

INVESTLIVERPOOL
ADVANCING THE CITY REGION



**THE FUTURE OF
BIOMANUFACTURING**

WELCOME TO A PLACE THAT DELIVERS.





WELCOME TO EUROPE'S MOST SIGNIFICANT CLUSTER OF BIOMANUFACTURING.

Liverpool City Region is home to the world's biggest pharmaceutical players.

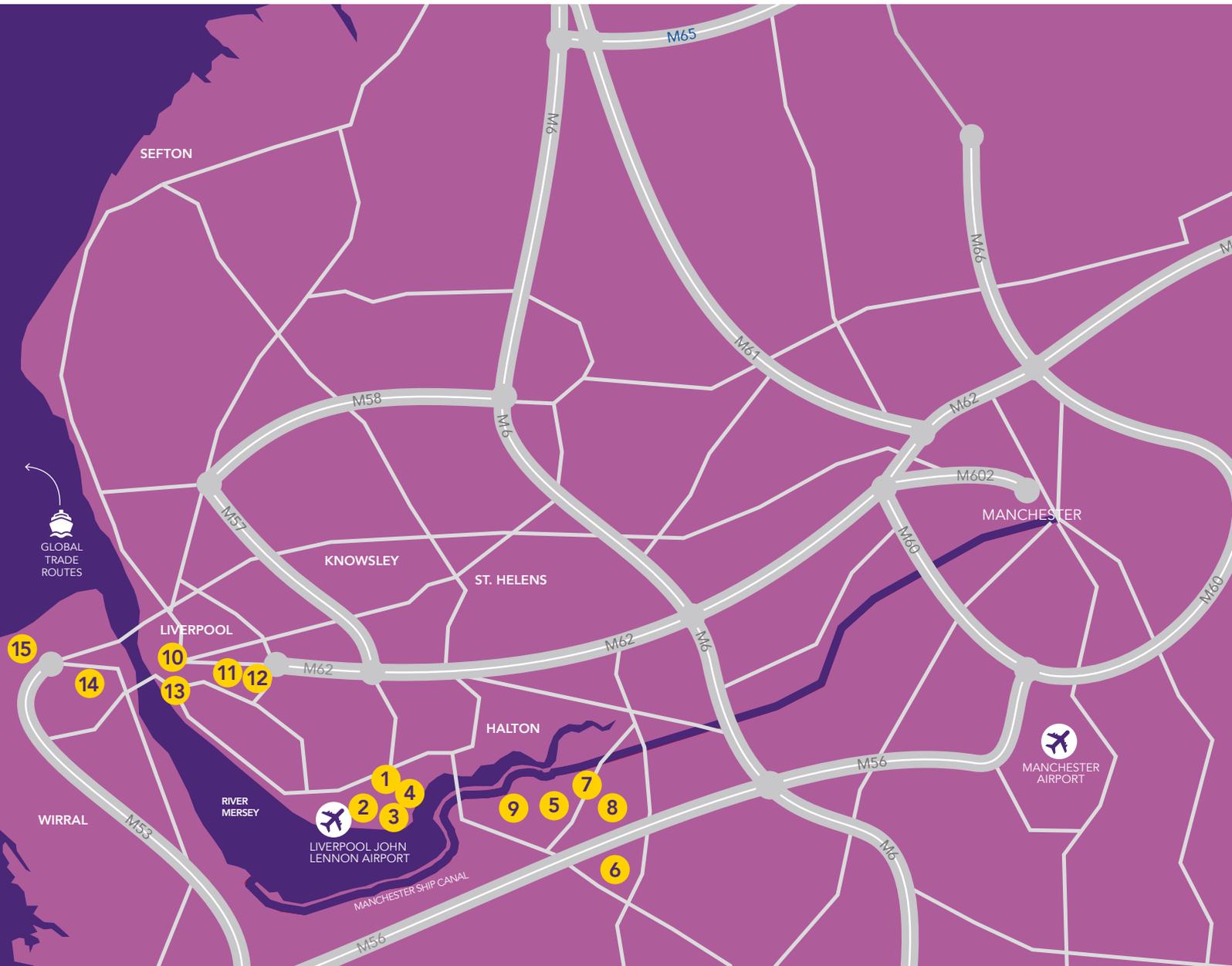
It is also one of the world's longest established biomanufacturing centres, chosen by the UK government in the 1940s for the largest penicillin manufacturing plant in the world. Major companies continue to build on this long-tradition and reinvest in new world-class facilities.

Our formula for pharma manufacturing success is clear. Liverpool City Region sits at the centre of the UK's chemical engineering industry; is part of a major centre for health and life sciences and is driving the advanced manufacturing sector through digital innovation. The convergence of these assets has a catalytic impact on the availability of the science, technology and engineering talent that underpins biomanufacturing.

Most importantly though, a committed partnership of local organisations is supporting existing manufacturers and the wider supply-chain, through programmes to invest in the infrastructure, facilities and skills that the sector needs to succeed.

Welcome to your future-proofed business location.





KEY:

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| <ul style="list-style-type: none"> 1. AstraZeneca/Medimmune - Vaccine manufacture 2. Allergan - Biologics 3. Seqirus - Vaccine manufacture 4. Lilly/Elanco - Pharma and animal health 5. Thermo Fisher Scientific - Pharmaceuticals 6. Teva - Pharmaceuticals 7. Fresenius Kabi - Nutraceuticals 8. Sci-Tech Daresbury - Science & technology campus | <ul style="list-style-type: none"> 9. Thompson & Capper - Pharmaceuticals 10. Knowledge Quarter - Innovation District 11. Baxter Healthcare - New clinical treatments 12. Nutricia - Nutraceuticals 13. Vitaflo - Nutraceuticals 14. PharmaPac - Pharmaceutical products 15. Bristol-Myers Squibb - Pharmaceutical research |
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SIZE AND SCALE MATTERS.

There is no better validation of Liverpool City Region's biomanufacturing prowess than the global players that choose to locate and reinvest here. From stem cell and gene therapy treatments and nutraceuticals research and development, to large scale manufacturing and the production of pharmaceuticals, vaccines and biologics. You'll find exemplar companies in every corner of the city region, but there are major concentrations around Speke in South Liverpool and Runcorn.

Our major investors include:

AstraZeneca - the MedImmune biologics site delivers 20 million flu vaccines and has seen £75 million investment to enhance research and bulk manufacturing.

Lilly - major facility for the past fifty years specialises in fermentation and biotechnology, manufacturing products for Elanco, Lilly's animal health division.

Seqirus - Centre of Excellence for egg-based influenza vaccines, one of the biggest biotech sites in Europe and the only injectable influenza vaccine manufacturer in the UK.

Allergan Biologics - state of the art development and clinical manufacturing facility and a Centre of Excellence for Biologics R&D.

Thermo Fisher Scientific - global manufacturing site and international training academy, includes chromatography and drug discovery operations.

Teva - manufactures sterile products for use in the treatment of respiratory conditions such as asthma and chronic obstructive pulmonary disease.

Nutricia - part of Danone, has invested more than £20 million in the development and manufacturing centre for protein-free medical nutrition brands.

Vitaflo - part of Nestlé Health Science, at the forefront of developing innovative clinical nutrition products for metabolic disorders, nutrition support and conditions such as kidney disease.

Bristol-Myers Squibb - undertakes chemistry, manufacturing and control (CMC) activities with new investment in pharmaceuticals and clinical supply packaging areas.

Baxter Healthcare - production and laboratory facility responsible for the development and manufacture of Icodextrin, used in a product to treat renal disease.



Image courtesy of Seqirus

CASE STUDY: **SEQIRUS**

Seqirus Liverpool is a Centre of Excellence for egg-based influenza vaccine manufacturing. It is one of the largest biotechnology sites in Europe and the only injectable influenza vaccine manufacturer in the UK. It also produces the only licensed adjuvanted seasonal influenza vaccine.

In 2017, Seqirus, the world's second largest influenza vaccine provider, announced a further £40 million investment for the site creating 100 new jobs. This expansion takes the total investment to £60 million over the last two years. The additional jobs will take the number of employees to over 700. The company, which is part of global biotherapeutics leader CSL from Australia, cements Liverpool as the country's largest flu vaccine manufacturing facility.

"Speed is of the essence in a pandemic situation. This investment means we can complete production of more pandemic vaccine much more rapidly, saving vital days in getting vaccines out to protect the British population as well as to other countries around the world," said Laura O'Brien, VP of operations and site head at Liverpool.



CLUSTER BENEFITS.

This large cluster of medicine manufacturers in Liverpool City Region brings several key benefits for locally-based companies.

Deep Regulatory Expertise

There is a high level of regulatory experience across the region, with manufacturing teams having worked with bodies such as the Medicines & Healthcare Products Regulatory Agency (MHRA) over many years.

Dynamic Pool of Workers

With so many medicines manufacturers within a short distance, there is a dynamic talent pool of experienced staff, from production line staff to clinical technicians to senior management. There are far more career choices for people in biomanufacturing in and around the Liverpool area, which makes it an attractive place to locate and recruit in.

Strong Local Supply-Chain

Alongside the major global manufacturers, you will find a strong local supply-chain of small and medium sized companies that serve the sector in a variety of ways from medical packaging to specialist logistics. The resilience that this brings to companies that are based here is another strength of being part of such a large cluster.

CASE STUDY: ASTRAZENECA

MedImmune is the global biologics research and development arm of AstraZeneca.

The biologics site at Speke, Liverpool brings together research scientists, manufacturing associates, engineers, quality professionals and support personnel that are committed to delivering vaccines that tackle each year's particular flu strain or mutation.

Over the last few years, around £75 million has been invested to bring all aspects of vaccine strain development and manufacture together in Liverpool and increase production.

The site now has the facilities to research, develop, produce and distribute up to 20 million vaccine doses a year for the global market. In the UK, bulk-manufacturing capabilities enable MedImmune to supply the nasal spray influenza vaccine Fluenz as an important part of the Government's extended childhood flu vaccination programme.

AstraZeneca is an active partner with local universities and research bodies. The Centre for Drug Safety Science at the University of Liverpool, brings together companies like AstraZeneca with regulatory authorities and academic researchers to work collaboratively on drug safety. The Centre is funded by the Medical Research Council (MRC) and carries out work of national importance.



BIOMANUFACTURING TALENT ON TAP.

Liverpool City Region is home to three major universities and 55,000 students. There are a further 10 universities in or close to the city region and 210,555 students studying at Higher Education Institutions within 30 miles.

Schools, colleges and universities in Liverpool City Region are involved in some of the world's most important science and engineering projects that provide a future-proofed recruitment pool full of the manufacturing and medical talent pharmaceutical firms need.

The amount of new investment in science, technology and engineering facilities and capabilities is testament to the ambition and vision of an academic cluster that works closely with major manufacturers.

University of Liverpool – a world-class university, one of the Russell Group of top ranking research universities in the UK. Its world-shaping work and an international reputation for research into advanced materials, personalised health and infectious diseases. The chemistry department is known for its research into new materials and nanosciences; while the computer science department is ranked in the top three in the UK.

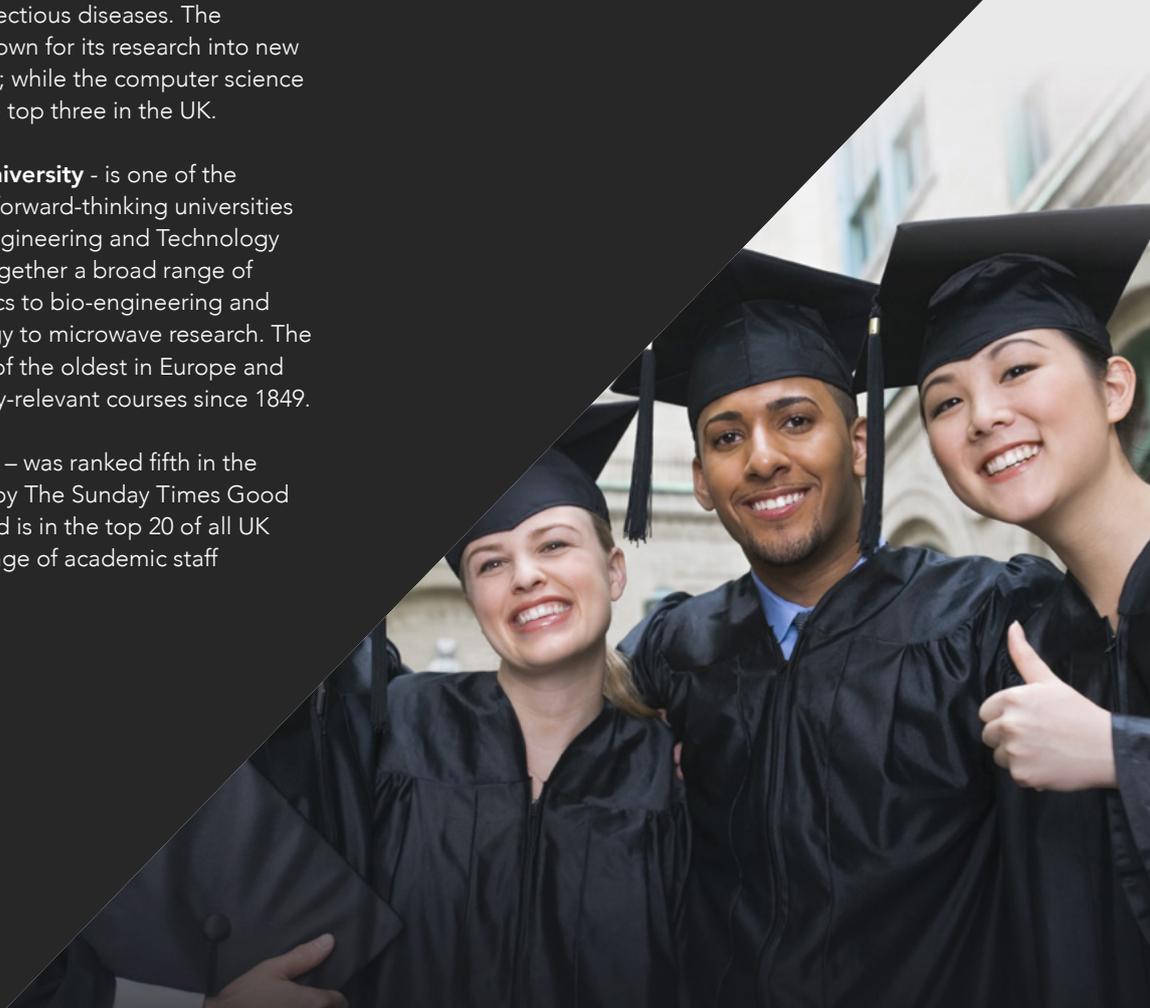
Liverpool John Moores University - is one of the largest, most dynamic and forward-thinking universities in the UK. The Faculty of Engineering and Technology Research Institute brings together a broad range of disciplines, from astrophysics to bio-engineering and computer games technology to microwave research. The School of Pharmacy is one of the oldest in Europe and has been delivering industry-relevant courses since 1849.

Liverpool Hope University – was ranked fifth in the UK for student satisfaction by The Sunday Times Good University Guide in 2016 and is in the top 20 of all UK universities for the percentage of academic staff with doctorates.

Edge Hill University – voted The Times Higher Education University of the Year in 2015, Edge Hill is a hub for research around sports science and health-related issues.

Liverpool Life Sciences University Technical College - the first school in the UK specialising in science and healthcare for 14 to 19 year olds. The UTC provides outstanding academic and vocational education by working closely with local employers to create the next generation of scientists, healthcare practitioners, engineers and entrepreneurs.

Liverpool School of Tropical Medicine - founded in 1898, was the first institution in the world dedicated to research and teaching in the field of tropical medicine. It attracts more than 600 students, from PhD research and Masters programmes to a range of professional courses. It is one of the world's most important centres in the fight against malaria and other insect-borne diseases.





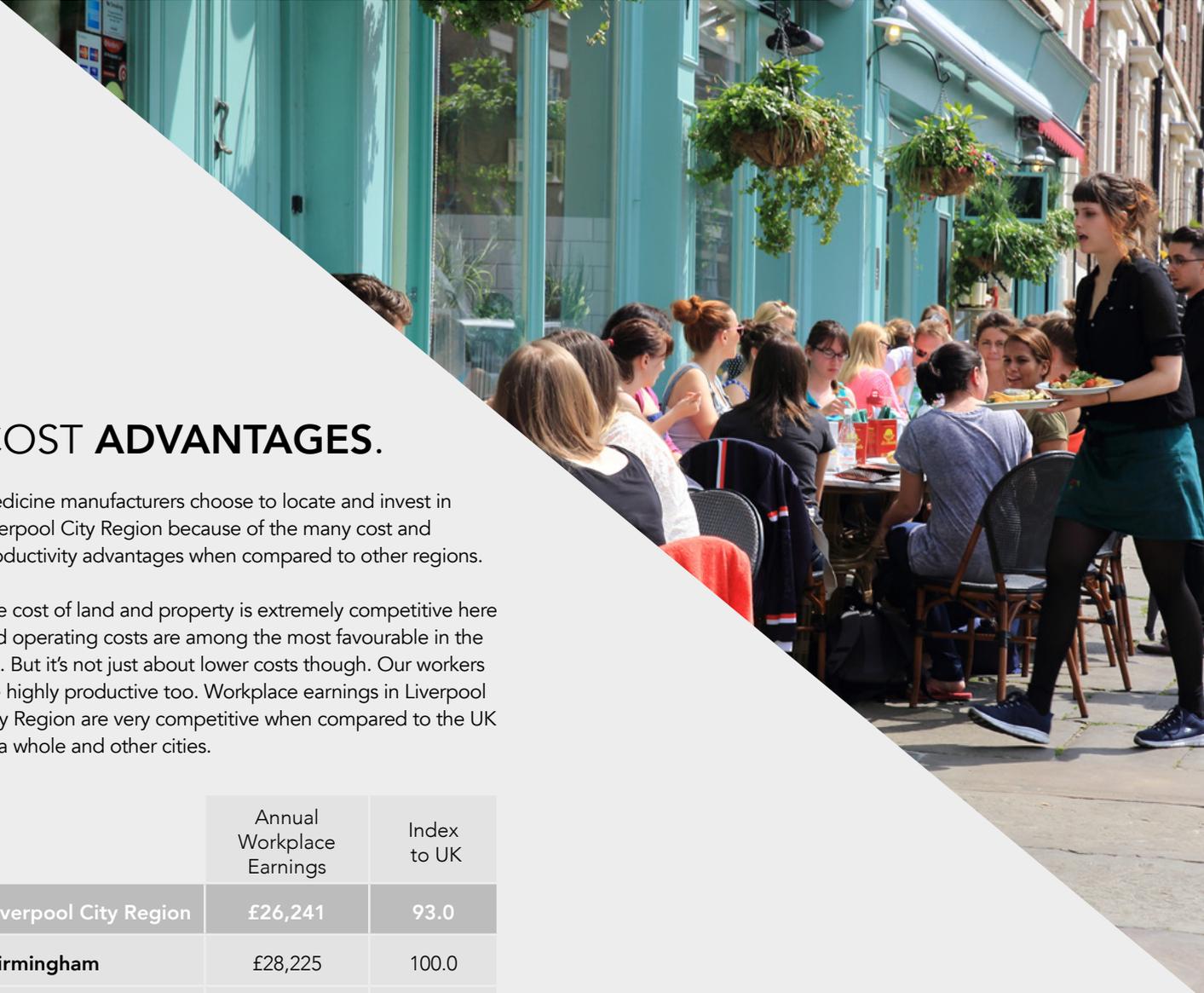
CASE STUDY: **THOMPSON & CAPPER**

With over 200 years of tablet manufacturing, Thompson & Capper has been a key player in Liverpool City Region since 1798. Originally a homeopathic chemist in Liverpool, the company grew to include a manufacturing facility in nearby Runcorn.

The site manufactures quality tablets and capsules for some of the best known companies and brands around the world. Continued reinvestment in the facility has created a world-class production site for the manufacture of vitamins, minerals and supplements.

A team of highly qualified experts are based at the site ranging from experienced formulation chemists to analysts who work in state-of-the art laboratories capable of performing many types of specialised physical and chemical analysis.

Thompson & Capper exports to over 60 countries around the world and is looking to expand the business further through new customer partnerships and targeted acquisitions.



COST ADVANTAGES.

Medicine manufacturers choose to locate and invest in Liverpool City Region because of the many cost and productivity advantages when compared to other regions.

The cost of land and property is extremely competitive here and operating costs are among the most favourable in the UK. But it's not just about lower costs though. Our workers are highly productive too. Workplace earnings in Liverpool City Region are very competitive when compared to the UK as a whole and other cities.

	Annual Workplace Earnings	Index to UK
Liverpool City Region	£26,241	93.0
Birmingham	£28,225	100.0
Leeds	£28,209	100.0
Manchester	£28,313	100.4
Oxford	£31,675	112.3
Milton Keynes	£32,497	115.2
City of London	£55,393	196.3

Office for National Statistics (ONS) 2016

There are also clear cost benefits of being located at the heart of such a major ports and logistics hub. Manufacturers enjoy the advantages of two international airports, fast rail and road access to the rest of the UK and a modern port infrastructure that distributes goods to every corner of the world.

The bottom line: Liverpool City Region is a profitable and productive place for medicine manufacturers.

CASE STUDY: PHARMAPAC

PharmaPac UK delivers solutions for outsourced manufacturing, filling, packing, storage and distribution for the healthcare, pharmaceutical and veterinary industries. From their facility in Wirral, they are able to manufacture, fill and pack solids, semi-solids, liquids and powders into blisters, sachets, bottles, pots and tubes along with providing a manufacturing and distribution service.

A modern cGMP compliant purpose-built production and storage facility is located across several units covering more than 140,000 sq ft on a secure business park close to the motorway network.

The company holds a manufacturer's licence from the Medicines and Healthcare products Regulatory Agency, is FDA Site Registered, has a Home Office controlled drugs licence and is accredited by BSI for ISO13485.

PharmaPac is a great example of the supply-chain of local companies that support the medicine manufacturers and the wider cluster.





DIGITAL INDUSTRIAL TECHNOLOGIES.

The emergence of sensor technologies, big data and robotics is changing the possibilities and processes of modern production. Liverpool City Region is leading the way with its LCR 4.0 programme, creating a new infrastructure that connects physical and digital assets to make the industrial internet a reality.

The Hartree Centre at Sci-Tech Daresbury is shaping the future of digital UK pharmaceutical design, development and manufacturing through big data analytics expertise.

The Centre is a partner in ADDoPT (Advanced Digital Design of Pharmaceutical Therapeutics), a four-year £20.4m project which aims to transform the UK pharmaceutical industry. ADDoPT is developing and implementing advanced digital design techniques that eliminate non-viable drug candidate formulations as early as possible, streamlining design, development and manufacturing processes.

Announced in January 2016, this pioneering collaboration between government, industry and academia hopes to tackle the challenge of getting new innovative medicines to market in the quickest and most cost-effective way possible to ensure the earliest access for patients. This will be achieved through the development of advanced digital design techniques that eliminate non-viable drug candidate formulations as early as possible, streamlining design, development and manufacturing processes.

Industrial pharmaceutical project partners such as Pfizer, GSK, AstraZeneca and Bristol-Myers Squibb will provide case studies, to which Hartree's expertise in supercomputing, big data analytics and computational chemistry will be applied. In this way we hope to develop more accurate digital design techniques that will enable more of the early R&D process to be carried out virtually, saving time and improving cost efficiency.

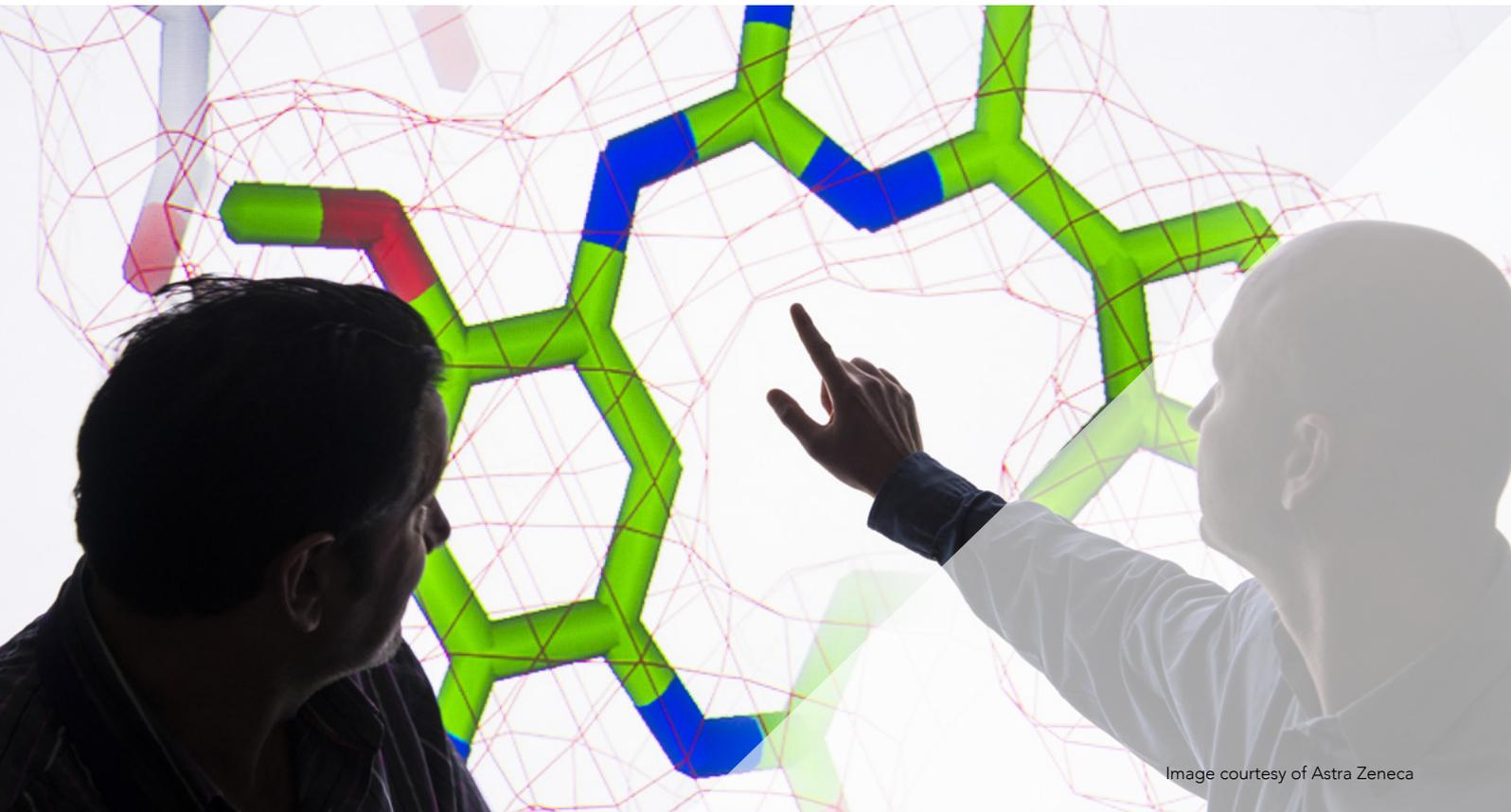


Image courtesy of Astra Zeneca

SUPPORTIVE ECOSYSTEM

As you'd expect from a world-class cluster, Liverpool City Region provides pharmaceutical manufacturers with the most supportive ecosystem possible. Our sense of community and solidarity runs deep. We attract talent and business from around the world and bring them together in collaborative networks and shared spaces to create a special alchemy.

Healthcare related business networks include:

Bionow - supports business growth, innovation and competitiveness within the biomedical and life sciences sectors across Northern England.

Innovation Agency - is the Academic Health Science Network for the North West Coast. Partners include 25 NHS providers, nine universities and life sciences industry partners.

Liverpool City Region Local Enterprise Partnership and Invest Liverpool – work together closely on providing practical support and assistance to biomanufacturing companies whether they are already based in the area, or are considering an investment in the area. With health and life sciences specialists, these local economic development bodies can help to connect you to partners in the ecosystem.

Liverpool Health Partners - brings together the region's leading hospitals and academic institutions to improve health and deliver exemplary research, education and healthcare.

MedilinkNW - a membership-based organisation with a remit to stimulate growth and innovation in the medical and health technology sector throughout the North West.

We have a team of business location experts from across Liverpool City Region that can assist you with your next project.

We can provide detailed research on markets, sectors and workforce demographics. We can put you in touch with the right contacts at industry networks and partner organisations. We're happy to introduce you to potential partners at our world-class universities and our existing businesses. We can help you to identify all the available support to help your expansion and show you a wider range of sites, premises and development opportunities.

SPEAK TO AN EXPERT

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