents Order in December 2020. Ørsted is also exploring the possibility of a fourth phase.[10] These future phases will require further inward investment into the region and create demand for net zero business and jobs. As well as offshore wind, the region benefits from strong onshore wind capabilities, especially in the West Yorkshire Combined Authority (WYCA). The WYCA has an exceptionally strong net zero cluster that we explore in further detail below.

West Yorkshire Combined Authority – Net Zero

The WYCA has committed to being a net zero economy by 2038 and, as part of this, they have been delivering a climate and environment investment plan, worth up to £4.4 billion, over the past three years, which involves investments from the combined authority, central government, local authorities, private investors and businesses.[11]

The composition of the net zero cluster in West Yorkshire mirrors the local economy with a number of renewable energy businesses, particularly in onshore wind and solar. For example, multinational company, Engie, is based in the area and its fuel mix is 29.3 percentage points more renewable than the UK's average.[12] Another example is Yorkshire Gas and Power, which has a fuel mix that is 100% from renewable sources.[13]

The combined authority is looking to build on these strengths in onshore wind and solar power. Preliminary plans have been announced for a new wind farm in Calderdale, which is estimated to bring an annual GVA boost of £26.2 million to the local economy once the site is operational, and two solar farms are currently undergoing a suitability assessment on sites located in Bradford and Keighley.[14, 15]

The cluster also benefits from a strong local academic environment, with notable focus on Net Zero. The University of Leeds hosts a School of Earth and Environment, Institute for Climate and Atmospheric Science and a Sustainability Research Institute. These are vital contributors of research and talent to the cluster, along with other universities.

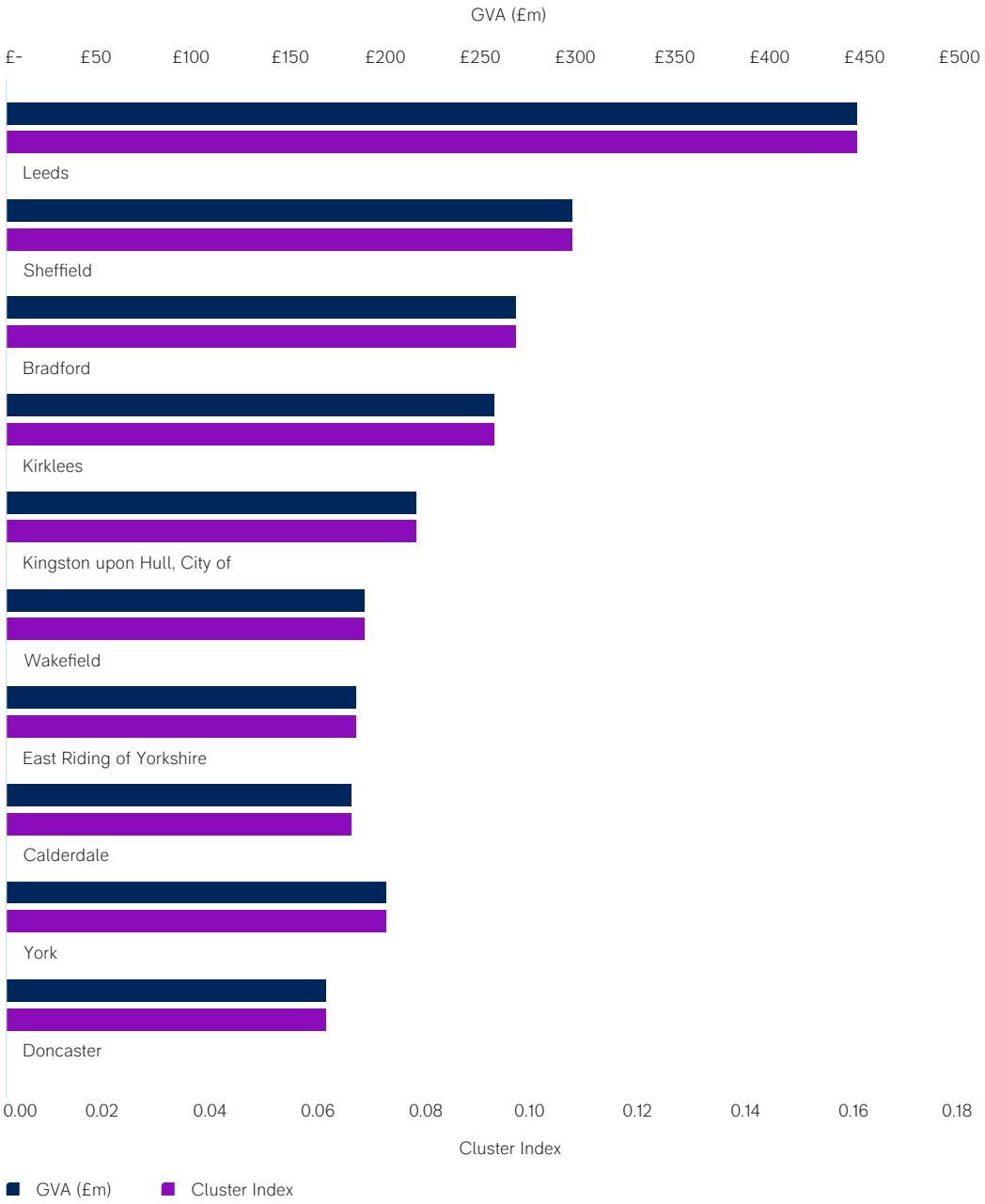
Metric	Value	Percentile
Output (GVA)	£2,416 million	99th
Business Population	1,358	98th
Employment (FTE jobs)	27,815	99th
Labour Productivity (GVA/FTE)	£118,868	92nd
Business Location Quotient	0.9	24th
Employment Location Quotient	1.0	57th

Net zero is not the only strength of the Yorkshire and The Humber region. The industrial history of the region has also made it a strong hub of Advanced Manufacturing, and the Life Sciences sector in particular has found a strong footing in the region.

Life Sciences

The strength of Life Sciences in the region is reflected in **Figure 16** below, Leeds, Sheffield and Bradford are the local authorities where life science is the most prevalent. In total, life science businesses and their supply chains in the region support an estimated 35,300 FTE jobs, contributing £2.3 billion in GVA to the regional economy. Even though the life sciences sector is the second largest cluster in the region in terms of GVA contributions, it only ranks sixth when looking at the average cluster index of LADs within the region, this is being driven by slightly lower levels of productivity within the region's life science sector.

Figure 16 Most significant Life Sciences clusters in Yorkshire and the Humber, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

From 2006 to 2022, Yorkshire and the Humber attracted a total of 447 National Institute of Health and Care Research (NIHR) NIHR research projects with a value of £278 million. Over this time period, the region has received benefitted from the largest amount of NIHR National Institute of Health and Care Research (NIHR) funding per head outside of London, receiving £163 per person.[16]

In November 2023, the government announced that West Yorkshire will be home to a life sciences investment zone. It is thought that the investment zone could unlock £220 million in investment and create 2,500 new jobs. The decision aligns with our findings, as the sector was a top performer in multiple local authorities in the West Yorkshire Combined Authority (WYCA) region. We discuss this in further detail below.

West Yorkshire Combined Authority – Life Sciences

The WYCA Life Science cluster excels particularly in HealthTech and exhibits a real strength in its business composition. The WYCA is home to established businesses producing medical technology such as Doc Adobe, Patient Case Management Information System (PCMIS), DePuy Synthes, Surgical Innovations, Xiros and Brandon Medical and a host of start-ups and high growth businesses.

This life science sector is also being supported by the strength of local universities. For example, the University of Leeds runs a Medical Technologies Innovation and Knowledge Centre that brings business together with experts in the field to accelerate the commercial development of new medical technology. The university also houses multiple National Institute for Health and Care Research (NIHR) facilities including a biomedical research centre, a surgical technologies research centre and a clinical research facility.

The WYCA is also the home of seven significant government health headquarters, including NHS England, NHS Digital, Public Health England, NHS Leadership Academy, Health Education England, NIHR Clinical Research Network and NHSX. As such, it is the decision-making centre for national policy and around £130 billion in funding for NHS commissioning, leadership and digital advancement (via major initiatives such as NHS Spine), as well as education and training of England's health workforce and the protection of public health and wellbeing.[17]

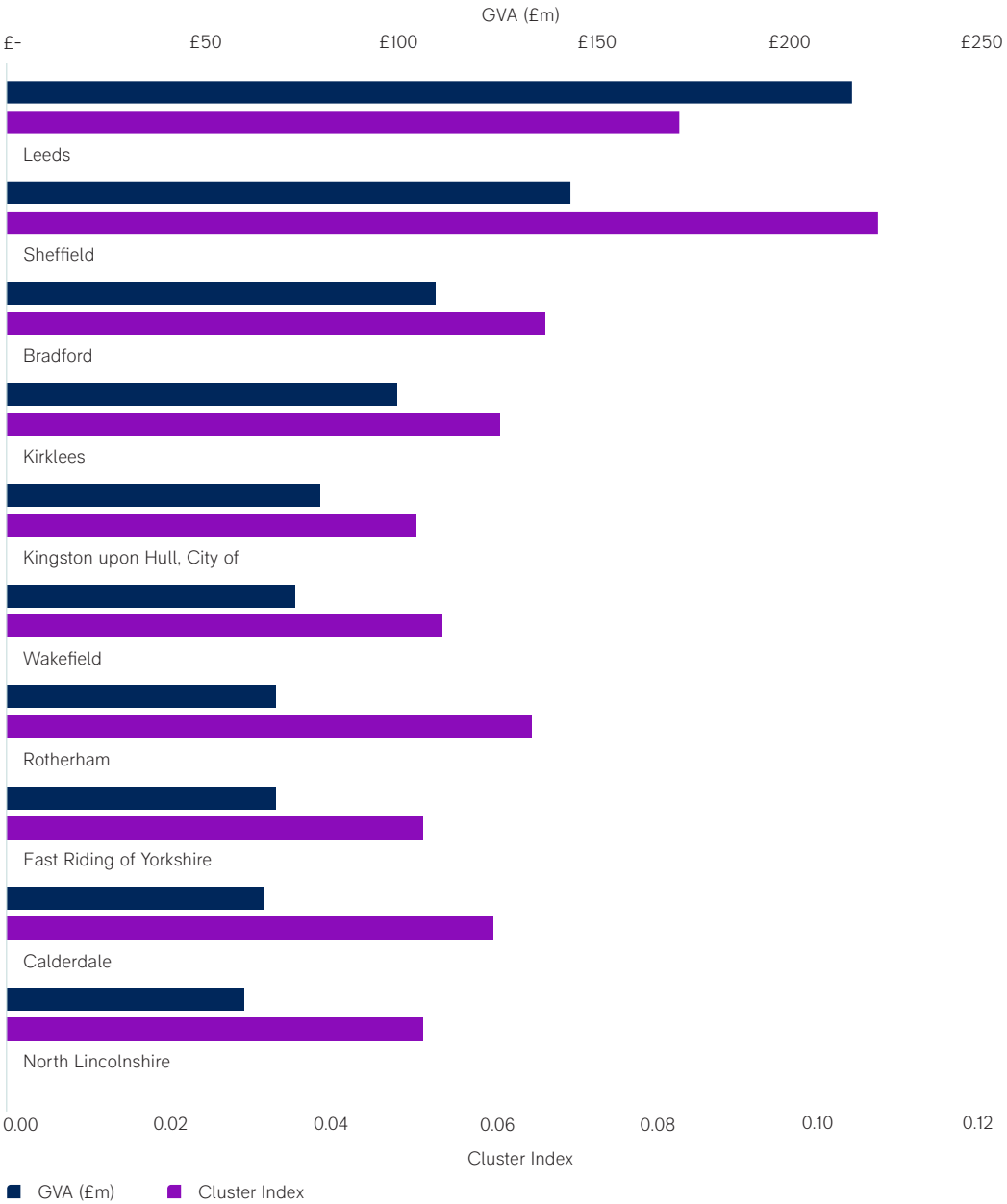
Metric	Value	Percentile
Output (GVA)	£1,118 million	98th
Business Population	1,723	99th
Employment (FTE jobs)	16,239	98th
Labour Productivity (GVA/FTE)	£73,576	29th
Business Location Quotient	1.2	46th
Employment Location Quotient	0.7	43rd

Outside of West Yorkshire and Leeds, the sector also performed well in Sheffield, supporting an estimated 3,815 FTE jobs and generating £243 million in GVA in the area. Sheffield also had a high concentration of life sciences businesses and employees, with a business location quotient of 1.4 and an employee location quotient of 1.3. The area hosts companies such as PreventX, the largest provider of remote sexual health testing in the UK, and Tecomet, a medical technology manufacturer.

Advanced Manufacturing

Yorkshire and The Humber has a thriving manufacturing sector. Since 2013, the manufacturing workforce has grown 19% between 2013 and 2022, well over the UK average of 2.5%.[18] This is, in part, due to the growing advanced manufacturing sector. Advanced manufacturing currently supports 18,700 FTE jobs in the region and contributes £1.3 billion in GVA to the regional economy. Even though it does not appear as the top sector in any of the region's local authorities, it is having a growing impact, especially within the South Yorkshire Combined Authority.

Figure 17 Most significant Advanced Manufacturing clusters in Yorkshire and the Humber, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

South Yorkshire Combined Authority – Advanced Manufacturing

In July 2023, South Yorkshire was designated as the first UK Investment Zone, with this investment zone targeted towards the Advanced Manufacturing sector and with areas such as Sheffield, Rotherham, Doncaster and Barnsley all standing to benefit. It is expected that a further 8,000 new jobs and an extra £1.2 billion funding by 2030 will be added to the local economy thanks to this Investment Zone.

Another reason for the advanced manufacturing cluster in this area is the active role universities are playing to generate skills and talent related to this sector, in particular the University of Sheffield and Sheffield Hallam University. The University of Sheffield's Advanced Manufacturing Research Centre (AMRC) has recently announced that it was had received £29.5 million in funding for its new Composites at Speed and Scale (COMPASS) facility. The COMPASS facility is building on a strategic partnership with Boeing and focusses on the development of new manufacturing techniques for lightweight aircraft components.

Metric	Value	Percentile
Output (GVA)	£312 million	85th
Business Population	706	88th
Employment (FTE jobs)	5,058	93th
Labour Productivity (GVA/FTE)	£63,372	12th
Business Location Quotient	3.3	94th
Employment Location Quotient	3.0	93rd

Sheffield stands out as a particular hotspot of advanced manufacturing activity. The local authority has a employee location quotient of 3.8 and a business location quotient of 3.9, meaning the concentration of advanced manufacturing employees and businesses is extremely high in the local authority. Thanks to this high concentration of activity, advanced manufacturing in Sheffield generates £115 million in GVA, 1.1% of the local GVA, and supports 2,276 FTE jobs.

North East

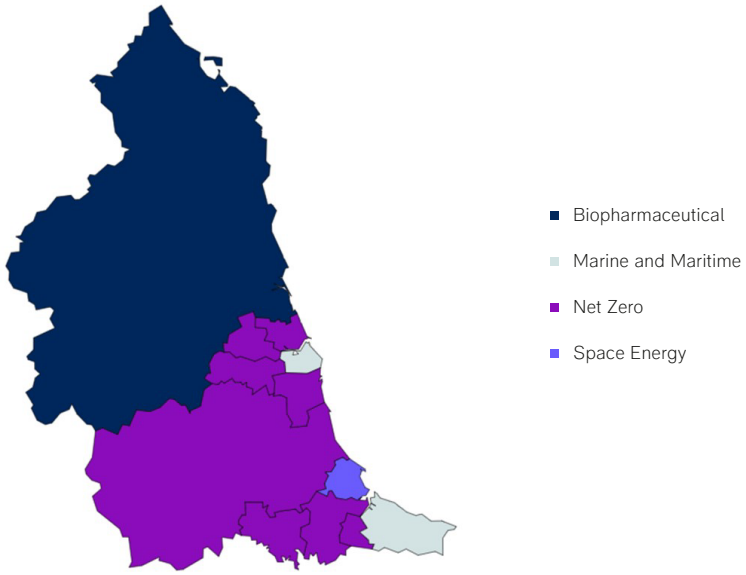
Economic Overview		
Working Age Population (% of UK)		1,635,400 (3.9%)
GVA (% of UK)		£63,107 million (2.8%)
Key Sectors	**GVA, (% of Region)**	**FTE (%, of Region)**
Net Zero	£2,509 million (4.7%)	31,061 (3.3%)
Energy Generation	£965 million (1.8%)	12,516 (1.3%)
CleanTech	£573 million (1.2%)	7,977 (0.8%)

The North East performs poorly on many macroeconomic indicators. The region's economic inactivity rate is currently 24.2%, the highest in England and only lower than Northern Ireland nationally. The region also has the lowest employment rate in the UK at 72.8%, over 3 percentage points lower than the average for England. The productivity of these jobs is also low with the average regional employee only generating £32.4 in GVA per hour worked, well below the average for England of £38.9. This translates into the region having the lowest average gross disposable income in the UK at £17,663. Despite this, the region looks set to play a key role the country's net zero transition, especially when it comes to hydrogen and low carbon technologies.

The net zero sector in the North East is impressive, contributing £2.5 billion in GVA, which is equivalent to 4.7% of the regional economy, and supporting nearly 31,000 FTE jobs. In terms of GVA, it is more than twice as large as the next cluster in the region, life sciences, which generates £1.1 billion in GVA. When looking at the other clusters that are prominent within the region, we can see why the North East has such a strong net zero sector. Energy generation is a significant sector in the region and supports £965 million in GVA and CleanTech as well, supporting £573 million in GVA. These sectors have a lot of overlap with aspects of the net zero sector, namely renewable energy and low carbon technologies, so the fact these sectors also have a strong presence in the region speaks to the composition of the net zero sector. There are also clusters that will be crucial to the supply chain of businesses within these sectors that appear in the top clusters in this region, namely advanced manufacturing and electronic manufacturing.

The map below outlines the top cluster in each of the local authorities within the North East. We see a strong showing from the net zero sector again, appearing as the top cluster in eight of the local authorities and predominantly around Tyneside and Teesside, where CleanTech is also a top cluster. It comes as no surprise that these two areas have strong net zero sectors. Tyneside is home to a significant amount of renewable energy infrastructure, including the Tyne Clean Energy Park and the Teeside industrial cluster is partaking in a decarbonisation initiative called Net Zero Teeside.

Figure 18 North East top clusters in each North East local authority by cluster index

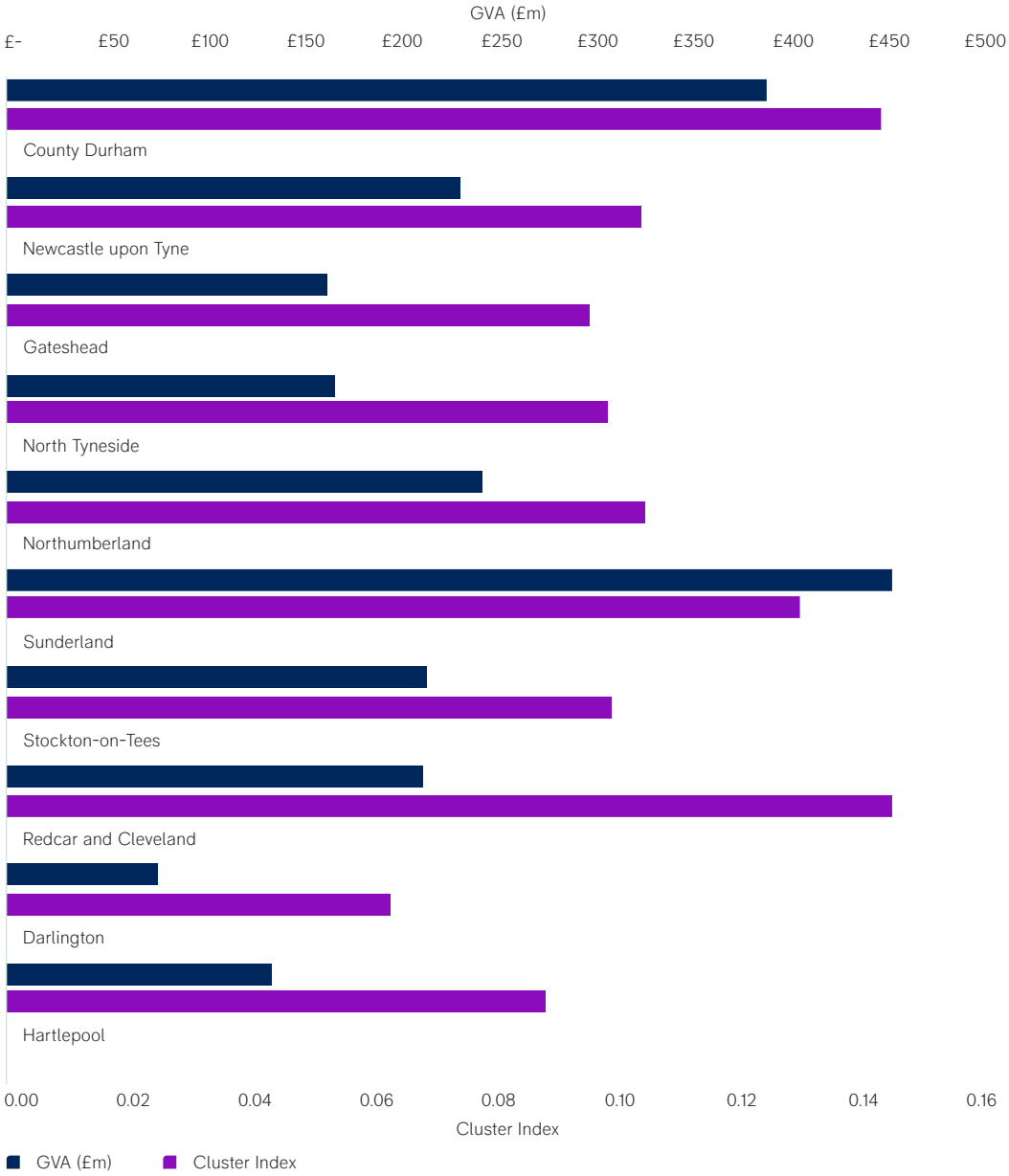


Source: CBI Economics modelling (2023)

Net Zero

The significant contribution of the net zero sector to the North East economy is upheld by industrial clusters now looking to decarbonise, along with renewable energy generation throughout the region. The net zero sector contributes 4.7% of the region's GVA, one of the largest proportions in the UK, and supports 31,000 FTE jobs. One of the largest clusters of net zero activity in the region is within the North East combined authority, were a combination of renewable energy, electric vehicles and low carbon technologies are supporting a strong net zero economy.

Figure 19 Most significant Net Zero clusters in the North East, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

North East Combined Authority – Net Zero

The North East combined authority covers seven local authority districts including County Durham, Gateshead, Newcastle, North Tyneside, Northumberland, South Tyneside and Sunderland. This combined authority net zero cluster is one of the strongest in the UK, being found in the 98th percentile in terms of GVA, the 97th in terms of employment and 96th in terms of productivity.

The Sunderland area is home to a thriving net zero economy, driven by the decarbonisation of key industries in the region. Notably, Nissan, one of the largest automobile manufacturers in the world, has chosen to expand its operations by unveiling ambitious plans for a £1 billion electric vehicle hub in the area. The plans encompass the establishment of a new gigafactory, built by Envision. This will become the UK's first 'at scale' facility of its kind, dedicated to supplying electric power packs to Nissan.

On top of significant private investment, the North East combined authority has seen significant public investment. In December 2023, a major project to decarbonise North Tyneside General Hospital, with the aim of reducing carbon emissions by 75%, was completed. The £22 million project was funded by the Government's Public Sector Decarbonisation Scheme which supports the delivery of the NHS ambitious goal to become net zero by 2040 and to reduce direct emissions from public sector buildings by at least 50% by 2032.

The Viking Energy Network in South Tyneside represents another case of public investment. The site is located in Jarrow and harnesses low-grade heat from the River Tyne and exports it to council-owned buildings, including Jarrow Focus leisure centre, three residential tower blocks, Jarrow Business Centre and Jarrow Town Hall. The project received £4.3 million in funding from the European Regional Fund, and the Department of Energy Security and Net Zero are now looking to expand the project.

Metric	Value	Percentile
Output (GVA)	£1,083 million	98th
Business Population	947	96th
Employment (FTE jobs)	11,367	97th
Labour Productivity (GVA/FTE)	£131,833	96th
Business Location Quotient	1.9	79th
Employment Location Quotient	1.3	73rd

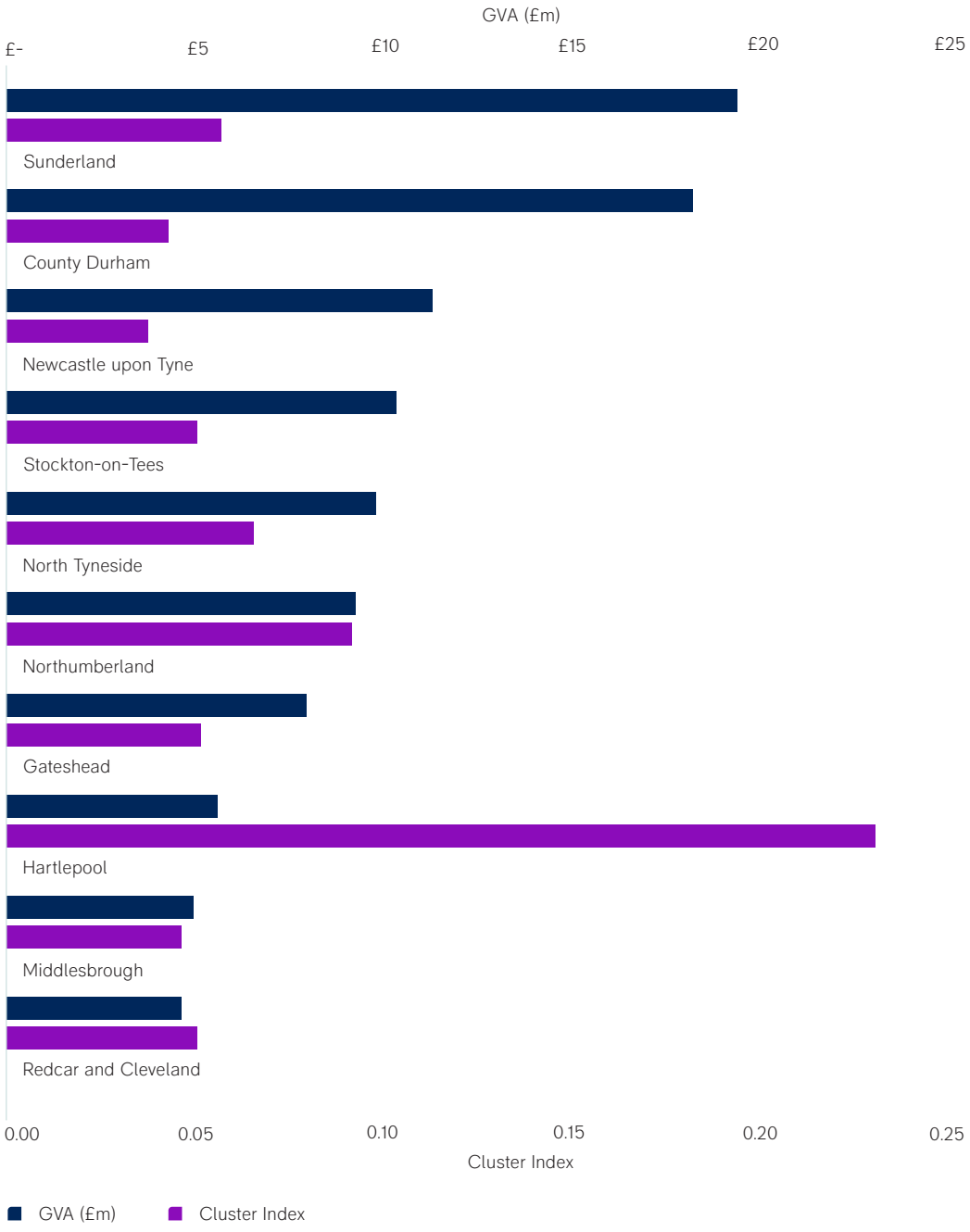
It is not only businesses in this combined authority that are spearheading the net zero economy. Similar to the Humber Zero initiative, Net Zero Teeside (NZT) comprises a consortium of energy intensive businesses committed to decarbonising their operations through the deployment of carbon capture and storage (CCS). The flagship project of NZT, known as NZT Power, aims to be the first commercial-scale gas-fired power station equipped with carbon capture technology. The project could create more than 3,000 jobs in the construction phase and then 1,000 jobs to maintain site operations. Furthermore, the CO2 transportation and storage infrastructure developed by NZT can be shared by businesses affiliated with the initiative.

In terms of local authorities, the Redcar and Cleveland area stands out for its substantial concentration of net zero businesses, boasting a business location quotient of 2.36. These businesses also exhibit remarkable productivity, producing £262,615 in GVA per FTE job. Given the North East region is historically the least productive in the country, this figure is even more noteworthy.

Space Energy

Space energy represents an emerging industry where businesses engage in research, development, and commercialisation of technologies and systems capable of generating, transmitting and storing energy in space. Despite its relatively modest economic contribution – £109 million in GVA and a mere 1,300 FTE jobs – the North East region is, in fact, a hotspot for space energy activity.

Figure 20 Most significant Space Energy clusters in the North East, by Local Authority (by GVA and Cluster Index)



Source: CBI Economics modelling (2023)

The broader space industry thrives in this region. Notably, Northumbria University has unveiled plans for a new North East Space Skills and Technology Centre, a £50 million facility supported by public investment from the UK Space Agency and industry giant Lockheed Martin.[19] The facility will equip the region with the skills needed to foster and grow the space energy industry and the wider space sector.

Furthermore, the region recently announced the formal launch of the 'Space North East' cluster. This collaborative effort involves Business Durham, Durham University, Newcastle University, Northumbria University, Teesside University, Sunderland University, and Invest North East England. Their collective goal is to enhance and build upon the existing North East Space Strategy, with an ambitious aim to create 10,000 new jobs within the space sector over the coming years.

Tees Valley – Space Energy

The Tees Valley Combined Authority is part of a wider Space Energy cluster in the North East, which is home to firms such as TT Electronics, based in Bedlington, that produce microelectronics and resistors for the aerospace market. Entek, based in Newcastle, are also involved in vehicle energy storage activities. Likewise, Raytheon Northern Space and Security Ltd, based in Alnwick, are a specialist in Space Situational Awareness, Space Domain Awareness and Space Surveillance & Tracking.

Small firms like StratoBooster, spun out of Teesside University, are part of the Tees Valley's Space Energy cluster. StratoBooster is in the process of developing a high-altitude balloon launched rocket system which will help organisations and institutions launch their small satellites into space.

Our results further highlight the strength of space energy in this combined authority. The Data City suggests that the business location quotient in the area iss 26.8 , indicating that the area has the greatest concentration of space energy companies in the UK. The employment location quotient is also strong at 1.4, and the productivity of space energy companies in the area is also strong generating £113,239 in GVA per FTE job. The size of the industry is still small producing only £30 millionmillion in GVA, but this is more a symptom of the industry's infancy.

Metric	Value	Percentile
Output (GVA)	£30 million	22nd
Business Population	62	37th
Employment (FTE jobs)	337	16th
Labour Productivity (GVA/FTE)	£113,239	89th
Business Location Quotient	26.8	99th
Employment Location Quotient	1.4	76th

Whilst local authorities such as Hartlepool, within the Tees Valley Combined Authority have the strongest cluster indexes within the North East space energy sector, it is Sunderland and County Durham that lead in terms of sheer magnitude. Specifically, space energy activities in County Durham contribute just over £18 million to the area's GVA, accounting for 17% of the region's overall space energy GVA. Meanwhile, space energy activities in Sunderland generates just over £19 million, constituting 18% of the region's space energy GVA.

Cluster Deep Dives

The following chapter will present three cluster deep dives that have been prepared as part of the overall exercise. The three presented are:

- West Midlands – Advanced Manufacturing
- Liverpool City Region – Life Sciences
- West Yorkshire – Net Zero

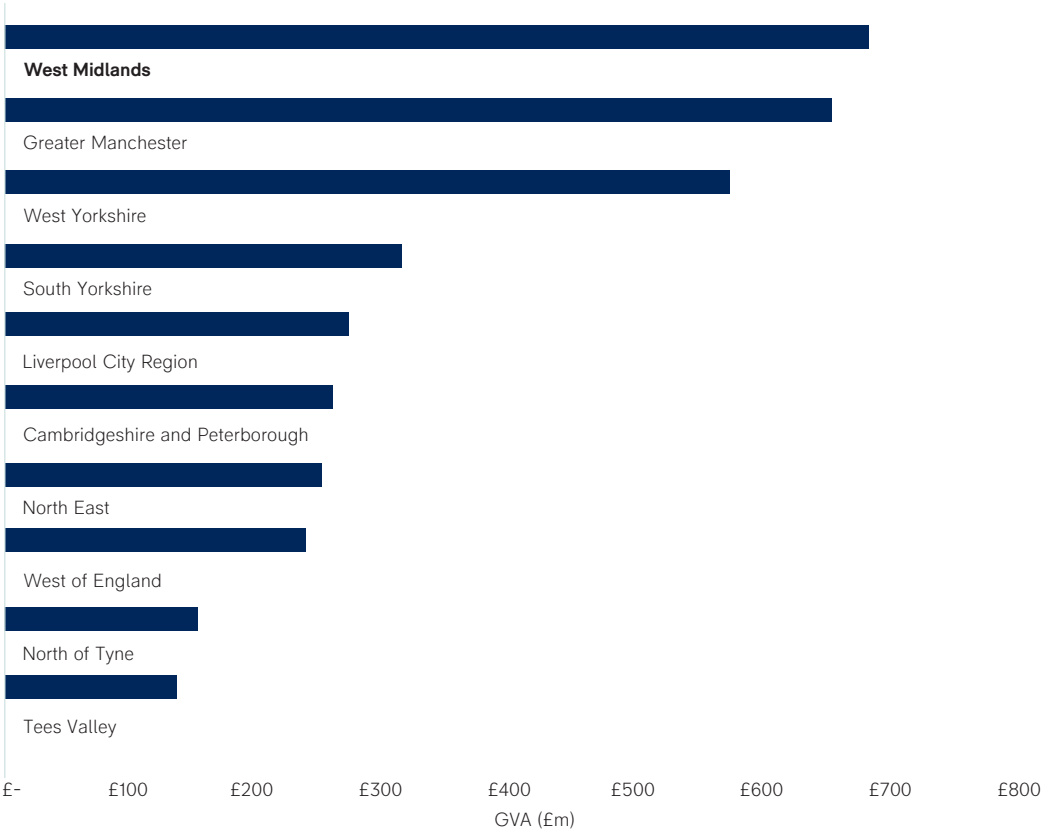
Further deep dives have been prepared for Lloyds Banking Group and sit separately to this document.

West Midlands - Advanced Manufacturing

Cluster Overview

The West Midlands has leveraged its deep historical involvement in manufacturing and its strong industrial base to a successful advanced manufacturing clusters, that specialises in machinery, electronics and transport.[20] The West Midlands also hosts large automotive, aerospace and rail clusters.

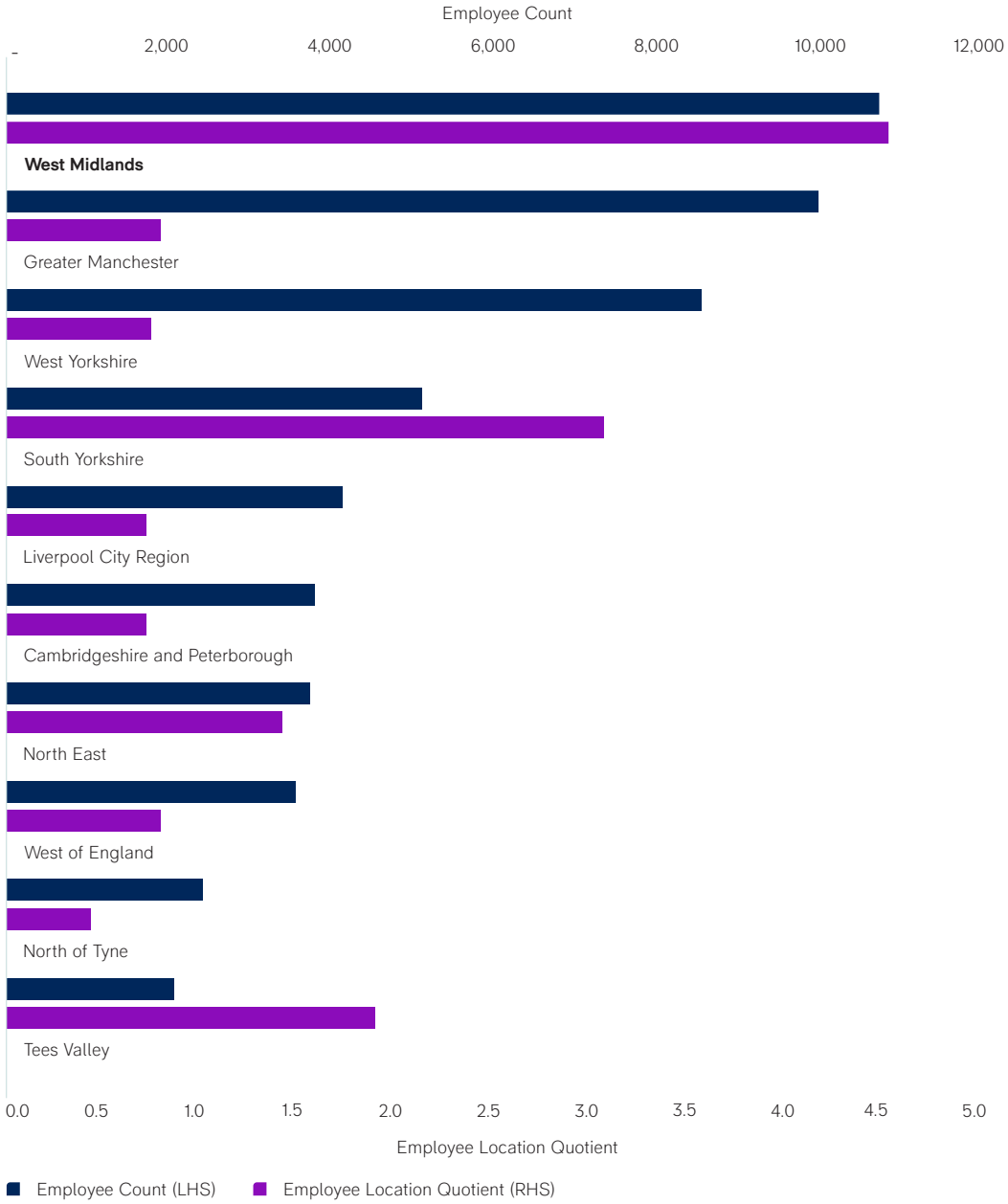
Figure 21 Economic contribution of UK combined authority advanced manufacturing clusters (Gross Value Added, £m)



Source: CBI Economics modelling (2023)

Contributing £679 million in GVA to the UK economy, the West Midlands advanced manufacturing cluster is the strongest of all combined authorities nationwide. Birmingham hosts the UK's fourth-biggest advanced manufacturing sector at local authority level. The region benefits from a large manufacturing workforces and is instrumental in driving UK exports outside of London and the South East, constituting 8% of UK goods exports in 2022.[21] The 1,600-strong business population in this cluster employs over 10,000 people, placing it in the 96th percentile of all combined authority clusters, with a concentration of employment in this sector that is 4.5 times the UK average.

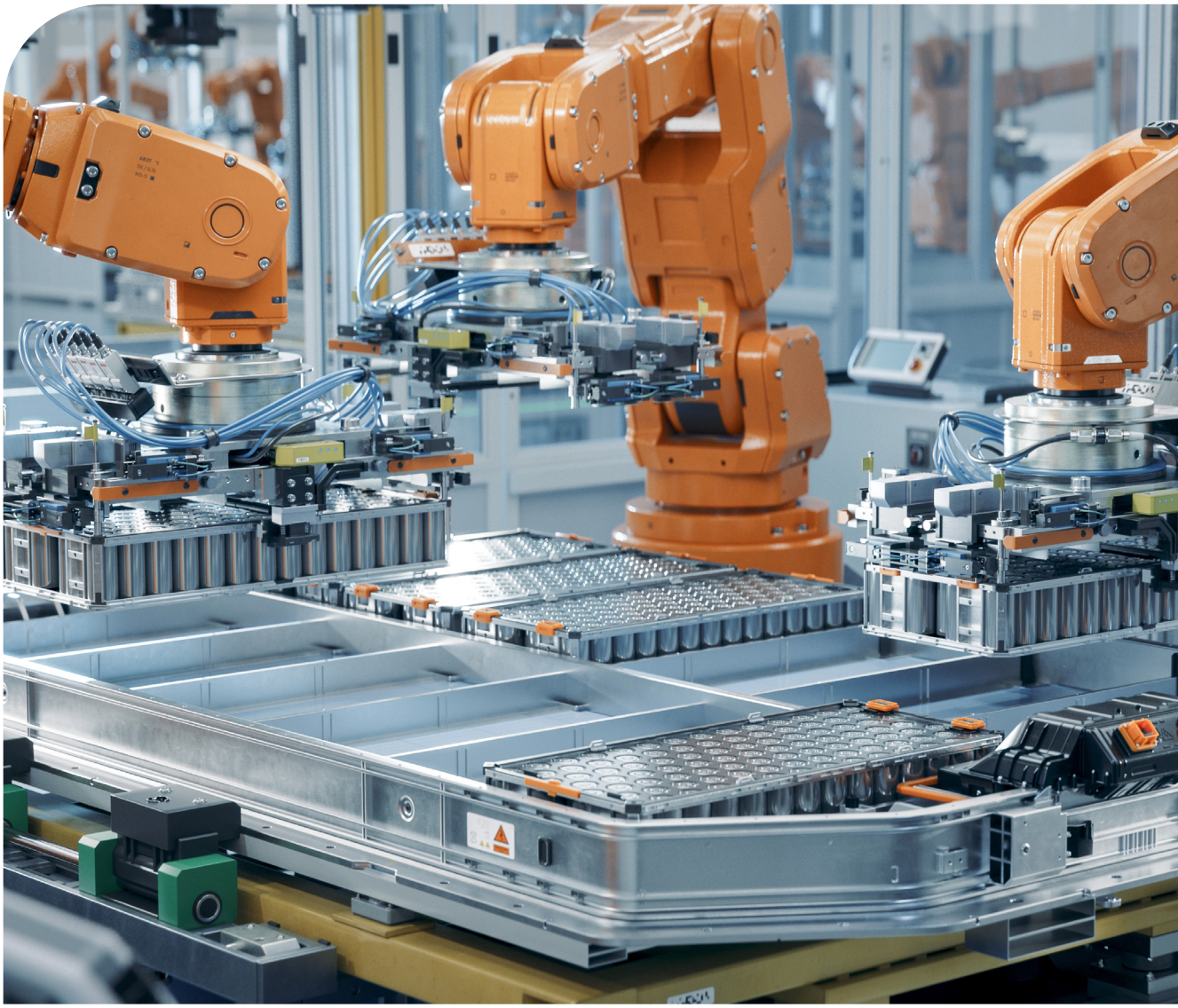
Figure 22 Employee counts and location quotients of UK combined authority advanced manufacturing clusters



Source: CBI Economics modelling (2023); The Data City (2023)

The West Midlands in the UK is a significant hub for automotive and aerospace manufacturing, producing a third of British cars and a quarter of engines. It exported £24.9bn in machinery and transport goods in 2023.[22] A network of Original Equipment Manufacturers (OEMs) contributes to cluster growth, with the region hosting 30% of UK-based aerospace manufacturers and benefits from over half of domestic inward investment in the sector.[23]

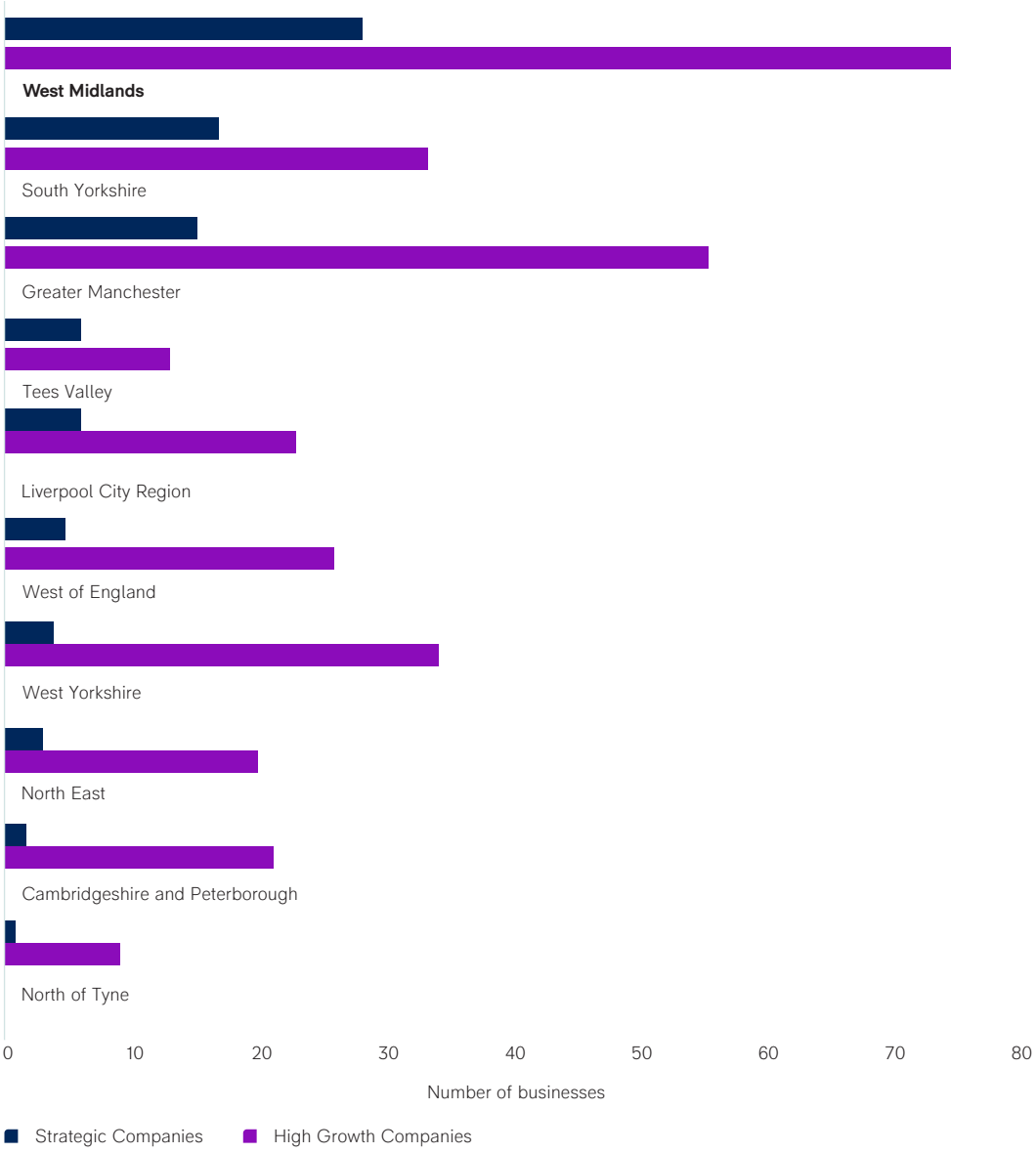
The cluster is bolstered by infrastructure, government support, and facilities like the UK Battery Industrialisation Centre (UKBIC). UKBIC is a battery manufacturing scale-up and research facility that hosts over 100 engineers and technicians, convening research, academia and industry to scale up and commercialise battery innovation.[24] Future investment plans include a potential battery gigafactory in Coventry. This is supported by the West Midlands investment zone, known as the Coventry-Warwick corridor, which will benefit from tax incentives, funding for infrastructure improvements, and measures to encourage industry-university collaboration. These interventions could drive £2 billion of new investment and create 10,000 jobs over the next decade.[25]



Business Environment

West Midlands' advanced manufacturing sector is driven by a thriving local business population. Hosting 28 firms with over £100 million turnover and 74 that have experienced annual growth rates of more than 20%, the cluster ranks in the 94th and 96th percentiles for numbers of strategic and high-growth companies respectively, out of all combined authority clusters. The cluster benefits from a substantial, developed network of successful businesses, particularly in the automotive and aerospace sectors, along with original equipment manufacturers that support strong local supply chains.

Figure 23 Numbers of strategic and high-growth companies in UK combined authority advanced manufacturing clusters



Source: The Data City (2023)

The Tata Group arguably represent one of the biggest industrial cluster stakeholders, making significant contributions through their Steel, Motors and Technologies subsidiaries. Their European headquarters are located in Coventry. Further, Tata have a distribution centre in Dudley and operate the UK's largest steel processing and distribution centre in Wednesfield, The Steelpark, the only one to be supported by an on-site mill. The state-of-the-art facilities can process more than 200,000 tonnes of sheet and coil steel annually, supporting and providing for the wider manufacturing supply chain.[26]

Company Case Study: Jaguar Land Rover

Jaguar Land Rover (JLR), headquartered in the West Midlands, has significantly contributed to the local and wider economy since its acquisition by Tata Group in 2008.[27] Their UK operations, centred around a 300-acre Solihull site, have seen substantial investment, leading to increased production and workforce.[28] Recent developments include a £500 million factory for the Jaguar XE and a £350 million engine plant at the i54 business park in Wolverhampton.[29] Post-pandemic, JLR has shifted focus towards electric vehicles, pledging £15 billion over five years into industrial footprint, vehicle programmes, and AI technologies, with plans to make the JLR Merseyside plant an 'all-electric manufacturing facility'.[30] This commitment has been followed by recruitment drives for technicians and engineers to work on electric vehicle lines.[31, 32]

The cluster's thriving aerospace subsector and activity is driven by two substantial manufacturers – Rolls-Royce and GKN Aerospace. Rolls-Royce Aerospace are the second-biggest producer globally of engines for civil and corporate aircraft. Their control systems are headquartered in the West Midlands and the wider Midlands area hosts their large technology, manufacture and assembly plant.[33] They are also an established supplier for the marine sector, civil nuclear power and high-speed diesel engines, announcing a £80 million zero emissions flights project in 2021 that could create up to 300 jobs in the Midlands. The sector is also supported by OEMs like GKN Aerospace, a components manufacturer that serve over 90% of the world's aircraft and engine manufacturers, with operations across 12 countries. GKN are headquartered in Birmingham and employ 3,600 throughout the UK.

Innovation and Research

The cluster is a leading innovator, with 49 companies receiving the highest 'Innovation Score' from The Data City. It also received the most grant funding, at £209 million, from Innovate UK (IUK) compared to other clusters. University-based centres, such as the University of Warwick's Automative Composites Research Centre, the Manufacturing Technology Centre at the University of Birmingham and the Polymer Research Group at Aston University. A further centre at the University of Warwick, the WMG (formerly Warwick Manufacturing Group) is part of the High Value Manufacturing (HVM) Catapult. Catapult centres were set up by IUK to promote research and development (R&D) and help manufacturers gain a competitive edge on the global stage. WMG have worked with JLR to define the performance, safety and degradation properties of lithium-ion batteries a crucial step for developing the company's first electric vehicle, the Jaguar I-PACE.[34]

The Manufacturing Technology Centre (MTC), another HVM Catapult centre, facilitates collaboration between industry, academia and other institutions. It has supported businesses to imrpove efficiency, aiding the delivery of over 3,000 projects and training over 1,100 apprentices in the process.[35] The West Midlands is also home to innovative firms such as Calligo, Keysight Technologies and Hitachi Energy. Over the past four years, IUK has invested over £935 million into the region's innovation infrastructure, making it a top recipient of IUK funding.[36]

Talent, Skills and Job Quality

There are 10,695 people employed in the advanced manufacturing cluster in the West Midlands. However, the WMCA have also indicated that there is a skills gap in the region.[37] The region's strong talent pool, supported by eight higher education institutions producing approximately 57,000 students each year, contributes to its growth. In 2019, 32,570 studied engineering and technology courses.[38] Regional further education colleges are receiving £2.4 million to strengthen technology adoption and training for small businesses.[39]

However, there are also challenges. Despite 1.4 million people being degree qualified or higher, this is only 29% of the population, which is lower than the national average of 34%.[40] Graduate retention and attraction rates are lower than the national average, particularly for STEM subjects.[41, 42] There are fewer people in higher-skilled jobs compared to other combined authorities.[43]

Future Outlook – Risks And Opportunities

Strengths

- West Midlands hosts the biggest advanced manufacturing cluster of all UK combined authorities by GVA contribution, benefitting from very strong local infrastructure through facilities like the UK Battery Industrialisation Centre.
- A thriving population of strategic, high-growth businesses exist in the cluster particularly in the automotive and aerospace sub-sectors, with JLR serving as an anchor institution.

Weaknesses

- The cluster business population is concentrated very heavily in the automotive and aerospace sub-sectors, and could potentially lack valuable diversification in the event of any external/ sector shocks.
- The region has lower levels of degree-qualified people, rates of graduate retention and graduate attraction and fewer people in high-skilled jobs than the national average.

Opportunities

- Future plans to develop a battery gigafactory next to the UKBIC in Coventry could potentially attract £1.2 billion of investment and significant new jobs to the cluster, should construction go ahead.[44]

Threats

- The skills gap in the manufacturing sector may persist in the West Midlands, compounded by low graduate retention rates and a smaller employment pool following the UK leaving the EU.

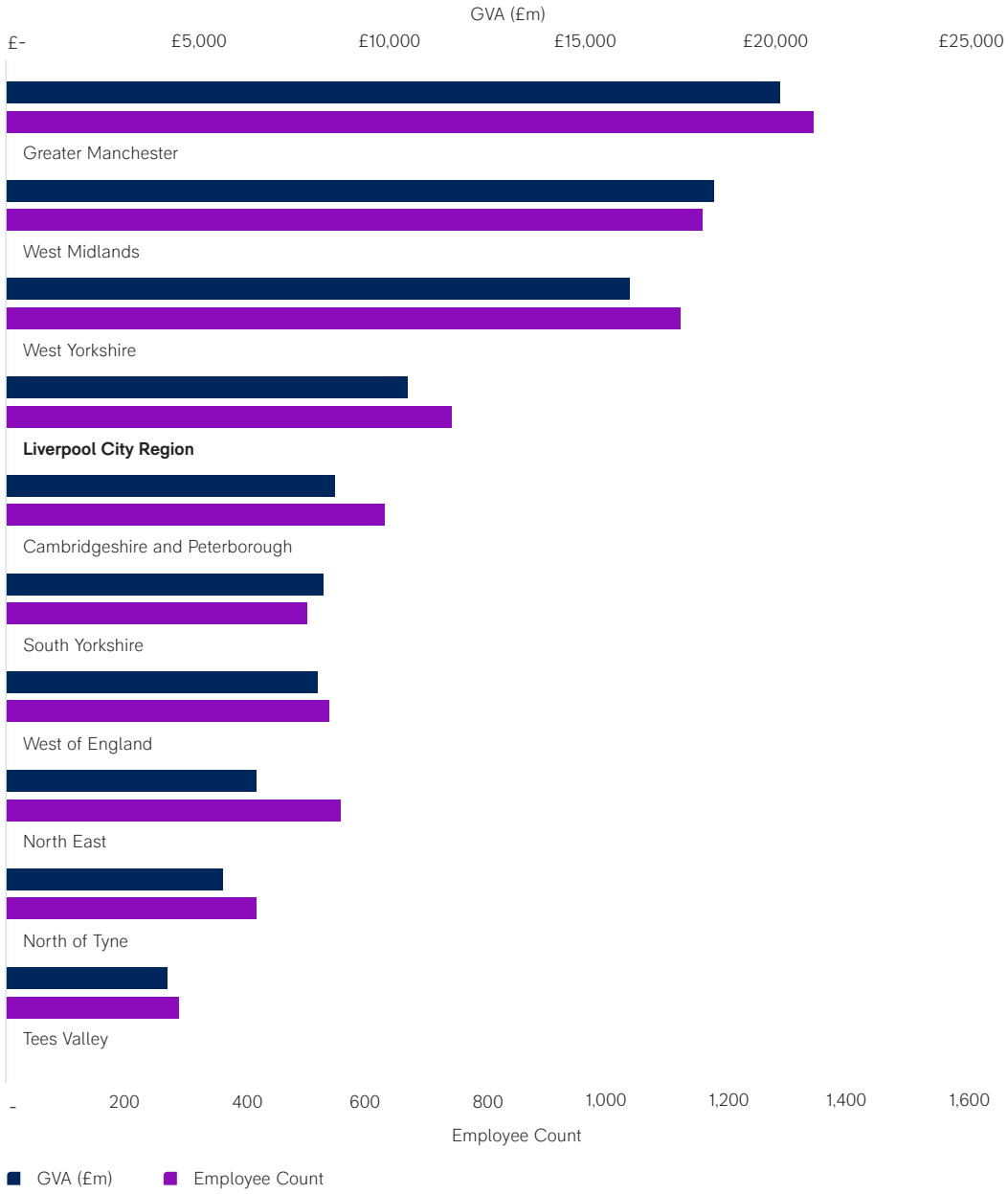
Liverpool City Region – Life Sciences

Cluster Overview

The Liverpool City Region (LCR) has a rich history in life sciences, housing the Liverpool School of Tropical Medicine and one of Europe's largest pharmaceutical clusters, comprised of businesses such as AstraZeneca and CSL Seqirus.[45] It was also the site for the national pilot of community open-access testing for Covid-19. The Liverpool City Region Combined Authority aims to invest 5% of regional GVA on R&D by 2030, with a £2 billion R&D pipeline and £725 million underway.[46]

In 2023, the UK Government launched a Life Sciences Investment Zone in LCR, potentially unlocking £320 million of private investment. This included a £10 million investment from US pharmaceutical manufacturer TriRx, enhancing its drug production capabilities. The Investment Zone could potentially create 4,000 jobs across various sites.[47]

Figure 24 Numbers of strategic and high-growth companies in UK combined authority life sciences clusters



Source: The Data City (2023)

LCR has the fourth largest life sciences cluster by GVA and employee count among Combined Authorities. LCR sees the life sciences cluster in Greater Manchester as complementary to their own, and also identify life sciences expertise in Cheshire as part of a wider North West cluster. Cooperation is already beginning through the Infection Innovation Consortium (iiCON).[48]

LCR is designated as a High Potential Opportunity for Vaccines, a programme launched with the Department for International Trade to boost Liverpool's vaccine discovery, development, and manufacture capabilities. Liverpool also boasts the highest number of specialist hospitals outside London.[49]

Business Environment

The Liverpool City Region (LCR) life sciences cluster employs approximately 10,370 people across 1,030 businesses, ranking in the 95th and 96th percentile for these metrics. The cluster business location quotient is 1.4 and the employment location quotient is 1.0, indicating a reasonable degree of regional concentration.

Businesses in the health and life sciences sector tend to be larger than in other sectors. For instance, 5% of businesses employ between 50 and 250 people, compared to around 1% in other sectors. Nearly 27% of businesses employ between 10 and 49 people, a higher proportion than in the next largest sector for this business size, Advanced Manufacturing (20%).[50]

LCR is home to one of Europe's largest pharma clusters, including AstraZeneca, CSL Seqirus, TriRX, and Pharamaron. The Speke Pharma Cluster, chosen as the site for the world's largest penicillin manufacturing plant in the 1940s, houses the UK's largest vaccine manufacturing facility, CSL Seqirus, which produces over 50 million doses of seasonal flu vaccine annually.

AstraZeneca are a major player in this cluster, operating a biologics facility in Speke that employs close to 400 scientific, manufacturing, engineering and support personnel. As the second largest biologics site in the AstraZeneca network it focusses on vaccine research, development, production and distribution.[51] Over £75m of investment at the site since 2010 has supported increased production capacity, as the site manufactures approximately 20m vaccine doses annually, for both domestic and global export markets.[52] At the 2024 Spring Budget AstraZeneca announced plans to invest a further £450m into this site as part of a wider £650m UK investment plan.[53]

Company Case Study: INEOS Inovyn

Employing over 500 people, INEOS Inovyn's Runcorn site is of strategic national importance and focuses mainly on the production of chlorine, caustic soda and chlorinated derivatives. The chemicals produced at the site are sold into a wide variety of pharmaceuticals.

The Runcorn site is particularly well-integrated and hosts a number of other chemical manufacturers including Runcorn MCP Ltd (a joint venture between INOVYN and VYNOVA), Koura, VYNOVA, Industrial Chemicals and Packed Chlorine Limited.[54]

Other notable companies in the LCR Life Sciences cluster include FirstKind Ltd, a subsidiary of Sky Medical technology Ltd, which produces the geko device, a battery-powered device that prevents life-threatening blood clots and promotes wound healing.[55] Also in Liverpool, the global life science contract research organisation Pharmaron operates a state-of-the-art facility, acquired from AbbVie in 2021. The company has invested £151 million, supported by government grants, to expand their viral vector and DNA manufacturing facilities.[56]

Innovation And Research

The Liverpool City Region (LCR) is a significant hub for life sciences, with institutions such as the Royal Liverpool Hospital, the Liverpool School of Tropical Medicine, and the University of Liverpool's Faculty of Health and Life Sciences. The Liverpool School of Tropical Medicine, in collaboration with the Royal Liverpool and Broadgreen University Hospital Trust, established the Liverpool Life Sciences Accelerator in 2017 to support the commercialisation of health and life sciences research.[57]

The University of Liverpool's Faculty of Health and Life Sciences is another core component of the cluster's research capabilities. The University also co-directs the UKRI-supported National Biofilms Innovation Centre.[58]

Liverpool School of Tropical Medicine, alongside several partners, are part of iiCON, an organisation focused on accelerating the discovery and development of innovative treatments for infectious diseases. The combined R&D portfolio of iiCON's partners currently exceeds £2 billion.[59]

In May 2024, the Combined Authority announced the first tranche of projects set to be supported in the first phase of the Life Sciences Investment Zone, with £26.5 million of Innovation Zone funding being sought for seven projects that will cost nearly £83 million in total. Projects include the development of 90,000sqft of 'grow on' laboratory and office space at Sci-Tech Daresbury Violet Phase 2.[60] Across the cluster, over £500 million in Innovate UK Grant Funding has been received by various organisations.

Talent, Skills And Job Quality

The Liverpool City Region (LCR) Life Sciences cluster employs approximately 1,030 people, ranking 4th of 10 compared to other combined authority Life Sciences clusters. The region's universities, including the University of Liverpool, Liverpool John Moores University, Edge Hill University, and Liverpool Hope University, contribute significantly to the talent pool, with a focus on real-world application and collaboration with industry.[61]

LCR have prioritised skills development, with the Combined Authority's five-year Skills Strategy aiming to improve the skills system's responsiveness to global and local conditions. This includes a £1.5 million grant to Riverside College's STEM centre to provide new pathways into life sciences careers.[62]

The Embedded Skills Development Programme and the Knowledge Quarter (KQ) Liverpool Future Innovators Programme aim to provide practical work experience placements and raise career aspirations in life sciences. KQ Liverpool plans to invest £1.26 million over the next five years to scale up existing innovation, skills, and outreach programmes.[63, 64]

The UK Government's 2021 Life Sciences Vision acknowledges the sector's strength and aims to develop a highly skilled workforce, positioning the UK as a global hub for life sciences.[65] The Association of the British Pharmaceutical Industry's survey indicates decreasing skills shortages, particularly in biological and clinical sciences.[66]

LCR performs well in terms of job quality, with 61% of jobs at Level 3 & 4, and median weekly wages higher than other Northern England Combined Authorities. The LCR's Science & Innovation Audit Refresh reports recent increases in residents with NVQ4+ skills and a decrease in residents with no qualifications, although it notes a skills shortage in biotech remains.

Future Outlook – Risks and Opportunities

Strengths

- Liverpool City Region is home to one of Europe's largest pharma clusters, with multinationals including AstraZeneca, CSL Seqirus, TriRX and Pharamaron.

Weaknesses

- In 2022, it was reported that there is a skills shortage in Biotech.

Opportunities

- The UK Government has established a Life Science Investment Zone in the Liverpool City Region which is expected to attract up to £640 million of private investment and create over 8,000 new jobs over the next 10 years.

Threats

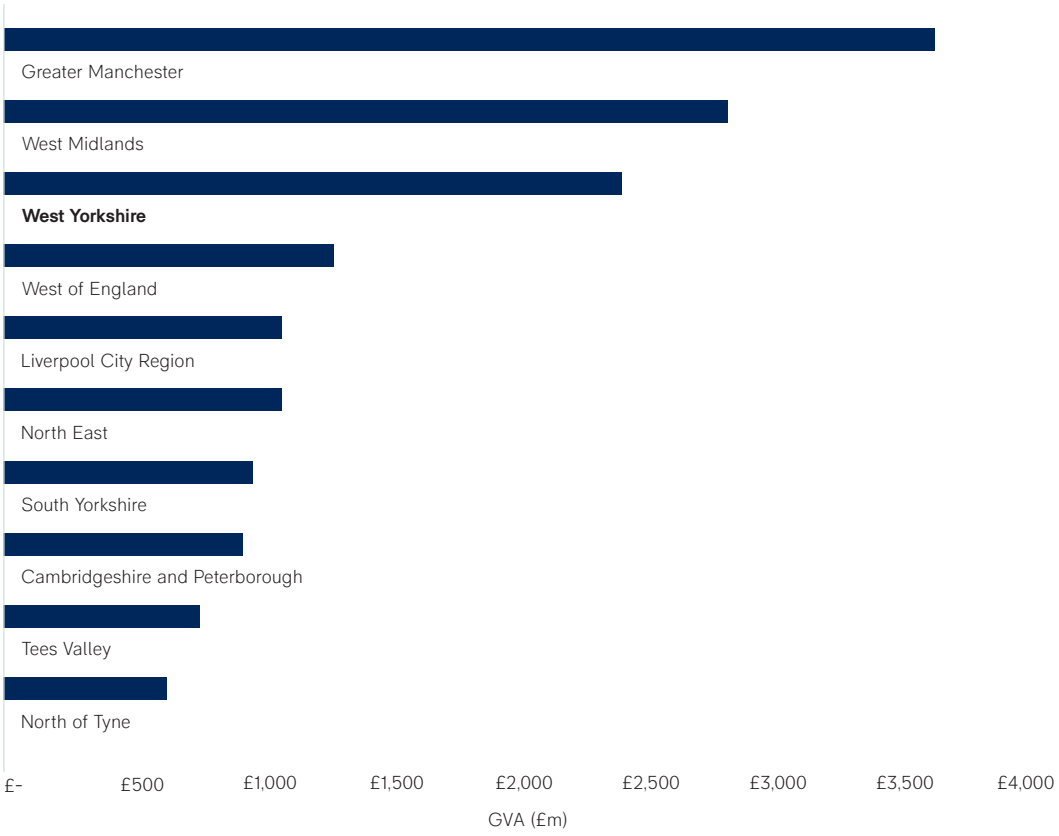
- Surveys suggest that skills shortages are present in the sector nationally, though there are some signs things are improving.

West Yorkshire – Net Zero

Cluster Overview

Leeds and the wider West Yorkshire region have a well-established energy sector that is transitioning to renewables, fostering a thriving net zero cluster. This cluster is supported by a large business population, including major energy providers like Drax, Engie, Northern Gas Networks, and Opus. The West Yorkshire combined authority is committed to becoming a net zero economy by 2038 and has been implementing a climate and environment investment plan worth up to £4.4 billion.[67]

Figure 25 Economic contribution of UK combined authority net zero clusters (Gross Value Added, £m)

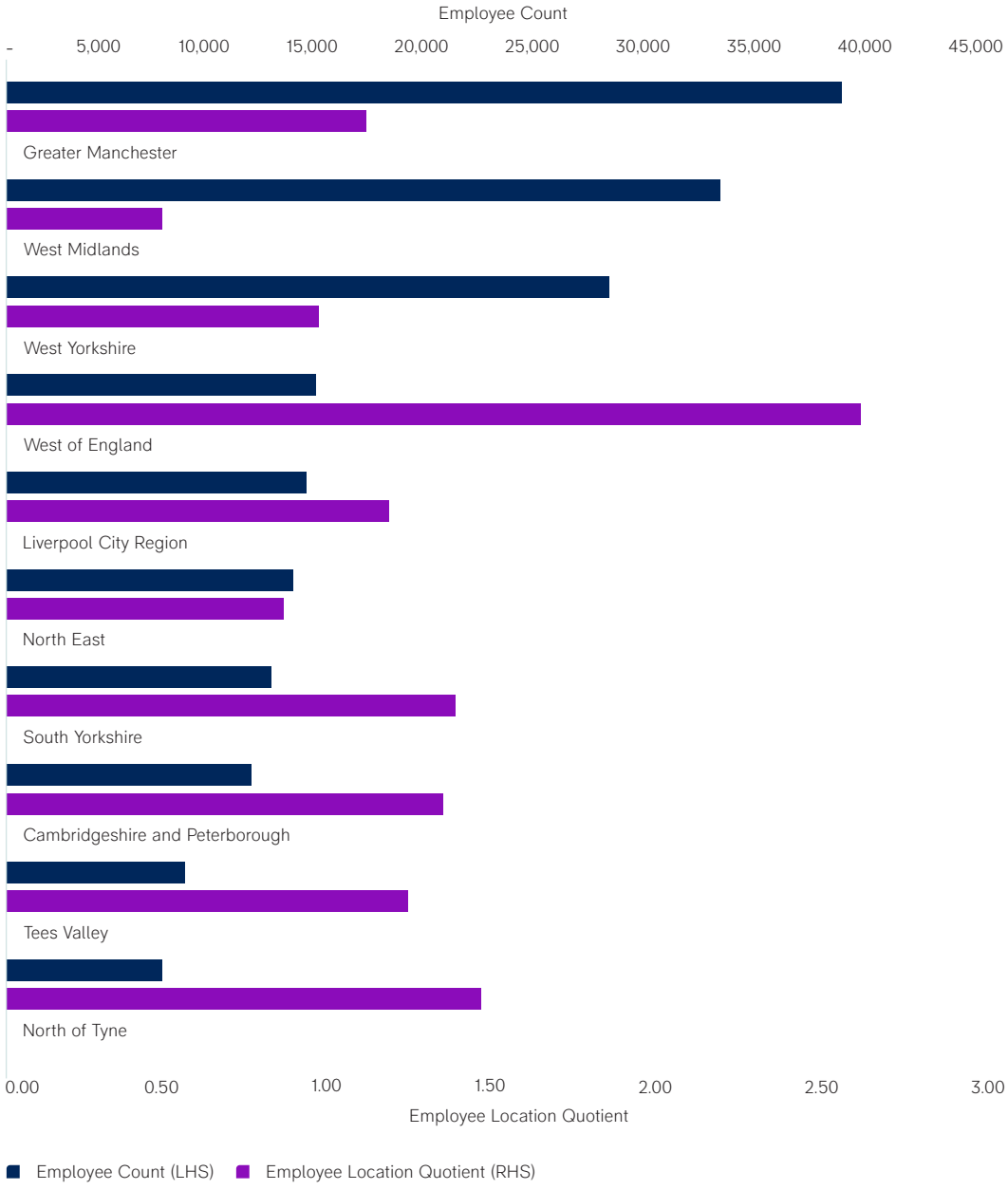


Source: CBI Economics modelling (2023)

The net zero cluster in West Yorkshire consists of 1,358 businesses, making it the third-largest combined authority cluster in terms of business population. These businesses contribute £2.4 billion in Gross Value Added (GVA) to the combined authority, which places the cluster in the 99th percentile of all combined authority clusters in terms of GVA contributions. However, with a business location quotient of 0.9, it is only in the 24th percentile for business concentration amongst all combined authority clusters.

The West Yorkshire net zero cluster supports approximately 27,800 full-time equivalent (FTE) jobs, placing it in the 99th percentile for employment. Jobs directly supported by net zero businesses in the West Yorkshire combined authority are highly productive, generating £119,000 in GVA per FTE job, which is 64% higher than the national average, placing it in the 92nd percentile when compared to other combined authorities and is 64% higher than the national average of £72,500 in GVA contributions per FTE job. Preliminary plans have been announced for a new wind farm in Calderdale and two solar farms in Bradford and Keighley. The West Yorkshire combined authority also benefits from the proximity of Humber Zero, which aims to decarbonise the UK's largest industrial cluster with industry led projects like Viking CCS.

Figure 26 Employee counts and location quotients of UK combined authority net zero clusters.

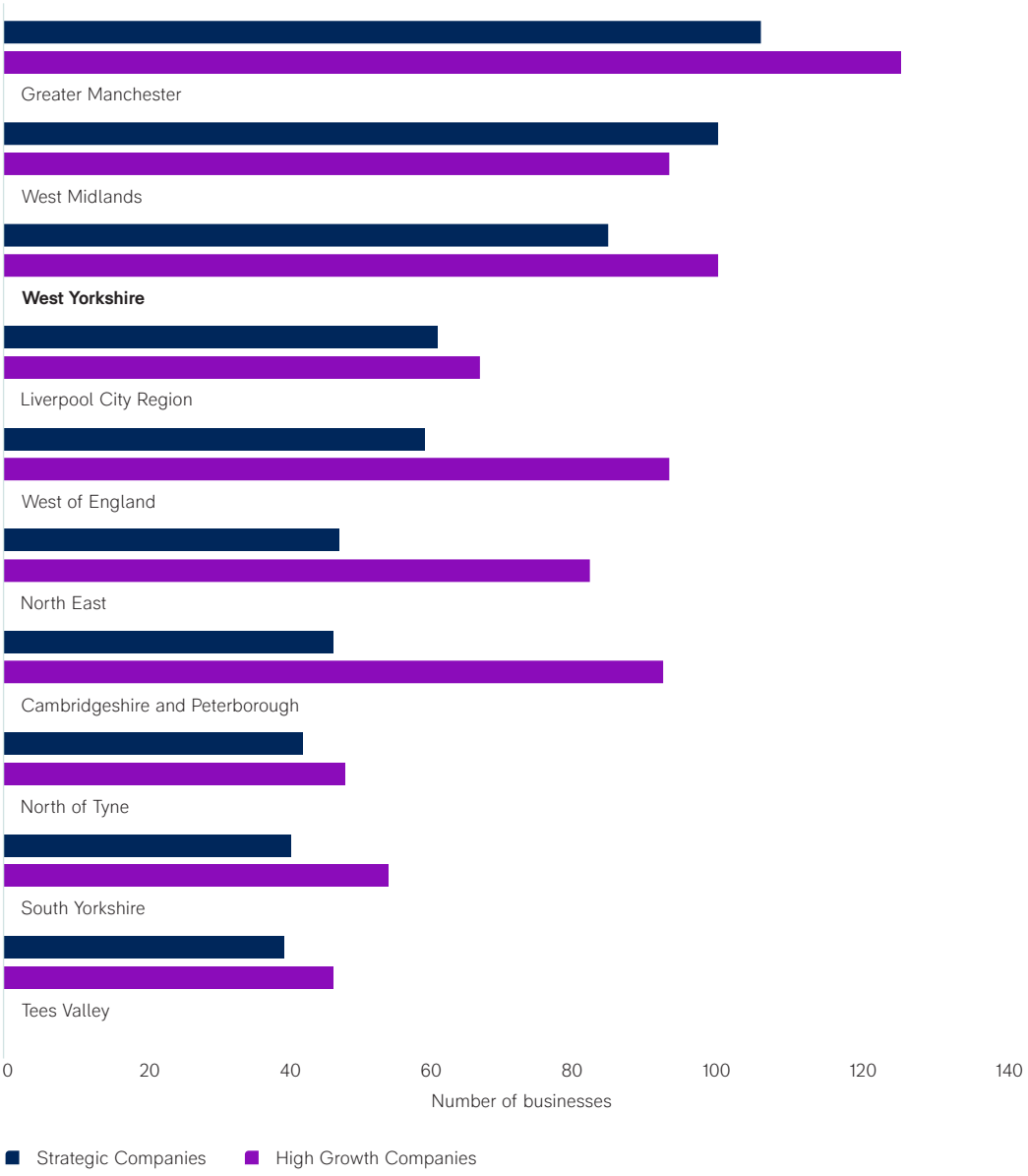


Source: CBI Economics modelling (2023); The Data City (2023)

Business Environment

The West Yorkshire net zero cluster has a very strong business environment, ranking highly among net zero combined authority clusters. It houses 85 strategic companies with turnovers over £100 million and 100 high growth companies with an annual growth rate of over 20%. It is also home to 33 OECD scale-ups, indicating that there is a strong foundation of anchor institutions that can attract additional investment and new market entrants.

Figure 27 Numbers of strategic and high-growth companies in UK combined authority net zero clusters



Source: The Data City (2023)

The cluster is supported by local government and public initiatives, forming a key part of the local economic strategy. The West Yorkshire combined authority outlined six net zero investment initiatives in their 'Investment Prospectus', including mass transit, retrofitting homes, expanding the EV charging network, installing heat pumps, increasing solar PV and establishing district heat networks.[68] The cluster is also home to multiple large energy companies, such as Drax and Engie, that are looking to invest in decarbonising fuels and facilities, attracting a supply chain of net zero businesses to help develop low carbon solutions and technologies. Separate to energy provision, Leeds-headquartered Sweco are an energy consultancy that supports businesses to transition, with experience in solar, wind and hydrogen projects. Overall, the business environment underpinning the West Yorkshire net zero cluster is very strong. Together with strategic initiatives, there is a supportive environment for future growth.

Company Case Study: First Bus

First Bus, based in Leeds, has been making significant strides in net zero innovation. They have made a series of investments to improve their fleet of vehicles, introducing zero-emission buses or reducing emissions of existing ones. In May 2024, they announced a £11.2 million investment, supported by the West Yorkshire Combined Authority and the Department for Transport's Zebra scheme, to add 22 electric buses to their fleet at the Bramley depot.[69] The investment builds on a £29m project completed in March 2024, which resulted in the electrification of the Bramley depot and the addition of 57 electric buses to use the Leeds bus network.[70] These investments are part of a series of initiatives since 2022 to decrease carbon emissions and implement low carbon technologies, including an £18.4 million investment that added 44 electric buses to the City of York's fleet, the largest order of electric buses in the UK outside of London.[71]

Innovation and Research

The West Yorkshire net zero cluster is a hub of innovation and research, with 119 net zero businesses given a 3* innovation score by The Data City, placing the cluster in the 94th percentile.[72] Such businesses include Instream Energy, Ameresco and Advanced Generation Global, which each focus on renewable energy. Net zero companies in the area have received notably large amounts venture capital investment, totalling £805 million, placing it in the 89th percentile of all combined authority clusters. The cluster has received a further £32.8 million in Innovate UK grants, placing it in the 87th percentile for this metric.

The cluster benefits from a strong local academic environment, with the University of Leeds having several net zero-focused institutes. For example, The Priestley Centre for Climate Futures (PCCF) is an interdisciplinary climate research centre focusing on climate prediction, risk and enabling low carbon transitions. The PCCF has developed tools to guide investment and aid industries like offshore wind.[73] Relatedly, the UK Centre for Greening Finance and Investment has an innovation hub at the University of Leeds which connects science and innovation with financial institutions.[74] Despite these strengths, the West Yorkshire net zero cluster lacks the number of innovation and collaborative spaces seen in other combined authorities, such as the Liverpool City Region. This may be because West Yorkshire combined authority is smaller overall and does not have the same resources to establish these high-tech facilities.

Talent, Skills and Job Quality

The West Yorkshire Climate and Environment Plan indicates that 235,000 jobs could be impacted by the transition to a net zero carbon economy, with around 119,000 workers in high demand because of their skills and experience, and 116,000 workers requiring upskilling and support. To address this, the plan outlines strategies to boost green skills, including integrating green skills into the mayor's pledge to deliver 1,000 skilled green jobs for young people, establishing a Green Skills Partnership and implementing training programmes.[75] The West Yorkshire Consortium of Colleges is also working to improve green skills, offering a Green Skills Service and running a series of green investment projects to boost skills.

However, there are challenges. Though there is a strong graduate labour supply with a total of 35,000 graduates in the combined authority per annum, the proportion of state-funded pupils in West Yorkshire who advance to higher education by the age of 19 is 2% lower than the UK average.[76] Further, schools based in the area are generally underperforming as Yorkshire and the Humber ranked second-worst of English regions for GCSE results in 2022.[77] Job quality is a concern, with 14% of jobs paying below the Living Wage Foundation's real living wage (1% higher than the national average). The proportion of part-time employees paying below this level was 5% higher than the UK-wide proportion.[78]

However, it must be noted that given the high productivity of net zero jobs and the likelihood this leads to higher wages, it is unlikely that these statistics are reflective of the job quality in within the West Yorkshire net zero cluster. It may even be argued that by growing the net zero economy and bringing skilled labour to the combined authority we could see rising living standards, especially when we consider the average wage in the net zero economy is £44,600, 23% higher than the current national average.[79]

Future Outlook – Risks And Opportunities

Strengths

- The West Yorkshire combined authority is very supportive of the net zero economy. Running an investment prospectus focused around net zero projects is a strong signal to net zero businesses that they will be supported.
- There is a good composition of established businesses, high growth companies and 'scale-ups', again indicating a good business environment.

Weaknesses

- There is a relatively small amount of innovation support for business, and a distinct lack of innovation hubs. This will impact the availability of high-tech facilities to smaller businesses in the area and could impact innovation in smaller businesses.

Opportunities

- CBI Economics research suggest the net zero economy creates high quality jobs, so by continuing to grow the net zero economy in the area there could be a significant impact on the standard of living in the area.

Threats

- The provision of skills is a concern for the area moving forward. There is a threat that net zero businesses will not be able to establish themselves if the supply of skilled labour does not increase.

Conclusion

This report has demonstrated that UK clusters are brimming with growth potential, driven by key sectors such as Net Zero, Life Sciences, Advanced Manufacturing, amongst many others. Our analysis also showed that this growth potential can be found all across the UK, even in regions historically lagging on measures of productivity or lacking in employment opportunities. We focused on the opportunities presented by clusters of specialised activity across four major regions: the the North East, North West, the West Midlands, and Yorkshire and the Humber. However, there are many more opportunities that can be found elsewhere in the UK and in other sectors.

Our discussion shows that the sectors analysed here are not only pivotal in terms of Gross Value Added (GVA) but also in fostering employment, driving innovation, and attracting investment. The Net Zero sector is at the forefront of the UK's economic transformation, driven by the urgent need to decarbonise and transition to a sustainable future. With a nationwide contribution of £84.2 billion in GVA and over 21,540 businesses, it is clear that the sector is pivotal in addressing climate change while also stimulating economic growth. Regions like the North West, with strong urban clusters in Greater Manchester and Liverpool, exemplify how regional resources and industrial frameworks can support substantial growth in this sector. Investments in renewable energy projects and green technologies are essential to sustaining this momentum and achieving the UK's environmental goals.

Life Sciences, contributing £34.7 billion in GVA, is another critical sector highlighted in this report. It demonstrates how specialised research, development, and manufacturing activities can create high-value jobs, drive regional economic growth, while also supporting societal wellbeing through advanced healthcare solutions. The concentration of life sciences activities in the North West and the West Midlands, supported by robust academic and research institutions, highlights the importance of fostering innovation ecosystems in the regions. Continued investment in R&D, coupled with strategic partnerships between public and private sectors, will be crucial in maintaining the UK's competitive edge in global healthcare and pharmaceuticals.

Advanced Manufacturing, with its focus on innovative technologies and productivity enhancements, is another specialised sector which contributes significantly to regional economies, particularly in the East and West Midlands. This sector's ability to integrate cutting-edge technologies into traditional manufacturing processes exemplifies the transformative potential of innovation. Regions like Yorkshire and the Humber, with their historical industrial strengths, are well-positioned to leverage advanced manufacturing to create high-value jobs and enhance productivity. Investment in skills training and technology adoption will be vital to sustaining growth in this sector.

The Marine and Maritime sector, contributing nearly £23 billion in GVA, showcases the diverse economic activities associated with coastal and marine environments. The strong regional contributions from areas like Scotland, the South East, and London underline the strategic importance of maritime activities to the national economy. Enhancing port infrastructure, supporting marine engineering, and promoting sustainable practices in transport and across supply chains are key strategies to bolster this sector's growth and resilience.

The analysis of these sectors across the North West, the West Midlands, and Yorkshire and the Humber highlights the diverse economic strengths and opportunities within the UK. The North West's post-COVID economic recovery, driven by robust Net Zero and Life Sciences clusters, exemplifies the potential for regional revitalisation through targeted investments. The West Midlands, with its strategic location and young population, shows promise as a hub for Net Zero and Life Sciences, provided there is continued focus on infrastructure and SME support. Yorkshire and the Humber's rapid GVA growth, supported by strong Net Zero initiatives and advanced manufacturing, demonstrates the potential for economic transformation through sustainable and innovative practices.

In conclusion, the report emphasises the critical role of strategic investments and policy support in driving the growth of these key sectors. By fostering innovation, enhancing infrastructure, and promoting sustainable practices, the UK can harness the full potential of these clusters to achieve robust, inclusive, and sustainable economic growth. The diverse strengths of the UK's regional economies are a testament to the country's capacity for resilience and innovation in the face of global challenges.

Appendix 1 – Top local authority clusters by region

East of England

Local Authority	Cluster	Business Count	Employee Count	Total GVA (£m)	Business LQ	Employee LQ	GVA per FTE
East Cambridgeshire	Omics	46	17	£1.3	28.5	6.6	£92,765
South Cambridgeshire	Biopharmaceutical	136	519	£54.3	19.5	29.6	£112,365
Huntingdonshire	Land Remediation	259	102	£9.9	20.9	0.7	£115,178
Fenland	Land Remediation	107	32	£2.0	21.5	2.7	£74,776
South Cambridgeshire	Omics	64	197	£18.8	14.3	37.9	£99,672
Broadland	Marine and Maritime	13	549	£130.8	0.6	0.4	£318,207
Cambridge	Quantum Economy	31	99	£8.4	14.1	37.1	£92,581
East Suffolk	Marine and Maritime	229	695	£74.5	5.4	26.4	£172,754
South Cambridgeshire	Pharma	168	715	£73.7	12.4	7.8	£111,287
Broadland	Net Zero	58	1,310	£225.3	0.8	0.5	£272,322

South East

Local Authority	Cluster	Business Count	Employee Count	Total GVA (£m)	Business LQ	Employee LQ	GVA per FTE
Southampton	Marine and Maritime	291	1,343	£343.80	5.6	50.7	£363,268
Dartford	Modular Construction	46	25	£1.70	9.1	238	£81,075
Test Valley	Wearables and Quantified Self	18	22	£1.80	11	167.7	£99,935
Dover	Marine and Maritime	92	566	£161.30	4.7	28.9	£367,890
Adur	Space Energy	74	26	£2.00	26.7	8.5	£99,023
Dover	Omics	45	33	£2.80	23.9	18.8	£92,648
Rushmoor	Space Economy	138	126	£10.00	18.9	26.1	£88,212
Isle of Wight	Marine and Maritime	78	466	£93.70	3.5	3.4	£322,258
New Forest	Marine and Maritime	194	543	£83.20	4.5	4.2	£259,817
Reading	Streaming Economy	47	46	£3.90	15.4	38.7	£95,150

East Midlands

Local Authority	Cluster	Business Count	Employee Count	Total GVA (£m)	Business LQ	Employee LQ	GVA per FTE
North West Leicestershire	Net Zero	118	3,295	£597.30	1.4	0.6	£282,949
Charnwood	Biopharmaceutical	42	147	£25.10	7.5	24.3	£247,625
Nottingham	Net Zero	151	6,544	£765.70	0.6	0.7	£151,765
Rutland	Net Zero	95	514	£98.50	3.4	0.9	£303,784
High Peak	Net Zero	48	1,174	£231.00	0.9	0.4	£306,557
Derby	Net Zero	92	5,712	£711.90	0.5	1.2	£162,999
North West Leicestershire	Geospatial Economy	19	259	£57.30	1.4	0.7	£326,714
High Peak	Geospatial Economy	7	107	£26.10	0.8	0.4	£342,038
North West Leicestershire	AdTech	1	26	£3.50	0.5	62.6	£237,084
High Peak	Marine and Maritime	2	324	£69.10	0.1	0	£328,056

London

Local Authority	Cluster	Business Count	Employee Count	Total GVA (£m)	Business LQ	Employee LQ	GVA per FTE
Westminster	Net Zero	2,409	20,355	£2,091.60	1.3	0.7	£149,658
City of London	Net Zero	1,973	19,729	£2,254.90	2.2	0.6	£142,950
Westminster	Business Support Services	1,577	20,015	£1,187.70	0.7	0.4	£56,761
City of London	FinTech	1,602	8,492	£1,179.20	8.3	2.4	£166,869
City of London	Business Support Services	1,259	16,924	£1,171.30	1.1	0.7	£54,865
Westminster	Life Sciences	2,097	10,386	£727.80	1.3	0.5	£71,398
City of London	Marine and Maritime	1,029	6,759	£855.90	3.9	1.1	£183,626
City of London	Life Sciences	1,149	8,799	£912.20	1.5	0.8	£118,131
Camden	Net Zero	906	9,178	£806.50	0.6	1.9	£112,267
Westminster	Energy Generation	808	8,078	£816.40	1.4	0.8	£139,640

South West

Local Authority	Cluster	Business Count	Employee Count	Total GVA (£m)	Business LQ	Employee LQ	GVA per FTE
Cornwall	Net Zero	724	5,984	£679.40	2.3	1.6	£186,178
Isles of Scilly	Marine and Maritime	4	10	£2.50	4.9	51	£361,827
Stroud	Photonics	33	68	£6.30	10.6	146.6	£104,943
Bristol, City of	Net Zero	662	7,983	£749.60	1.5	3.7	£123,218
Bristol, City of	Business Support Services	834	7,587	£420.80	1.5	1	£52,630
North Devon	MedTech	53	46	£4.90	16.5	9.2	£144,188
North Devon	Space Energy	54	53	£4.10	20.3	4.9	£92,097
Mendip	Net Zero	166	1,450	£239.60	1.8	2	£273,656
Wiltshire	Net Zero	408	5,343	£449.20	1.2	0.9	£107,690
Mendip	Energy Generation	100	519	£75.60	3.3	2.6	£248,185

Appendix 2 – The theory behind clusters

Literature review

Clusters are hubs of interconnected companies and institutions, but can also encompass linked industries, suppliers, customers and infrastructure.

Michael Porter's theory of clusters predominantly informed this study. Porter outlined clusters as being 'critical masses – in one place – of unusual competitive success in particular fields' and notes that they are a 'striking feature of virtually every national, regional, state, and even metropolitan economy, especially in more economically advanced nations'.[80] Porter also proposed a more precise description of clusters, that they are 'geographic concentrations of interconnected companies and institutions in a particular field' that 'encompass an array of linked industries and other entities important to competition'. This may include suppliers of specialised inputs such as machinery, services and providers of specialised infrastructure. They may also extend downstream to the customer base, manufacturers of complementary products and companies in industries related by skills, technologies, or common inputs. Porter also discussed how clusters could include institutions, such as universities, think tanks, vocational training providers and trade associations that provide specialised training, education, information, research and technical support.[81] Zheng et al. echo Porter's thinking on clusters, defining them as the co-location of firms that may share supply chains, draw on similar resource requirements (e.g. skills), and operate in complementary markets.[82]

Clusters, influenced by access to resources and demand, contribute to comparative advantages, fostering specialisation, scale, and productivity.

Although the literature does not specify any restrictions on potential size, a cluster must have a geographical boundary. Common themes in clusters include the characteristics of the people and businesses involved, as well as the cluster's structure. These are all linked by a spatial dimension. Geographical boundaries are determined by firms' access to inputs and demand, which can vary by industry. Defining clusters by geographical boundaries presents significant challenges, particularly in the era of globalisation. Supply chain activities, for example, may take place outside of the cluster geography. Economically, cluster boundaries are defined by access to resources (materials, employees, suppliers) and the main sources of demand (other industries, government, end consumers). Boundary size can vary with industry and business model – for example, knowledge-intensive businesses may choose to cluster around a University in order to minimise the cost of accessing knowledge resources. By contrast, businesses in the service industry, such as retailers may seek to locate around their customer base.[83] [84] The literature is harmonious in finding that the presence of certain firms, on a large enough scale, plays a clear role in attracting further business to locate somewhere. However, further 'foundational' factors are also important such as the presence of institutions, skills, or infrastructure. In combination, these factors create regional comparative advantages, when the cluster gains an advantage of a competitor thanks to a natural endowment of a factor of production, which help to further develop specialisation and build scale.[85] Porter also argued that the greater productivity gained from the clustering – through features such as knowledge transfers, innovation creation, and shared resources – gives the agents within these clusters a comparative advantage.

Agglomeration and its effects are crucial to clustering.[86] This describes firms and institutions, located in near proximity and with sufficient scale to develop specialisms, organically developing into clusters through the sharing of knowledge, services, resources, suppliers, and skills.[87] Agglomeration rates are found to be higher between economically similar industries, indicating that both physical proximity and economic linkages significantly influence a firms location choices, and therefore determine cluster formation.[88]

Innovation is key for cluster development, inducing specialisation and global competitiveness

Classifying clusters at the industry level can be also challenging due to cross-industry linkages and new technologies coming forward, meaning their activities can be ever-evolving.[89] It is important to be able to identify emerging clusters. Therefore, innovation is a key indicator for cluster formation and growth and it can also help to foster other areas of specialisation in an industry, furthering the presence of comparative advantages. Innovation hubs, through rapid resource exchange, are crucial for cluster development and help regions to strengthen existing specialisations, compete globally, and capture new market opportunities.[90, 91, 92, 93]

When measuring innovation, indicators tend to sit across three core themes. The first relate to foundational institutions and can include elements such as the ease of starting a business, tax rates, property rights and labour market flexibility. The second, innovation and entrepreneurship capacities tends to be more regionally specific and can include items such as infrastructure, human capital, culture and incentives; and comparative advantage. Finally, the measurement of comparative advantage of a region is based on the principle that specific areas of strength that differentiate it from others around it can be assessed locally or globally. This can be done through ranking economic sectors or clusters within the region, and then undertaking a cross-regional comparison. It can also be useful to find measures that capture the collection of natural resources or other specialised assets that may contribute to a cluster's comparative advantage.[94]

Growth clusters attract Foreign Direct Investment

Growth clusters increase Foreign Direct Investment (FDI) flows into a region. Human capital agglomeration is key in attracting FDI. In the UK, some studies have found that foreign-owned firms tend to locate themselves alongside leading domestic firms in existing clusters.[95] Another study found that globally, multinational firm headquarters tend to be the establishment that is most likely to agglomerate.[96]

Clusters can be measured both quantitatively and qualitatively across indicators relating to business activity, innovation, investment and skills

Clusters are complex systems and there is no singular metric that captures the state of an ecosystem. Quantitative indicators generally focus on the themes of business activity, innovation, investment, and skills. However, various measures are needed to characterise clusters. Business activity can be measured through location quotients, for example. Location quotients can be based on business population, employment or output.[97] Innovation is typically measured by patent applications or other relevant licenses that a technology may receive. In the UK, it is also important to consider the quantum of innovation-related funding that a firm, cluster or region may receive from government bodies such as UK research and innovation. Investment is another important indicator of a cluster, which may be measured through venture capital funding received or more simply, the presence of venture capital firms in an area. Finally, productivity is often measured against the sector or regional mean. Companies within a cluster are often thought to be more productive in sourcing inputs; accessing information, technology and coordinating with related companies.[98, 99]

Qualitative indicators capture difficult to measure factors such as the presence of research institutes, talent, or networks. Additional, qualitative, indicators may be required to capture elements which cannot be measured quantitatively. This includes anchor tenants, such as research-intensive public and private institutions such as Universities. These generate and apply specialised knowledge in a particular technological field. A strong local talent pool is also indicative of a cluster, these can be measured quantitatively but an evaluation of how well the labour pool matches what businesses are seeking is also crucial to assessing the local labour market. Finally, the strength of business community activity, which can take place at accelerators for example can also help to foster a cluster-friendly environment.

Detailed methodology

Given the lack of a widely-accepted, standardised methodological framework for clusters, this research devised a bespoke approach that is heavily driven by relevant theory and available data. In order to comprehensively and effectively analyse economic clusters throughout the UK, our approach was structured into three phases:

1. Initially identifying and categorising clusters
2. Assessing the development and strengths of clusters
3. Ranking and comparing clusters relative to each other

In order to effectively identify and categorise clusters from the outset, our research constructed a clear geographic and industry framework within which to operate

Following from the underlying cluster theory detailed in the literature review, setting out clear geographic boundaries is fundamental to cluster analysis. Geography is integral to cluster formation and development, given this is rooted in agglomeration effects and the local sharing of capital, skills and knowledge, to develop a comparative advantage. Our research initially set geographical boundaries at the level of Local Authority Districts (LADs). LADs are sub-regional UK geographic areas used for the administration of local government, including county and district councils, unitary authorities, metropolitan districts and London boroughs.[100]

Spanning 361 LADs throughout the UK at the time of our analysis,[101] this geographical unit strikes a good balance between sufficiently large to capture significant clusters and collections of activity, while small enough to generate a good level of granular detail. They are also flexible and compatible with both ITL1 regions and combined authorities (CAs) – additional geographical units that are covered in this research. CAs represent locally-run governance structures that merge local authorities and councils,[102] covering 10 metropolitan areas throughout the UK, developed in order to deliver local policy under a more devolved framework. These units were incorporated further into the analytical process to capture clusters on a bigger scale in key UK cities, while ITL1 regions are used to structure the analysis in main results chapters.

Parallel to this geographic perspective, theory also dictates that cluster development occurs through economic activity within a core industry or group of closely related sectors. Equivalent to geographic boundaries, our framework therefore also requires industry-related boundaries in order to categorise and identify relevant clusters. While Standard Industrial Classifications (SIC) serve as the widely-accepted, official approach to doing this in the UK, significant emergence of new technologies, types of activity and industries since their last revision in 2007 render SIC codes somewhat inappropriate. This research has instead opted for Real Time Industrial Classifications (RTICs) in partnership with The Data City.

RTICs represent a modern sector classification approach that aims to update and go beyond traditional SIC codes. This framework is driven by web-scraped data on how companies describe themselves as opposed to predetermined, static categories in SIC codes, providing a more accurate and up-to-date perspective of the UK economy.[103] The RTIC classification spans 53 total sectors at the time of this research, focussed on emerging and fast-growing areas of the economy such as Net Zero, Cyber and Advanced Manufacturing. Each RTIC also contains multiple sub-sectors called 'verticals'.

Together, these geographic and sector boundaries set out the overall cluster identification framework. Given the combination of 361 geographic units (LADs) and 53 industry units (RTICs), this produces a total of 19,133 potential clusters, or alternatively 530 potential clusters under the 10 CA geographical units.

An iterative data collection, long-listing and short-listing process generated a suite of metrics by which to assess clusters, categorised into core and supplementary types

Having set out the geographic and industry boundaries to identify clusters, the next phase of our methodology focussed on producing metrics to assess the development and strengths of these clusters. The final metric selection was derived from a comprehensive process that began with desk-based research of cluster theory and available data. An exhaustive long-list of potential metrics was produced initially from this desk-based research and data collection, with a rating assigned to each one. This rating scoped potential metrics both on their conceptual relevance – how integral they were to capturing the theory and idea of a cluster, and their data availability and degree of granularity. The two aspects of the rating were weighted equally. Utilising these scores in an iterative long-listing and short-listing process with Lloyds Banking Group, we arrived at a final selection of both core and supplementary metrics.

Six core metrics were selected to form the basis of the cluster ranking process, integral to the presence of clusters and assessing their development. These six metrics account for the two fundamental cluster concepts of scale and concentration. Scale covers three of the core metrics, reflecting the absolute size of a cluster, comprised of the total businesses, employment and economic output that it is responsible for. Business count represents the first scale metric, sourced directly from The Data City and capturing the total number of active businesses operating within a cluster. This metric is also a key input for the subsequent economic modelling to generate the two remaining scale metrics.

Using CBI Economics' in-house, bespoke input-output economic contribution model, we derive metrics that capture both the economic output and employment generated by total cluster activity. Cluster output is measured through Gross Value-Added (GVA), and the employment that it supports is captured in Full-Time Equivalent (FTE) jobs.

This absolute scale perspective is supplemented with a more relative approach through metrics that capture cluster concentration. Two out of the three core concentration metrics implement the concept of location quotients, statistical measures that capture the industrial specialisation of a particular area as a sector's proportion of the overall economy, relative to a wider (usually national) average.[104] The first concentration metric – business location quotient (LQ) – measures the proportion of total businesses that the cluster constitutes within its given area, compared with the nationwide average. For example, the Leeds Net Zero cluster has a business LQ of 1.06. This denotes that in the Leeds LAD, the proportion of total businesses that belong to the Net Zero sector (RTIC) is 6% greater than the overall UK-wide average.

Employment LQ constitutes the second core concentration metric. Similarly to the business equivalent, this captures the proportion of total employment that a cluster is responsible for within its given area, relative to the nationwide average. Both location quotient metrics for all UK clusters are sourced directly from The Data City. The final concentration metric is covered by labour productivity, produced from CBI Economics' in-house economic contribution modelling. In line with the two scale metrics derived from this, labour productivity is expressed as GVA output generated per FTE job.

Using these six core metrics to primarily assess and rank clusters, the equal weighting of both absolute (scale) and relative (concentration) approaches allows consideration of both newly-emerging, specialised and more developed, mature clusters. However, this research also incorporated an additional 12 metrics to supplement the core perspective. Supplementary metrics were not directly used to assess clusters, but provided more context and information around the cluster and its environment, categorised under four main themes:

Table 1 The 12 supplementary metrics employed in this analysis, categorised under four broad themes

Business Environment	Job Quality	Innovation and Investment	Access to Talent and Skills
Strategic companies: number of cluster companies with more than £100m turnover	**Average wages:** median weekly earnings within the cluster area, £	**Cluster business innovation:** number of cluster companies with a 3* innovation score	**Graduate labour supply:** total number of graduates from universities within the cluster area
High-growth companies: number of cluster companies with more than 20% annual growth rate	**Wage growth**: annual change in median weekly earnings within the cluster area, Y/Y%	**Venture investment:** total venture capital funding attracted by cluster businesses, £	**Relevant university spin-outs:** total number of spin-out companies produced by universities in the cluster area
Business maturity: number of OECD 'scale-up' companies within the cluster	**Job skill level:** Proportion of jobs within the cluster area that fall under SOC level 3 or 4, %	**Innovate UK grant funding:** total value of Innovate UK grants awarded to cluster companies, £	**Apprenticeship labour supply:** total number of apprenticeship completions within the cluster area

Core metrics were aggregated into a consistent index to compare clusters, before a long- and short-listing process narrowed the sample down to clusters of interest

In order to properly assess clusters in comparison with one another, the six core metrics were then aggregated and synthesised into a single index. Initially, each individual metric was indexed, by taking its value as a proportion of the maximum value in that particular metric throughout the whole cluster sample. For example, at 2,409 registered businesses the Westminster Net Zero cluster represented the maximum total business population throughout our cluster sample. Its index therefore measured 1.000, whereas the Leeds Legal Services cluster, with 518 businesses, generated an index of 0.215 in total business count. Although there was an alternative ordinal approach in simply ranking clusters' performance in each metric, this cardinal approach contributed more nuance and accuracy to cluster comparison. Indexing was repeated for all six cluster metrics individually.

Following this, the individual metric indexes were assigned an equal 1/6th weighting and summed, producing an overall, aggregated cluster index that ranged from 0 to 1. This aggregation approach ensured that clusters' performance was captured in a balanced, comprehensive way across all core metrics. A cluster could hypothetically achieve a perfect score of 1 if it generated the maximum value throughout the whole sample for all six metrics. For context, the strongest LAD cluster in our sample displayed an index of 0.526.

All clusters in our sample (both LADs and CAs) were ranked under this aggregate index framework, before the 20,000-strong total sample was narrowed down via an iterative long- and short-listing process. The initial long-list presented the following lists to highlight particularly strong and notable clusters:

- Top 10 LAD clusters by ITL1 region
- Top 10 LAD clusters by RTIC (sector)
- Top 10 LAD clusters by combined authority
- Top 25 combined authority clusters
- Top 3 CA clusters within each combined authority

This long-listing presentation facilitated a collaborative selection process between CBI Economics and Lloyds Banking Group, arriving at a final short-list of 40 clusters that were particularly strong or notable to Lloyds Banking Group. Scorecards were then developed for all short-listed clusters, incorporating quantitative data, charts and visualisations and qualitative commentary. Seven of these clusters were selected for a further deep-dive analysis – three of which are presented in the deep dives section of this report. The The analysis within this report centres around cluster development and strengths by region, and while short-listed clusters are the focus, the scope is not confined to this list.

RTIC Descriptions

RTIC	Description
AdTech	AdTech means Advertising Technology – a term used to describe the software and technology advertisers use to launch, deliver, monitor, and measure the effectiveness of their digital campaigns. AdTech companies range from analytics software and data management services to programmatic platforms and ad exchange marketplaces.
Advanced Manufacturing	Advanced Manufacturing within the UK can be used to classify companies that use innovative technologies and processes to increase production and productivity. Typically, what's different between traditional and advanced manufacturing is the use of versatile production methods that drive efficiency. This includes companies leveraging automation, robotics, artificial intelligence, software, AR & VR, digital design and other cutting-edge processes that add value in the manufacturing process.
Advanced Materials	Advanced Materials is an emerging trend of new materials with enhanced or superior properties being designed, produced and used to increase performance in the manufacturing industry. Today the industry encompasses a wide range of practices from the creation of biomaterials and carbon-based materials to the development of technical ceramics and specialised metal alloys.

Agency Market	The agency market describes the sector in the UK made up of marketing, advertising, and creative agencies. This broad industry includes agencies providing both B2B and B2C services and expertise across marketing (social media, PR), design (branding, user experience) and other areas of digital (including analytics, E-commerce).
AgriTech	AgriTech is the use of technology in farming to help improve efficiency, sustainability, and profitability, allowing us to make more from less. The industry is made up of companies developing and implementing new agricultural technologies with a focus on Net Zero, through automation, drone technology, precision framing and more.
Artificial Intelligence	AI is a broad term used to define the use of computer systems and machines that emulate human intelligence or processes to solve problems. When we refer to AI as a field, in most cases we mean the practical application of perceived intelligence or the ability to perform certain tasks that might normally be undertaken by intelligent beings.
Autonomy and Robotics	Autonomy and robotics is an interdisciplinary sector of science and engineering dedicated to the design, construction and use of mechanical robots. This RTIC comprises the subsectors of robotic integration, manipulation, reasoning and acting and sensing and perception.

Biopharmaceutical	Biopharmaceuticals are pharmaceutical drugs that are manufactured in, extracted from or synthesised from biological sources. Differing from totally synthesised pharmaceuticals, they include vaccines, whole blood, blood components, allergenics, somatic cells, gene therapies, tissues, recombinant therapeutic protein, and living medicines used in cell therapy.
Business Support Services	The Business Support Services industry comprises a wide range of companies, agencies and organisations offering a variety of services for businesses. These services can include temporary, contract or permanent staffing solutions; office and administrative support, human resources, landscaping, cleaning services, security and access control solutions, transport and vehicle rental, document management and archiving, office supplies and equipment, and other miscellaneous business support services.
CleanTech	CleanTech is the description of a product, services or process that aims to improve or reduce negative environmental effects. This blanket term relates to various companies and technologies that work within clean energy, sustainability, recycling, and other green innovation practices, such as water purification, biofuels, environmental protection, agriculture and much more.
Computer Hardware	Hardware refers to the devices and equipment that enable you to perform major functions such as input, output, storage, communication, processing, and more. There are two types of computer hardware: external and internal. External hardware devices include monitors, keyboards, printers, and scanners, whereas internal hardware devices include motherboards, hard drives, and RAM.

Cryptocurrency Economy	Cryptocurrency put simply is used to describe any form of digital or virtual currency that uses cryptography to secure transactions, making it nearly impossible to counterfeit. Instead of relying on banks, Cryptocurrency uses a peer-to-peer system that enables anyone across the world to send or receive payments, with transactions recorded in a public ledger or blockchain.
Cyber	Cyber is a broad term used to describe the UK's ecosystem of cyber security and computer safety companies. Today in the UK's there's a thriving cyber industry made up of a mixture of established companies and start-ups. This includes a wide range of risk management, endpoint security, cryptographic authentication and incident detection experts.
Data Infrastructure	Data Infrastructure is a digital infrastructure that promotes data consumption and sharing. Data Infrastructure is normally made up of several different components such as hardware, software, services and more, all of which allow organisations to create and manage their data. Some examples of companies that make up the UK's broad Data Infrastructure sector include those working in data centre cooling, hardware suppliers, software developers and data store providers.
Data Intermediaries	Data intermediaries cover a range of different activities and governance models for organisations that facilitate greater access to and sharing of data. Data intermediaries often process data external to their business, on the behalf of other organisations.

Design and Modelling Technologies	The Design and Modelling Technologies industry encompasses the UK's companies that specialise in products and services related to design. This sector includes those working or supporting prototyping, design and production, and ranges from 3D modelling, computer aided design (CAD), digital twins and even those working with augmented and virtual reality (AR / VR).
Digital Creative Industries	Whilst the digital and creative sectors are distinct in their own right, the Digital Creative Industry encompasses companies utilising both activities. This includes those using new technologies and digital practices in creative markets such as advertising, film, design and music.
E-Commerce	E-commerce is the term used to describe Electronic Commerce – the process of selling or buying goods and services over an electronic network. When we talk about E-commerce today, in most cases we mean the buying or selling of goods over the internet – from specific products and services, to subscriptions, data, food and much more.
EdTech	EdTech is a term used to describe technology – such as software, devices or products – that supports teaching and learning or enhances educational outcomes. The UK's EdTech sector is made up of a wide range of companies and start-ups who are all contributing to education in different ways. This ranges from the development of immersive teaching environments and LMS software to the production of smart learning devices and tablets.

Electronics Manufacturing	Electronics Manufacturing covers everything involved in the design and production of electronic products and microelectronics. The industry also includes companies that provide services for the electronic industry, such as those that specialise in component repair and equipment supply.
Energy Generation	The Energy Generation industry in the UK includes a wide range of companies, producing or supplying energy. This includes more established methods such as nuclear power and the use of fossil fuels, but also encompasses companies investing in renewables or using greener practices such as solar power and wind energy.
Energy Management	Energy Management encompasses a wide range of different technology, networks and software that's used to administrate energy use and consumption. The UK's Energy Management industry includes companies maintaining smart grids and producing smart meters as well as organisations monitoring energy consumption using AI and the Internet of Things (IoT).
Energy Storage	Energy Storage is the capture of energy to be stored and used at a later date. There are many forms of Energy Storage and different practices used today including hydrogen, thermal, mechanical and battery storage.With a focus on renewable energy and the modernisation of electric grids, the UK Energy Storage industry is thriving, with companies developing new innovative technologies and methods to store electricity or heat.

FinTech	Financial technology (better known as fintech) is used to describe new technology that seeks to improve and automate the delivery and use of financial services. At its core, fintech is utilized to help companies, business owners, and consumers better manage their financial operations, processes, and lives. It is composed of specialized software and algorithms that are used on computers and smartphones.
Food Tech	Food Technology (or Food Tech) is an emerging sector made up of a combination of companies, organisations and projects that use technology – such as AI & machine learning, precision farming and automation – to help design, choose, produce and deliver food. Often the Food Technology sector is associated with the use of technology to drive efficiency and sustainability, particularly within the agricultural and AgriTech industries.
Gaming	Today the UK's video game industry encompasses all aspects of the gaming lifecycle, from software and game development to the publishing and advertising of the finished product. A broad and thriving sector, when we talk about the gaming economy, this includes a wide range of job roles and functions, including programmers, software developers, animators, marketers, graphic designers and much more.
Geospatial Economy	The Geospatial industry or economy consists of a range of companies, start-ups and organisations who work with technology or provide services to capture, process, analyse, visualise or store geographic data across the UK. Geospatial companies in the UK range from those developing proprietary Geographic Information Systems (GIS) and indoor mapping solutions right the way through to those specialising in 3d visualisation and data processing.

Immersive Technologies	Immersive Technologies is a broad term used to describe any technology that extends or alters our current reality typically within the 360-degree space. Examples of Immersive Technologies include Virtual Reality (VR), Augmented Reality (AR), 360 and Mixed Reality (MR). Extended Reality (XR) is the terms often used to describe this full suite of Immersive Tech.
In-Orbit Servicing and Manufacturing	In-Orbit Servicing and Manufacturing (IOSM) covers a range of activities focusing on in-space capabilities, covering the areas of robotics, manufacturing, in-orbit operations, control and prototyping.
Internet of Things	The Internet of Things (or IoT) is a system of computer devices, objects, software, technologies and sensors capable of connecting and sharing data with each other over the internet without human to human or human to computer interaction. The Internet of Things ranges from consumer IoT often found in the home such as smart devices and wearables to more commercial and industrial devices and ecosystems used across healthcare, transport and manufacturing.
Land Remediation	Land Remediation is the process of restoring land to its true state or to the best standard to protect the environment. This includes the removal of pollution or other contaminants from soil and groundwater which could cause significant harm to people, property or protected animals. Common areas for Land Remediation that are often polluted or lacking in suitable environmental standard include brownfields (previously developed land that's not currently in use), landfills, construction sites and quarries.

Legal Services	Legal Services refers to any legal service provided – including advice, consultancy or assistance – in any branch of law by a lawyer, barrister, solicitor or legal firm. The UK Legal Services sector has long been one of the country's biggest employers and contributors to the economy, with lawyers, barristers and solicitors providing a vital service to their clients. The sector can be divided into several different sub-sectors, including corporate and commercial law, employment law, family law, crime, regulation and property law, to name but a few.
Life Sciences	The life sciences industry comprises companies operating in the research, development and manufacturing of pharmaceuticals, biotechnology-based food and medicines, medical devices, biomedical technologies, nutraceuticals, cosmeceuticals, food processing, and other products that improve the lives of organisms.
Marine and Maritime	The maritime industry is responsible for the transportation of goods, products, and people by sea. This includes everything from container ships, and oil tankers, to cruise ships and passenger ferries to smaller vessels like fishing boats. This sector comprises marine activity and transportation for commercial, leisure, logistical and defence purposes, also incorporating subsectors like aquaculture, cleanmaritime and marine engineering.
Media and Publishing	Media and Publishing is a broad term used to describe the publication of content online, in print or through a variety of other mediums. This includes agencies, organisations and groups involved in the production and distribution of information through broadcast, print, video, music and other forms of media.

MedTech	MedTech or Medical Technology is a term used to describe the development and deployment of medical devices, products, services and solutions within the healthcare system. MedTech is a broad and growing industry, with innovative technology being developed across a wide range of applications such as treatment, diagnosis and care.
Modular Construction	Modular Construction refers to the process of producing components, or in some cases entire structures, in an off-site location before being assembled on-site. Modular Construction has increased in popularity in recent years, with more companies and organisations realising the advantages of off-site production – with many cost-cutting, time-saving and environmental benefits.
Net Zero	Net Zero is a unique emerging sector in that it has been established to tackle a specific problem within a specific time frame – reducing greenhouse gases produced by humans. This ecosystem of verticals and companies in the Net Zero supply chain, which range from low carbon energy generation all the way to green finance, represent a now thriving industry and present big opportunity for economic growth in the future.
Omics	Omics is a term used to describe a number of biological sciences that end with -omics. This includes areas of study such as Genomics, Transcriptomics, Proteomics and Metabolomics, all of which come from the study of certain objects such as a genome or transcriptome. Each branch or field of study share a similar aim to discover, define or quantify the biomolecules and molecular processes that impact the form and function of cells and tissues.

Pharma	Pharma is a term used to describe the wider pharmaceutical industry of companies and organisations dedicated to the development, testing, production, distribution and marketing of medicines or pharmaceutical drugs. UK Pharma is a growing sector made up of a series of companies providing new technologies and services, including those specialising in advanced manufacturing, AI, automation, data analytics and BioPharma.
Photonics	Photonics refers to the physical science of light waves. A branch of optics (the study of the behavior and properties of light), Photonics describes the generation, detection and manipulation of light. In the UK, the Photonics industry is made up of a wide range of companies designing, manufacturing and using advanced optical technologies. This includes those working in microelectronics, remote sensing, telecommunications and even quantum technology.
Quantum Economy	Quantum Computing – such as superposition, interference, and entanglement – is an area of computer science that goes beyond the binary 1 and 0 computing we're used to, harnessing subatomic particles to sort through a huge number of possibilities and provide solutions to incredibly complex problems. Some of the applications of Quantum Computing are cyber security, logistics and weather forecasting.
Rehabilitation	Rehabilitation is a form of care used to enhance and restore mental, physical or cognitive abilities in a person that might have been lost or declined over time. Rehabilitation comes in many forms, supporting patients who might be suffering from a physical, psychological, cognitive, vocational or speech impairment.

Research and Consulting - Physical Sciences and Engineering	Physical Sciences and Engineering brings together a number of disciplines and fields, including physics, chemistry, astronomy, engineering, the environment and architecture. This sector is focused on companies providing complementary research and consulting services within the Physical Sciences and Engineering sector, including those working across physical sciences, engineering and architecture.
Sensors	Sensors are a critical component of modern life, enabling us to measure, track and monitor data for a wide range of applications. Sensors are increasingly being used in various industries, due to the wide range of advantages they provide. For instance, they are used in automotive industries to monitor vehicle performance, in medical applications to track vital signs, and in manufacturing processes to monitor machinery and production lines.
Software as a Service (SaaS)	SaaS is a term used to describe the process of delivering software or applications over the internet as a cloud-based service rather than being installed or downloaded. Often run as a subscription service for customers and businesses, the SaaS model has allowed companies to make software more accessible, compatible and easier to operate, with customers able to access services direct through a browser.
Software Development	Software development refers to a set of computer science activities dedicated to the process of creating, designing, deploying and supporting software. This covers the main four types of software including: system software, programming software, application software and embedded software. Other sub-sectors within this RTIC span cloud computing, API Development to games and web development.

Space Economy	The UK's Space Economy is made up of a growing ecosystem of companies and organisations that work across manufacturing, operations, applications and other ancillary services. These companies participate in a number of space-related activities such as satellite services, spacecraft production, governance, research and more.
Space Energy	Space-based energy is the concept of harvesting free solar energy in space, transported to Earth then collected and converted to electricity for the grid. This RTIC comprises smaller sub-sectors such as operations management, power cores, space infrastructure and ground segments.
Streaming Economy	The streaming economy refers to companies that stream or enable the streaming of content from the internet. This includes technology developed to support the streaming infrastructure, live streaming services, real-time data steaming, as well as the companies offering on-demand content through streaming platforms.
Supply Chain Logistics	Whether it's companies that specialise in innovative tracking products or companies that develop management software, today's Supply Chain Logistics sector is extremely diverse. Made up of logistic experts and businesses driving operational efficiency across supply chains through tech or other processes, it's an industry dedicated to problem solving and delivering cost-saving services.

Telecommunications	The Telecommunications industry provides key transmission services that allow us to communicate via voice, data, text, sound, video and other methods. Largely comprised of telephone companies and internet service providers, the UK Telecommunications sector has grown significantly over the past 20 years, with companies involved in 5G technology, fibre connectivity, wireless networks, broadcasting and satellite communications.
Wearables and Quantified Self	Wearables and Quantified Self refers wearable technology that's worn on the human body – often as an accessory or within clothing – used to record vital signs or other ambient information that's fed back to the wearer. Whilst Wearables is a broader term of electronic devices worn on a user's body, Quantified Self (sometimes shortened to QS) refers to the process the self-tracking, measurement, and quantification of all aspects of daily life.

References

1. CBI (2022) Clusters Playbook
2. Rachel Reeves Mais Lecture (2024) The Labour Party
3. Labour Manifesto - Kickstart Economic Growth (2024) The Labour Party
4. UK Government (2019) Clean Growth Grand Challenge: Industrial Clusters Mission
5. Michael E. Porter (1998) Clusters and the New Economics of Competition
6. Why the West Midlands? | Invest West Midlands. **Link**
7. Energy Voice (2023) Everything you need to know about the 'transformational' Viking CCS Project **Link**
8. Viking CCS & Harbour Energy (2023) Transforming the Humber into a net zero SuperPlace **Link**
9. Humber Industrial Cluster (2023) Humber Industrial Cluster Plan: Inward Investment **Link**
10. Orsted (2023) Hornsea Projects **Link**
11. West Yorkshire Combined Authority, (2021). Climate and Environment Plan. **Link**
12. Engie, (2024). Fuel Mix Disclosure. **Link**
13. Yorkshire Gas and Power, (2024). Fuel Mix Disclosure. **Link**
14. Calderade Wind, (2024). Opportunity. **Link**
15. BBC, (2024). Bradford solar farms could reduce council energy costs by 20%. **Link**
16. West Yorkshire Combined Authority (2022) West Yorkshire HealthTech Strategy 2022 - 2027
17. West Yorkshire Combined Authority (2022) West Yorkshire HealthTech Strategy 2022 - 2027
18. Get it Made (2023) Yorkshire & The Humber: The UK's Manufacturing Powerhouse
19. Northumbria University Newcastle (2024) North East Space Skills and Technology Centre **Link**
20. West Midlands Growth Company (2024) Advanced Manufacturing
21. Department for Business and Trade (2023) Unlocking the West Midlands' Export Potential
22. HMRC (2024) UK regional trade in goods statistics, fourth quarter October to December 2023
23. Invest West Midlands (2022) Advanced Manufacturing
24. UKBIC (2022) UKBIC Pioneering a Greener Future
25. HM Treasury, DLUHC (2024) Investment Zones
26. Tata Steel (2024) UK - Steelpark Service Centre
27. The New York Times (2012) Tata Motors Finds Success in Jaguar Land Rover
28. Jaguar Land Rover: A Manufacturing Success Story

29. BBC (2011) Wolverhampton Jaguar Land Rover plant approved
30. Jaguar Land Rover (2023) JLR to invest £15 billion over next five years as its modern luxury electric-first future accelerates
31. BBC (2023) Jaguar Land Rover to create 300 new jobs in West Midlands
32. BBC (2024) Jaguar Land Rover creates 250 new jobs
33. InterEngineering (2017) Tour of Rolls-Royce Control Systems, Birmingham
34. HVM Catapult (2021) Enabling Jaguar Land Rover's successful transition to electric vehicles
35. Manufacturing Technology Centre (2023) MTC's Impact in Numbers
36. Innovate UK and the West Midlands Combined Authority (2023) West Midlands Local Action Plan
37. West Midlands Combined Authority (2023) Plan to get more people into manufacturing and engineering job
38. Invest West Midlands (2022) Advanced Manufacturing
39. West Midlands Combined Authority (2024) Local Further Education colleges in the West Midlands to get £2.4m Innovate UK funding
40. ONS (2021) Census 2021
41. The West Midlands Regional Economic Development Institute and the City-Region Economic Development Institute (2022) Graduate pathways: Identifying patterns of regional retention and attraction
42. The West Midlands Regional Economic Development Institute and the City-Region Economic Development Institute (2021) Regional brain drain and gain in the UK: Regional patterns of graduate retention and attraction
43. ONS (2024) Annual Survey of Hours and Earnings
44. FleetNews (2024) Talks with 'number of EV battery manufacturers' for gigafactory investment
45. Liverpool City Region includes the local government districts of Liverpool, Halton, Knowsley, Sefton, St Helens and Wirral.
46. Invest Liverpool City Region (2024) A Wealth of Life Sciences and Innovation Opportunities
47. HM Treasury (2024) £360 million to boost British manufacturing and R&D
48. Liverpool City Region Combined Authority (2023) Liverpool City Region Science & Innovation Audit Refresh 2022
49. Invest Liverpool City Region (2024) A Wealth of Life Sciences and Innovation Opportunities
50. Liverpool City Region Combined Authority (2023) Skills Strategy 2018 - 2023
51. AstraZeneca (2023) Our UK Sites: Speke, Merseyside
52. Invest Liverpool (2023) Advanced Engineering and Manufacturing
53. HM Treasury (2024) AstraZeneca plans £650m investment in UK

54. Ineos Group (2024) Sites: Runcorn **Link**
55. Geko Devices (2024) Company Profile **Link**
56. Pharmaron (2023) Pharmaron invests £151M into UK Gene Therapy CDMO with support from UK Government Grant **Link**
57. Invest Liverpool City Region (2023) Life Sciences Investment Zone: A Wealth of Life Sciences Innovation and Opportunities
58. Invest Liverpool City Region (2023) Life Sciences Investment Zone: A Wealth of Life Sciences Innovation and Opportunities
59. iiCON (2023) iiCON proves Wirral-made wipes tackle antimicrobial resistant bacteria
60. Liverpool City Region Combined Authority (2024) Robotic labs, fighting infections and skills training among first seven Innovation Zone projects set for approval
61. Invest Liverpool (2022) Inspiring Manufacturing
62. Liverpool City Region Combined Authority and Liverpool City Region Local Enterprise Partnership (2023) Skills Strategy 2018 - 2023
63. Liverpool City Region Combined Authority (2024) Robotic labs, fighting infections and skills training among first seven Innovation Zone projects set for approval
64. Invest Liverpool City Region (2023) Life Sciences Investment Zone: A Wealth of Life Sciences Innovation and Opportunities
65. HM Government (2021) Life Sciences Vision
66. The Association of the British Pharmaceutical Industry (2022) Bridging the skills gap in the biopharmaceutical industry
67. West Yorkshire Combined Authority, (2021). *Climate and Environment Plan.* **Link**
68. West Yorkshire Combined Authority, (2024). *Investment Prospectus.* **Link**
69. First Bus, (2024). *First Bus and Combined Authority announce further £11.2m for Bramley bus depot.* **Link**
70. First Bus, (2024). *First Bus 'switch on' the largest fleet of zero emission buses in West Yorkshire.* **Link**
71. First Bus, (2022). *Over £18million investment sees First Bus order 44 new electric buses for York.* **Link**
72. The Data City designate an 'Innovation Score' to each company in their database, their estimate being based on website information and providing a ranking from zero to three stars.
73. Preistley Centre for Climate Future, (2024). *Enabling Low Carbon Transitions.* **Link**
74. Centre for Green Finance and Investment, (2024). *Leeds Innovation Hub.* **Link**
75. West Yorkshire Combined Authority, (2021). *Climate and Environment Plan.* **Link**
76. West Yorkshire Combined Authority, (2024). *Economic Strategy: Evidence Pack.* **Link**
77. House of Lords Library (2022) Educational attainment gap: Regional disparities **Link**
78. West Yorkshire Combined Authority, (2024). *Economic Strategy: Evidence Pack.* **Link**
79. CBI Economics and ECIU, (2024). *The UK's Net Zero Economy.* **Link**

80. Michael E. Porter (1998) Clusters and the New Economics of Competition
81. Michael E. Porter (1998) Clusters and the New Economics of Competition
82. Zheng et al. (2015) FDI Announcements: A Potential Signal of the Benefits of Cluster Development
83. Edward L. Glaeser and William R. Kerr (2009) Local Industrial Conditions and Entrepreneurship: How Much of the Spatial Distribution Can We Explain?
84. Ellison et al. (2010) What Causes Industry Agglomeration? Evidence from Coagglomeration Patterns
85. Fiona Murray and Phil Budden (2017) A systematic MIT approach for assessing 'innovation-driven entrepreneurship' in ecosystems (iEcosystems)
86. Kahtleen Bolter and Jim Robey (2020) Agglomeration Economies: A Literature Review
87. Michael E. Porter (1998) Clusters and the New Economics of Competition
88. Ellison et al. (2010) What Causes Industry Agglomeration? Evidence from Coagglomeration Patterns
89. European Commission (2021) Clusters of Social and Ecological Innovation in the European Union, Perspectives and Experiences
90. Michael E. Porter (2000) Location, Competition, and Economic Development: Local Clusters in a Global Economy
91. Delgado et al., (2014) Defining Clusters of Related Industries
92. Maryann P. Feldman (2014) The character of innovative places: entrepreneurial strategy, economic development, and prosperity
93. Fiona Murray and Phil Budden (2019) A MIT Approach to Innovation: eco/systems, capacities & stakeholders
94. Fiona Murray and Phil Budden (2017) A systematic MIT approach for assessing 'innovation-driven entrepreneurship' in ecosystems (iEcosystems)
95. Centre for Economic Performance (2006) Exploring the Detailed Location Patterns of UK Manufacturing Industries Using Microgeographic Data
96. Laura Alfaro and Maggie Xiaoyang Chen (2014) The global agglomeration of multinational firms
97. Centre for Cities (2014) Industrial Revolutions: Capturing the Growth Potential
98. Michael E. Porter (1998) Clusters and the New Economics of Competition
99. OECD (2007) Competitive Regional Clusters: National Policy Approaches
100. Department for Levelling Up, Housing and Communities (2023) Local Government Structure and Elections
101. ONS Geoportal (2024) Local Authority Districts (April 2023) Names and Codes in the United Kingdom
102. Local Government Association (2024) Combined Authorities
103. The Data City (2024) What are CLUSTERs?
104. US Bureau of Economic Analysis (2008) What are location quotient (LQs)?

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