

September 2022

The West Midlands

At the centre of UK innovation

For West Midlands Growth Company



Summary

The West Midlands is a resurgent innovation region whose combined competitiveness is even greater than previously recognised.

The places that are innovative and technology-rich increasingly perform well in the world's benchmarks, league tables and indexes. Yet as the world views it, the West Midlands is not usually identified as one place. Individual places within the region such as Birmingham, Coventry, Wolverhampton are usually identified, observed, and measured in isolation from one another. As a result, their complementarity and collective strength has been less visible.

As the global contests have shifted to the focus on science, technology and leading-edge innovation, cities are relying on the applied strengths of their region. Birmingham's new business model (creativity, discovery, knowledge) is a business model where its region, the West Midlands, provides a powerful extra dimension, adding skills, scale, scope and supply chains that the city alone does not have.

Taken together the West Midlands actually compares and competes on a different plane. It has the critical mass, diversity and innovation dynamics to deserve comparison with Europe's top 'middleweight' cities.

Yes, Munich has a renowned regional infrastructure platform. Barcelona is excelling for digital industries. Hamburg is a capital of clean technology. But the West Midlands holds its own in all these areas and stands out as one

of the world's top mid-sized city regions for applied research specialisms and higher education. The West Midlands eco-system has experienced a major uptick in activity and is starting to register major returns and investor interest.

West Midlands' 'multi centre' development model also offers flexibility and choice to companies, investors and workers, and the potential to deliver more environmentally friendly growth than its competitors. The West Midlands retains an affordability advantage, and provides the chance to anchor new locations and sectors of opportunity. Its flexible system of specialist hubs can in future deliver value for citizens, commuters, innovators and investors alike.

The journey to fulfilling the transition from Birmingham as a single city to West Midlands as a multi-centre city platform presents opportunities for developers and investors of real estate, places and ecosystems:

- A variety of investment opportunities without the risk of an overly constrained city centre.
- Capacity to accommodate a mix of functions that appeal to a wider group of domestic and international businesses and investors.
- A larger and increasingly integrated market of consumers and businesses, with different office, housing and lifestyle needs.
- A critical mass of jobs and talent that can boost visibility and unlock further investment.
- Different entry points based on risk appetite and return requirements.

3m population.

150 years

of history as a global centre of innovation in R&D, product design and production.

3 cities, 4 metropolitan boroughs, and
1 integrated region with a shared vision.

10% population growth
up to 2035. (UN)

2nd fastest growth in
business-led R&D investment
since 2014 in Northern and
Western Europe.
(European Innovation Scoreboard)

More FDI attracted in last **25**
years than anywhere else in
the UK outside of London. (EY)

188% expansion of its
innovation ecosystem since
2015. (Dealroom)

See endnotes for full list of sources and definitions.¹



38 minutes to
London once HS2 complete
(to Interchange in Solihull).

Home to **10%** of UK's
high potential investment
opportunities. (DIT)

150,000 students,
more than in any other mid-
sized region globally. (QS)

Home to as many large
homegrown firms in tech-
enabled sectors as Zurich
and Kuala Lumpur.
(Crunchbase)

West Midlands in global context

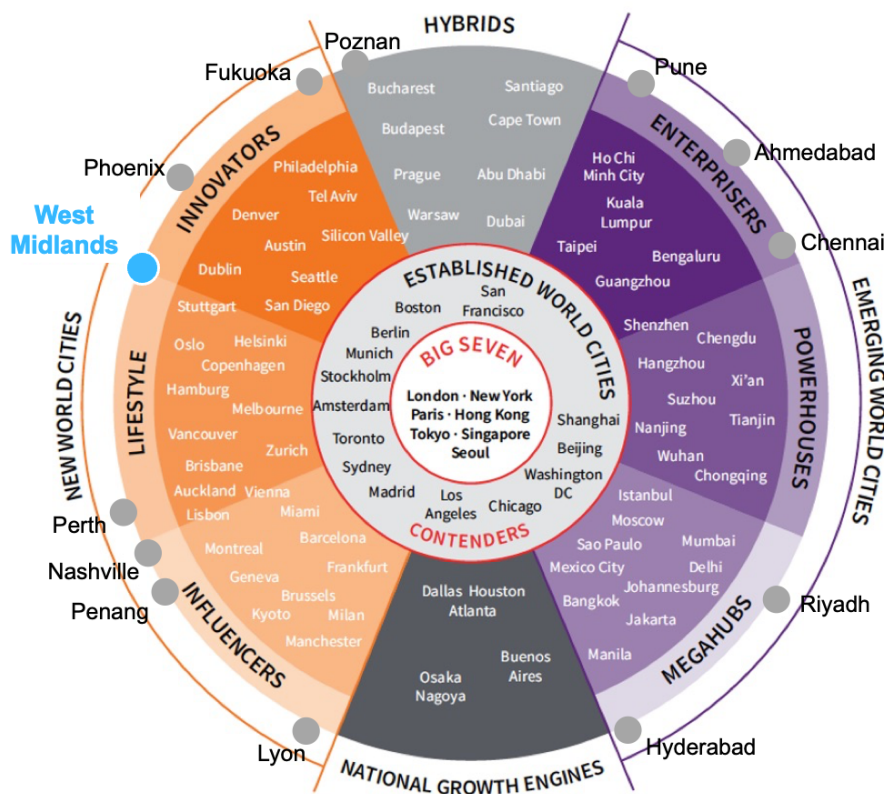
The century-long process of global urbanisation takes place in cycles of 5–10-year periods, defined by the industries that are globalising, the technologies that are scaling, and the preferences of talent and citizens. In the last cycle, which began roughly in 2010, the landscape of which city regions compete and how, has changed.

In 2010, there were 111 **highly globalised world cities** with a critical mass of globally networked companies in advanced knowledge services. At the last count this had risen to **141 cities**.²

Ten years ago, just 12 cities in Europe and North America absorbed more than \$300m of **venture capital**. Today this has increased more than fivefold, to **67 cities**.³

A decade ago, there were 43 **financial centres** that had the assets and international perception to be rated as internationally or globally significant. Today this has doubled, to **86**.⁴

Over this period, 100 cities have led the way for global real estate investment and all-round competitive success (see Chart). In the next cycle, West Midlands is part of a new cycle of city regions that are gradually competing and specialising in global markets. This group includes Nashville, Phoenix, Fukuoka, Pune, Riyadh and others. These cities are differentiating themselves through new infrastructure, placemaking, signature real estate, and metropolitan co-operation. West Midlands is starting to distinguish itself as a home for founders and innovators, with more of the liveability ingredients to suit the next generation of workforce.



Adapted from JLL and The Business of Cities (2019)

West Midlands in 2022: in figures

Building critical mass

1. The 5th densest major built-up area in Europe.⁵
2. Forecast to be among the top 5 fastest-growing major metropolitan areas in Europe, and top 15 for share of young people across both Europe and North America.⁶
3. Among top 10% fastest growing jobs base of all city regions in the OECD since 2015.⁷

A fast-moving innovation hub

4. The 9th most mature innovation ecosystem in EMEA.⁸
5. More homegrown early-stage tech-enabled companies, and more large corporate HQs, than Lisbon and Milan.⁹
6. Ahead of Hamburg and Tel Aviv for the size of its talent pool.¹⁰

A world-class education proposition

7. Is the top mid-sized city region in the world for exports of higher education and student presence¹¹, and in the top 3 mid-sized city regions globally for how many globally competitive universities there are.¹²
8. Has more top 100 universities than San Diego, Stuttgart or Milan.¹³
9. Has the 2nd highest share of students intending on staying in the region post-graduation among major UK city regions outside London, after Edinburgh.¹⁴

Variety of innovation and investment locations

10. More established set of recognised innovation districts and hubs than Dublin, Portland, and Hamburg.
11. One of 10 non-capital European city regions that is home to the full range of innovation place types: city centre hubs, suburban technology parks, university-led campuses and specialised industry locations.¹⁵
12. Viewed more favourably among European real estate investment experts for its future development prospects than Frankfurt, Barcelona and Stockholm.¹⁶

Rising to the connectivity challenge

13. Faster than average mobile broadband connectivity among 150 major city regions globally, including Milan and Beijing.¹⁷
14. More commuter rail stations like for like than Toronto, Frankfurt and Washington DC.¹⁸
15. Better placed for the EV transition than 70% of major urban areas in Europe and North America, with more charge points like for like than Brussels, Boston and Barcelona.¹⁹

This work has defined the West Midlands region as the 7 constituent local authorities in the West Midlands Combined Authority. The 7 local authorities are City of Birmingham, City of Wolverhampton, City of Coventry, Dudley, Sandwell, Solihull and Walsall.

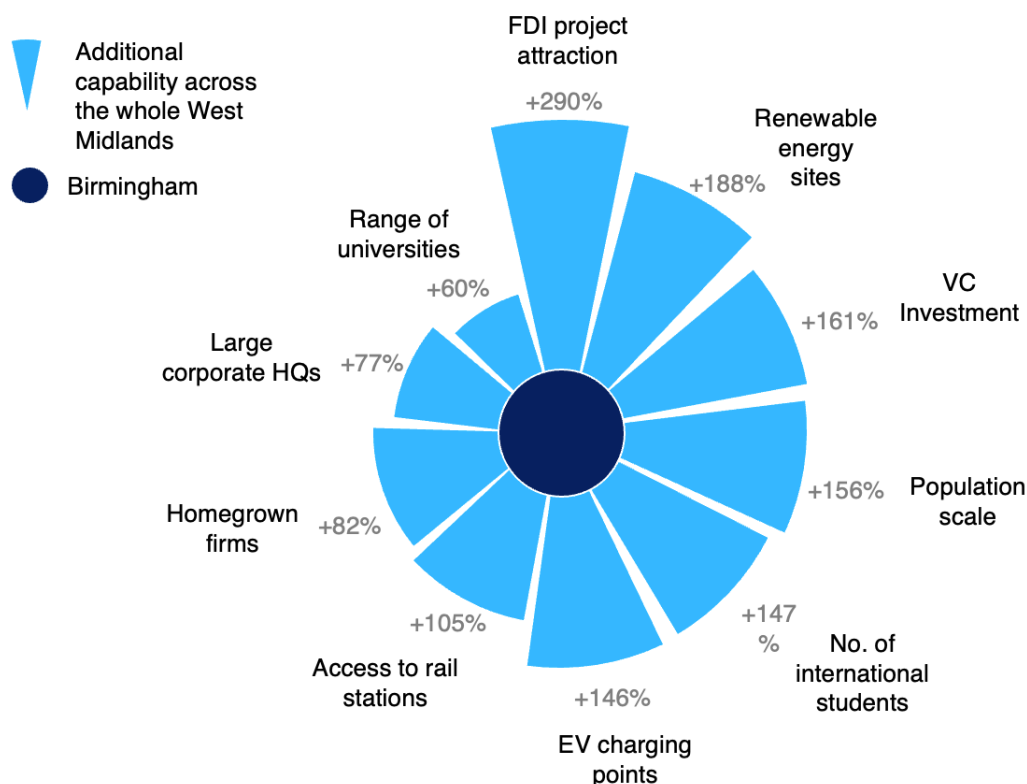
The added value of the region

The West Midlands as a multi city-region is in fact more competitive than usually given credit for because of what the region adds to the cities.

The sharing of assets, resources and economic specialisations means that Birmingham, Coventry, Wolverhampton and others have a combined scale, common factors and complementary assets that allow them to punch above their individual weight. Whether for investment, demand or sustainable infrastructure, the West Midlands as a combined region has much larger reach and capacity than any one city alone (Figure 1). With the next stage of connectivity and development, the West Midlands will soon have the feel and appeal of a much larger metropolis.

The West Midlands together has internationally competitive scale, demand and recognition

Figure 1: West Midlands' performance in key performance indices compared to Birmingham alone



Sources (clockwise from top): [EY](#), [UK National Government](#), [Dealroom](#), [Local Statistical Agencies](#), [QS](#), [Department for Transport](#), The Business of Cities research, [Crunchbase](#), [Crunchbase](#), [QS](#).²⁰

Innovation scale

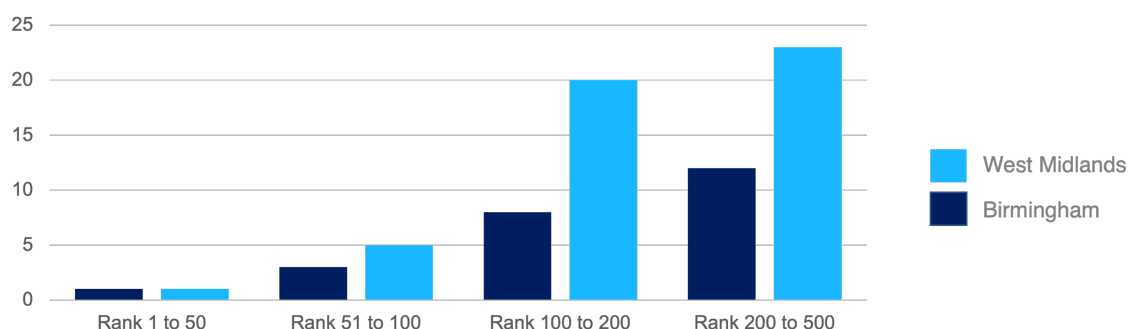
The innovation promise of the West Midlands has so far been undersold by a presumption that the region is principally a specialist in automotive, and a tendency just to use Birmingham as a shorthand for what is in fact a much larger and more diversified region. In fact, across the whole innovation economy the West Midlands creates tech companies at an impressive rate in a variety of sectors.²¹

The region elevates Birmingham in a number of innovation arenas:

- **Breadth of technology company size.** The region combined aggregates large firms (e.g. Gymshark in Solihull, Cadent Gas in Coventry), promising mid-sized companies (e.g. M&J Evans Construction and Brownhill Investments in Walsall) and rapidly scaling ecosystem catalysts (e.g. GivePenny in Stourbridge, PurpleBricks and Hydrogen Hub in Solihull). Altogether West Midlands is now the home of as many large tech-enabled businesses as important commercial hubs such as Zürich, Santiago, and Kuala Lumpur.²² This is a big reason why in 2021 West Midlands outranked Berlin and Amsterdam for its innovation potential.²³
- **R&D investment capacity.** In 2021, the region ranked 11th for total private R&D among regions containing a major city, ahead of Amsterdam, Düsseldorf and Hamburg.²⁴
- **VC investment.** In the 5 years to 2022, the region was recognised for attracting nearly \$500m of VC investment, more than half going to firms outside of the core City of Birmingham.²⁵
- **Specialised university expertise.** The West Midlands' combined number of global top 500 rankings for science-related subjects (49) is higher than in other regional higher education hubs such as Dublin and Vancouver (see Figure 2).²⁶ There are 2 universities in the UK top 20 for research excellence, with 34% of regional research considered world-leading in terms of originality, significance and rigour.²⁷
- **Breadth of knowledge/business partnerships.** The frequency of collaboration between universities and businesses in the West Midlands is a competitive edge. Prominent examples include the Energy Research Accelerator, supported by 3 universities (Birmingham, Warwick & Aston), to solve the energy industry's most pressing challenges; Jaguar Land Rover, the University of Warwick and Plug and Play UK's mobility programme on advanced propulsion and CAVs; and the University of Birmingham and Bruntwood SciTech's Health Innovation Campus.
- **Talent pipeline.** There are 9 universities in the West Midlands, 5 in the Top 1,000 globally. This puts it 2nd in the world among mid-sized city regions. The Universities of Warwick, Wolverhampton and Coventry are essential components in attracting and developing more students combined than in any other region of its size globally.²⁸

West Midlands' amplified science research and discovery capabilities

Figure 2: Number of universities ranking in global top 500 across science subjects, West Midlands vs Birmingham



Source: [Shanghai Ranking](#).

At the regional scale there is major demand for different kinds of space to serve the variety of growth companies, institutes, university facilities, the talent that fuels them and the corporate investors who wish to be part of this enlarged ecosystem.

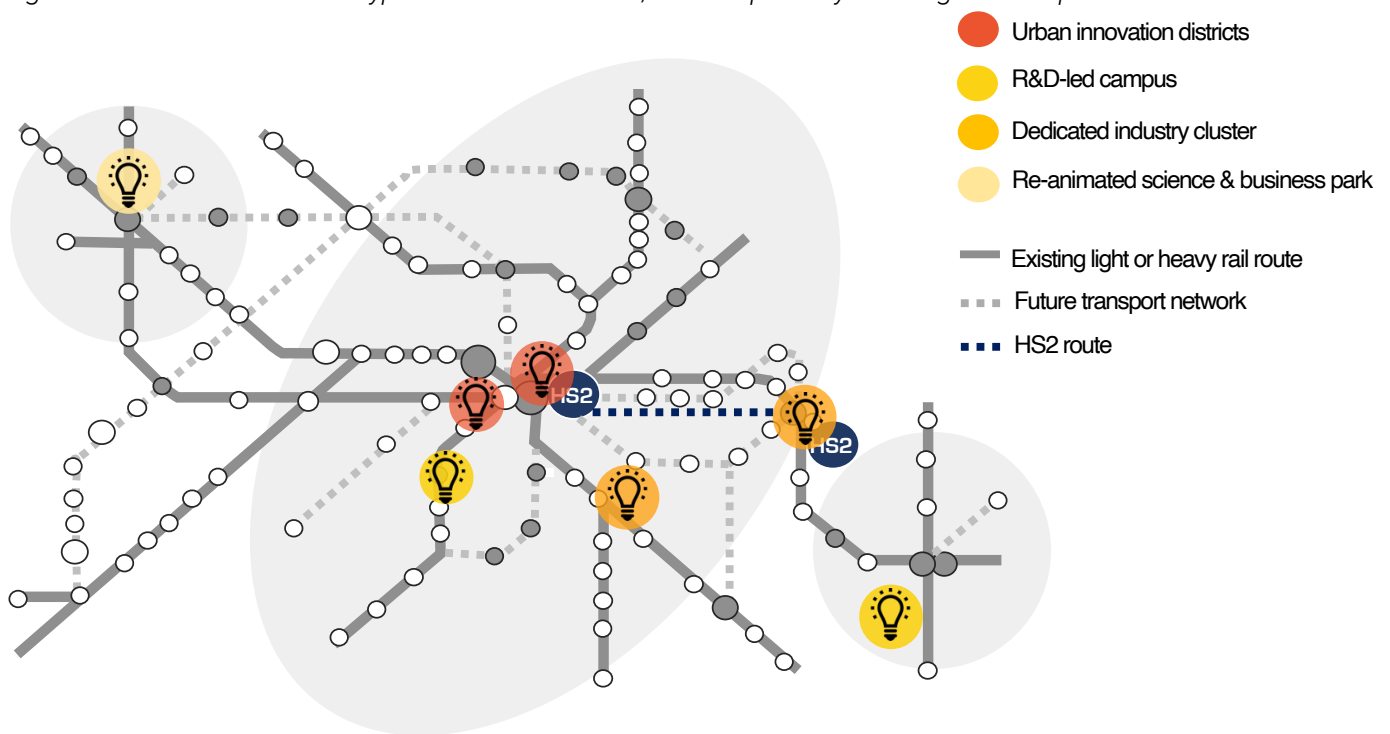
Innovation location variety

While many other UK city regions have grown outwards from a single city, West Midlands has a distinct multi-centre form. It is home to three cities and four metropolitan boroughs, which together host multiple important locations for firms, universities, talent and housing. Each requires a distinctive development and real estate platform to succeed and excel.

The West Midlands ecosystem is home to a variety of locations, at different stages and with distinct specialisms. The multi-city region already boasts more recognised hubs of innovation than most regions, that are host to SMEs, facilities and established firms. These accommodate industries across a range of advanced digital, productive and creative sectors. With HS2 unlocking a new innovation cluster around Arden Cross, West Midlands is one of 10 non-capital European city regions that are home to the full recognised suite of innovation-rich investment locations – urban innovation districts, R&D led campuses, industry hubs, and re-animated science & business parks (see Figure 3).²⁹

The variety of spatial formats for hosting innovation sets the West Midlands apart

Figure 3: Innovation locations and types in the West Midlands, and their proximity to the regional transport network



West Midlands has the breadth to meet the requirements and strategic priorities of many kinds of investors. Its borrowed scale provides greater flexibility in where investment can be allocated and diversified when circumstances are right.³⁰

The variety of innovation players within the region depend on a high-interaction development platform to be brought forward by real estate developers and institutional investors. Demand for amenity, vibrancy and porosity is set to grow to match the number, size and specialisms of each location. This offers many entry points for investors with different return objectives, sector focus and risk appetite.

Infrastructure platform for innovation

West Midlands emerges as a region whose backbone is highly connected. It has a higher concentration of rail stations than places presumed to be much better connected, such as Toronto, Frankfurt and Washington DC. Half of these are in the wider region, beyond Birmingham. The region is among the top 50 worldwide for the share of people who live within easy walking distance of essential services.³¹ This connectivity will grow and diversify with the arrival of HS2 and Arden Cross.

As a region, West Midlands is much more digitally connected than Birmingham is by itself. Thanks to average speeds 20% higher at the fringes of the region, WM has stronger mobile connectivity on average than Milan, Hamburg and Helsinki.³² Launched in 2020, 5PRING built on the West Midlands' early adoption of 5G technology to become the UK's first 5G commercial application accelerator.

The region is a strong platform for both the innovation and roll-out of EVs. West Midlands has more EV charging locations like for like than 70% of other major cities in Europe and North America, including Brussels, Boston and Barcelona.³³ As a region, its industrial building capacity and high solar uptake means it also has the potential to produce similar levels of solar energy to larger cities in much hotter climates such as Buenos Aires. Coventry and Wolverhampton are each forecast to produce more solar energy than Mexico City up to 2031.³⁴

Infrastructure advantages have helped West Midlands to over the long run consistently attract more FDI than anywhere else in England and Wales outside of London. Nearly 40% of this FDI has occurred in the areas surrounding Birmingham.³⁵ This ratio is in contrast to other more "single centre" UK city regions. More global investors are becoming aware of the advantages that the multi-centre region brings: West Midlands' perceived development prospects among these audiences are up year-on-year, and are now higher than in Frankfurt, Barcelona and Stockholm.³⁶

Future regional innovation infrastructure is well co-ordinated. The West Midlands Innovation Board helps to coordinate regional innovation coordination, overseeing the West Midlands Innovation Programme and the Innovation Accelerator, a programme prioritised with £100m government investment to build on the region's engineering and manufacturing strengths.

The physical and digital infrastructure of the West Midlands is the basis for a more productive and innovative region, that is able to grow and attract world-class, industry-shaping companies. New and forthcoming development projects add to the opportunities for the West Midlands to become a more efficient freight and distribution platform and to grow its specialisms in low-carbon infrastructure and innovation.

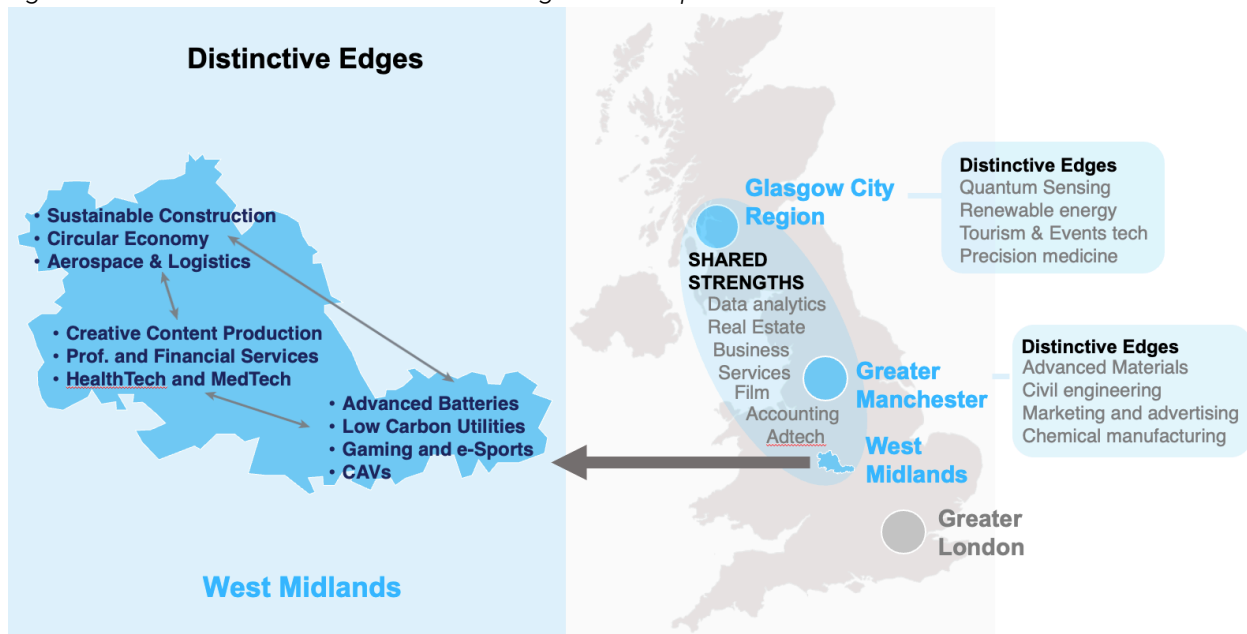
Complementary innovation

West Midlands' constituent parts add scale and complementarity to the combined innovation platform. For many years the region has been viewed principally as the UK's capital of automotive and advanced manufacturing. But in 2022 the West Midlands' recognised edges are much more diverse. The urban clusters of HealthTech and MedTech, experienced professional and financial services, creative content production and gaming, all combine effectively with the more distributed capabilities – the manufacture of future housing, aerospace, electrical light vehicles, battery storage devices, low carbon utilities, and circular economy (see Figure 4).³⁷

Together, the different centres in the West Midlands display strengths across the whole innovation chain, from scientific discovery and enabling technologies, to market applications, and place-based innovations.

West Midlands' innovation specialisms share complementarities regionally and nationally

Figure 4: Observed West Midlands innovation strengths and complementarities with the other UK innovation accelerators



With the right kinds of institutional and investment support, West Midlands is well placed to play a leading role in the UK's net zero journey, including sustainable methods of construction, electric and other alternative fuel transport, retrofitting energy grids, recycling of rare earth materials, a sustainable professional services industry and plans to build the UK's largest battery Gigafactory in Coventry.

The breadth of the West Midlands' regional innovation platform, combined with its location and connectivity advantage, makes it an essential part of the UK's innovation future. This creates significant long-term demand for high quality settings and spaces for business, enterprise, knowledge and talent.

Future promise and prospects

Over the longer term, the West Midlands' innovation promise is reinforced by two under-rated areas of competitive advantage that emerge strongly when looked at as a whole region.

1. Positive demographics. West Midlands is already one of Europe's fastest-growing and diverse city regions, outperforming in jobs growth places like Paris, Toronto and Amsterdam.³⁸ The region is forecast to be among the top 5 fastest growing major regions in Europe.³⁹ As population has grown, West Midlands has also become much more diverse, by culture and age.⁴⁰ In 2022, West Midlands is among the top 15 major European and North American regions for how many people are children and young teenagers.⁴¹ The region has a more robust and futureproof supply of future consumers and workers than most, especially compared to European and some East Asian competitors. West Midlands' combined affordability advantage translates into a bigger and more effective labour market and greater choice and diversity in housing stock for all different income levels.⁴²

2. Lifestyle and habitat. West Midlands' multi-centre model gives it more potential to bring forward more places that host a high-interaction high-amenity environment. In 2022, the region as a single built up area is in fact the 5th densest in Europe among major regions, and fully three-quarters of people live within easy walking distance of education and health facilities.⁴³ Across measures of living standards, income equality, work-life balance, time spent commuting and access to green space, West Midlands as a region does better as the sum of its parts. It has more green space coverage than Amsterdam or Berlin.⁴⁴ It is among the top 3 major city regions in Europe for how clean the air is on average, and 6th among 50 similar regions for how efficiently road transport is managed, ahead of Barcelona, Milan and Seattle.⁴⁵

More people are becoming aware of these competitive advantages for the future innovation and talent platform of the region. There are many opportunities for world-class real estate, combined leadership and public engagement to build exceptional places to match this potential. With the right investment and curation, West Midlands can become a stand-out region internationally for founders and innovators, whose multi-centre character is the foundation for the quality of place, space and lifestyle that its talent will require.

References and endnotes

- ¹ Sources (from top to bottom, left to right): [UN](#), [European Commission](#), [EY](#), [Dealroom](#), [DIT](#), [QS](#), [Crunchbase](#). FDI projects across whole West Midlands region (6 counties: Herefordshire, Shropshire, Staffordshire, Warwickshire, West Midlands, Worcestershire), 1997-2019. Innovation ecosystem expansion based on comparing total value of all innovative firms in 2021 and 2015. Homegrown firms = tech-enabled firms with their HQ in Birmingham/West Midlands.
- ² GaWC Group. The World According to GaWC. (Alpha and Beta). <https://www.lboro.ac.uk/microsites/geography/gawc/world2010.html>; <https://www.lboro.ac.uk/microsites/geography/gawc/world2020t.html>
- ³ Based on 2011 to 2021 data. Dealroom data. (Publicly available via the Dealroom database: <https://dealroom.co/>)
- ⁴ Z/Yen Global Financial Centres Index, editions 22 and 32. https://www.longfinance.net/documents/128/GFCI_12.pdf; https://www.longfinance.net/documents/3061/GFCI_32_Report_2022.09.22_v1.0_.pdf
- ⁵ Major = built-up areas with more than 2.5m people. Demographia data: <http://www.demographia.com/db-worldua.pdf>
- ⁶ % of population aged 0-14. OECD data; On a par with Vienna, Manchester and Lyon. Major = >2.5m people in metropolitan area. <https://stats.oecd.org/Index.aspx?DataSetCode=CITIES>
- ⁷ Excluding US and Mexico. 2015-2020. Jobs base = % growth in no. of employees aged between 15 and 64. OECD data. <https://stats.oecd.org/Index.aspx?DataSetCode=CITIES>
- ⁸ Birmingham-Coventry scale. Hickey & Associates Global Innovation Hubs Index 2021. Data not publicly available.
- ⁹ Crunchbase data, September 2022. Early stage tech-enabled start-up HQs = tech-enabled firm HQs founded since 2000 ranking outside the global top 10% in Crunchbase's aggregate measure of firm activity, online and media visibility, investment momentum, etc. Large Corporate HQs = tech-enabled firm HQs with more than 1,000 employees. Publicly available via the Crunchbase database: www.crunchbase.com/home
- ¹⁰ Like for like talent pool = Number of registered employees working in the knowledge, policy and digital economies as registered on LinkedIn, per 10,000 people living in the city. Based on TBoC research.
- ¹¹ Mid-sized cities = <3.5m metropolitan population. Exports of higher education = no. of international students. Data from QS: https://www.topuniversities.com/qs-world-university-rankings?qs_qp=topnav
- ¹² Globally competitive = ranking in the top 1,500 in the world according to QS. https://www.topuniversities.com/qs-world-university-rankings?qs_qp=topnav
- ¹³ QS data: https://www.topuniversities.com/qs-world-university-rankings?qs_qp=topnav
- ¹⁴ Knight Frank/UCAS Student Accommodation Survey 2021: <https://www.knightfrank.com/research/report-library/knight-frank-ucas-student-accommodation-survey-report-2021-7707.aspx>
- ¹⁵ Non-capital = city that is not the largest or capital city in its nation state (e.g. Zurich in Switzerland). Full range = home to each of city centre hub, suburban technology park, university-led campus and specialised industry location. *Includes Health Innovation Campus, which is currently under construction. Definitions based on The Business of Cities/Connected Places Catapult research: https://cp.catapult.org.uk/wp-content/uploads/2021/04/CapitalQuartersHandbook_V11.pdf
- ¹⁶ PwC/ULI Emerging Trends in Real Estate Europe 2022: <https://www.pwc.com/gx/en/industries/financial-services/asset-management/emerging-trends-real-estate/europe-2022.html>
- ¹⁷ The Business of Cities research, based on aggregating all MLab speed test results within a 30km radius from city centres, June to August 2022. Final average speeds weighted in line with other global speed test studies (90% download, 10% upload; plus modified trimean 1:2:1 ratio for 10th percentile, 50th percentile and 90th percentile). Major cities = >2.5m metropolitan population
- ¹⁸ Heavy rail (suburban/commuter rail and metro) stations per 10,000 people. The Business of Cities research, based on local and national statistics.
- ¹⁹ The Business of Cities research, based on EV charging points within a 30km radius from city centres, indexed to population within the same radius as defined by WorldPop (based on estimated building density & occupancy). Major urban areas = >2m people living within 30km radius of city centre.
- ²⁰ FDI projects across wider WM region (6 counties: Herefordshire, Shropshire, Staffordshire, Warwickshire, West Midlands, Worcestershire), 1997-2019. [EY Trends in Foreign Direct Investment in Great Britain's Towns](#). Rail station density = no. of rail stations per 10,000 people. Homegrown firms = tech-enabled firms with their HQ in Birmingham/West Midlands. Large Corporate HQs = tech-enabled firm HQs with 1,000+ employees.
- ²¹ Crunchbase data. Total number of tech-enabled firm HQs compared to population size.
- ²² Crunchbase data. Large corporate HQs = tech-enabled firm HQs with more than 1,000 employees.
- ²³ Hickey & Associates Global Innovation Hubs Index 2021. Data not publicly available. Based on VC investment, patents and tech job creation, growth in millennials, no. and density of start-ups, growth in R&D investments, international student presence and all-round labour force growth
- ²⁴ European Innovation Scorecard (NUTS2 region scale): https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/regional-innovation-scoreboard_en
- ²⁵ Dealroom data (September 2022).
- ²⁶ Shanghai Ranking: <https://www.shanghairanking.com/rankings/arwu/2022>
- ²⁷ Research Excellence Framework results 2021: <https://results2021.ref.ac.uk/> Percentage of research across all subjects with 4* overall score across all universities in West Midlands.
- ²⁸ QS data: https://www.topuniversities.com/qs-world-university-rankings?qs_qp=topnav
- ²⁹ Based on The Business of Cities' database of more than 500 innovation locations globally.
- ³⁰ The Business of Cities and Connected Places Catapult 'Hubs of Innovation' Playbook: https://cp.catapult.org.uk/wp-content/uploads/2021/04/CapitalQuartersHandbook_V11.pdf
- ³¹ ITDP Pedestrians First: <https://pedestriansfirst.itdp.org/city-tool/step-1> Health and Education services
- ³² The Business of Cities research, based on aggregating all MLab speed test results within a 30km radius from city centres, June to August 2022. Final average speeds weighted in line with other global speed test studies (90% download, 10% upload; plus modified trimean 1:2:1 ratio for 10th percentile, 50th percentile and 90th percentile).
- ³³ The Business of Cities research, based on aggregating EV charging points within a 30km radius from city centres and comparing to population within the same radius as defined by WorldPop (based on estimating building density and occupancy).
- ³⁴ Google Sustainability Insights: <https://insights.sustainability.google/>
- ³⁵ [EY Trends in Foreign Direct Investment in Great Britain's Towns](#) (Urban areas = "large towns"). West Midlands refers to the larger area containing 6 counties: Herefordshire, Shropshire, Staffordshire, Warwickshire, West Midlands, Worcestershire.
- ³⁶ PwC/ULI Emerging Trends in Real Estate Europe 2022: <https://www.pwc.com/gx/en/industries/financial-services/asset-management/emerging-trends-real-estate/europe-2022.html>
- ³⁷ West Midlands Plan for Growth: <https://www.beta.wmca.org.uk/what-we-do/economy-and-innovation/plan-for-growth/>
- ³⁸ OECD data: <https://stats.oecd.org/Index.aspx?DataSetCode=CITIES>. 2015-2020.
- ³⁹ UN World Urbanisation Prospects 2018: <https://population.un.org/wup/>. Data to 2035.
- ⁴⁰ TimeOut World's Best Cities 2022: <https://www.timeout.com/things-to-do/best-cities-in-the-world>
- ⁴¹ OECD data: <https://stats.oecd.org/Index.aspx?DataSetCode=CITIES>. Major = >2.5m metropolitan population. Coventry data based on most recent UK census.
- ⁴² WM is more affordable than Birmingham on both median multiple housing affordability measures (based on median multiple, which calculates ratio between median household income and median home price) and on rental affordability measures (based on self-reported, citizen uploaded data).
- ⁴³ Demographia data: <http://www.demographia.com/db-worldua.pdf>; ITDP – Pedestrians First: <https://pedestriansfirst.itdp.org/city-tool/step-1>
- ⁴⁴ ISGlobal Cities Ranking – Green Space: <https://isglobalranking.org/city/west-midlands-urban-area/#green>
- ⁴⁵ Plume Labs: <https://air.plumelabs.com/air-quality-in-Birmingham-b8Qj> (based on average of average annual air quality index and number of days per year of "fresh air" air quality); EasyPark Cities of the Future – Transport Management: <https://easyparkgroup.com/studies/cities-of-the-future/en/> (among other metropolitan areas >3m people). Score based on congestion level, time spent commuting, and satisfaction of locals with journey to work.

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