LIVERPOOL CITY REGION
COMBINED AUTHORITY

METRO MAYOR
LIVERPOOL CITY REGION

LIVERPOOL CITY REGION

INNOVATION PROSPECTUS

REALISING THE UK'S AMBITION AS A SCIENCE SUPERPOWER

- MATERIALS CHEMISTRY
- INFECTION CONTROL
- AI SOLUTIONS

+

- NET ZERO & MARITIME

CONTENTS

HISTORIC ROYAL ALBERT DOCK

ICONIC LIVERPOOL WATERFRONT

“I AM DETERMINED TO MAKE OUR REGION THE COUNTRY’S INNOVATION ENGINE”

For as long as we have existed, people and businesses in the Liverpool City Region have been working to perfect the art of innovation. We have been architects to inventions and discoveries that have changed the world – and our understanding of it.

From groundbreaking research into the detection of radio transmissions, to laying the foundations for modern IVF treatment – and establishing the world’s first research centre for tropical medicine – we are home to some of the iconic industries, ingenious inventors, and illustrious imaginations that have helped to change the world.

Not only has this wealth of experience reinforced our region’s place at the forefront of UK innovation, but it has also taught us an invaluable lesson: that to deliver effective, meaningful innovation, place matters.

Since I was elected Mayor, it has been one of my main priorities to establish our region’s reputation as an attractive environment for forward thinking businesses to innovate and invest in.

The journey to realising my ambition is built on enviable foundations: our existing, world-leading industry strengths, from infectious disease control to materials chemistry innovation, and artificial intelligence.

We have already accomplished so much – and I’m proud of how far we have come. But I don’t think that we can be content with resting on our past glories.

I am determined to make our region the country’s innovation engine – and to make that happen, we will be investing 5% of our GVA in research and development over the next few years – nearly double the government’s national targets.

I want to take advantage of our strengths – and potential - and turn them into profitable businesses, creating better, greener jobs and bringing greater prosperity to local people.

From Mersey Tidal Power, harnessing the power of our river to generate clean, predictable energy, to partnerships with globally significant companies to decarbonise and revolutionise polluting industries, the Liverpool City Region has all the assets, capabilities – and the political will – to be at the forefront of the UK’s mission to become a science and innovation superpower.

This Innovation Prospectus is my roadmap to turn that vision into a reality.

It’s a big ambition – but if anywhere is capable of it, then I believe that it is the Liverpool City Region.

Steve Rotheram
Mayor of the Liverpool City Region

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METRO MAYOR LIVERPOOL CITY REGION

READY TO IMPACT THE GLOBAL STAGE

LIVERPOOL CENTRAL BUSINESS DISTRICT

LIVERPOOL SCHOOL OF TROPICAL MEDICINE

The global and UK landscapes have changed dramatically over the last three years. Geo-politics, Brexit, the pandemic, the climate emergency and now the energy supply crisis continue to disrupt long-established patterns, norms and behaviour, creating new challenges and opportunities.

At the same time, the Government is investing in Research and Development (R&D) at record levels and with a focus on areas beyond the southeast - as it strives to consolidate the UK's position as a science and innovation superpower.

Liverpool City Region shares this vision and is primed to contribute to achieving the Government's goal – by bringing distinctive world-leading science, innovation, and industry assets to bear on the national and global stage.

The Government's target is ambitious, with R&D accounting for 2.4% of GDP by 2027, yet if this is to be reached, some regions will need to go much further.

The Liverpool City Region is poised to do just that...

Our ambition of 5% R&D investment annually by 2030 is nearly double the national target and we plan to become net zero by 2040, a full 10 years ahead of the UK goal.

"We can help you invent the future and make it a better place to live and work in"

Dr. Peter Waggett
Director of Research - UK,
IBM Research Europe

Our confidence is founded on a track record of delivery and one of the UK's most highly developed place-based innovation approaches that helped deliver £2bn of investment in just five years before the pandemic.

And we're not resting on our laurels. A further £1bn of projects is underway and we have a future R&D pipeline worth more than £3bn, that would maximise our world-leading and connected strengths in materials chemistry, infection control, and AI solutions.

What's more, we are delivering world firsts in hydrogen and industrial decarbonisation and developing a globally significant Mersey Tidal Power project that would attract at least £4bn of investment, together with a further £5bn investment in hydrogen capabilities.

The only missing ingredient to unleashing our enormous potential is sustained large scale public funding and private investment. Together with Government, industry, and research institutions, we are ready to deliver on national ambitions to level up the UK economy, shape the future, and change the world.

DR. JON HAGUE

VICE PRESIDENT
SCIENCE AND
TECHNOLOGY,
UNILEVER HOMECARE

"It is no accident that Unilever was born in the Liverpool City Region and continues to invest and thrive here.

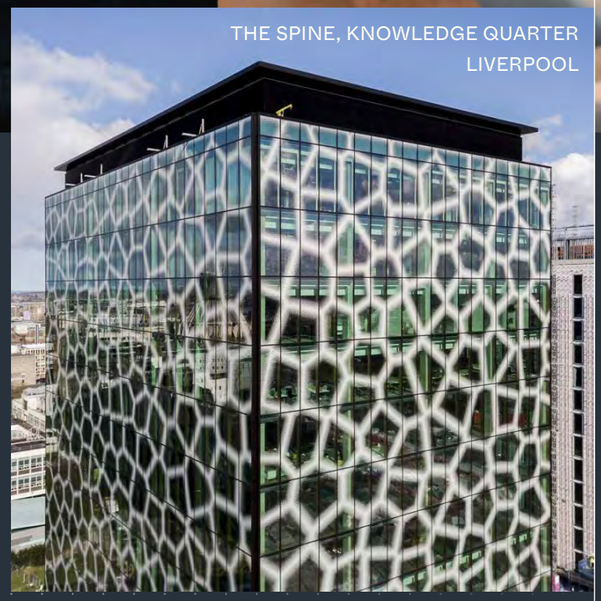
It has a unique blend of distinctive competitive strengths, science and research excellence, world-leading assets, translational mechanisms, and quality of life.

There is also massive as yet untapped commercialisation and investment potential.

All of this makes for a busy and exhilarating time as both a multi-national R&D leader and as Chair of a dynamic and talented Innovation Board!"

> £3bn

Future R&D Pipeline



THE SPINE, KNOWLEDGE QUARTER
LIVERPOOL

LIVERPOOL CITY REGION COMBINED AUTHORITY

METRO MAYOR LIVERPOOL CITY REGION

WHY WE CAN DELIVER

Liverpool City Region combines distinctive assets, commitment, expertise, a thriving ecosystem, and scale required to help transform UK productivity and to achieve the Government's science and innovation superpower aims. We have:

SOUTHPORT PIER

WORLD-CHANGING PEDIGREE

From the birthplace of the railways and the world's first commercial wet dock, to Pilkington, Beecham and Lever Brothers, Liverpool City Region has been changing the world for more than 300 years.

EVIDENCE-LED APPROACH

Innovation based on facts not fiction, and reflected in the Government-commissioned Science & Innovation Audit undertaken in 2017 and refreshed in 2022.

DISTINCTIVE WORLD-LEADING CAPABILITIES

Liverpool City Region is at the global forefront of translational R&D in infection, materials chemistry, and AI solutions.

WORLD FIRSTS IN NET ZERO

Offshore wind, hydrogen, industrial decarbonisation, and tidal energy are all being pioneered in the Liverpool City Region.

UK-LEADING SCIENCE AND INNOVATION CAMPUSES

Knowledge Quarter Liverpool and Sci-Tech Daresbury.

WELL-ESTABLISHED INNOVATION INFRASTRUCTURE

£2bn investment attracted in the 5 years prior to the pandemic.

INVESTMENT TRACK RECORD

A further £1bn of projects are underway.

CATALYTIC PROJECTS

Recent major government-backed industry investments include iiCON, Glass Futures, and the Hartree National Centre for Digital Innovation.

£3BN + £4BN + £5BN OF FUTURE OPPORTUNITIES

A pipeline of innovation projects, Freeport, Mersey Tidal, and hydrogen.

BESPOKE BUSINESS SUPPORT

This includes the seminal UK-leading LCR4.0 4IR programme, and the new LCR Ventures innovation commercialisation vehicle.

INNOVATION SKILLS FOR GROWTH

Liverpool City Region is the first and only UK location to produce a dedicated plan.

LEADERSHIP AND DELIVERY

With a forward-thinking Metro Mayor, the UK's first sub-regional Innovation Board, global partnerships, expert coordination, and a truly collaborative approach, Liverpool City Region has what it takes to get things done.

POTENTIAL IMPACT

It is estimated that realising the 5% R&D investment ambition by 2030 will deliver a gross economic benefit of £41.7bn GVA, and an additional net £19.7bn GVA, 10% increase in productivity, and 44,000 new jobs.

THREE WORLD-LEADING SPECIALISMS, ONE MISSION TO SUCCEED

How excellence in Materials Chemistry, Infection Control, AI solutions and emerging net-zero innovation can drive the Liverpool City Region and UK economies

The Liverpool City Region – comprising Halton, Knowsley, Liverpool, Sefton, St Helens and Wirral - has a long history of world-leading innovation and applied science. From the birth of railways at Rainhill, to the first commercial wet dock and the first tropical diseases research institute, we've been changing the world for more than 300 years.

Innovation was at the heart of Lever Brothers commitment to make cleanliness commonplace, Beecham's turned the region into a pharmaceuticals powerhouse, and in St Helens Pilkington revolutionised glass - worldwide. In tandem, our scientists and academics have secured Nobel Prizes in chemistry, physics, medicine and economics.

This long tradition of turning invention into business is very much alive today and can be evidenced through our world-leading innovators, research and assets.

And thanks to carefully nurtured partnerships in the UK and abroad, we are unlocking even greater opportunities than ever before.

CHANGING THE WORLD FOR MORE THAN 300 YEARS

UoL DIGITAL INNOVATION FACILITY

ENGINEERS AT DARESBURY LABORATORY

The Liverpool City Region is a global powerhouse in materials chemistry, infection control, and AI solutions.

These three distinctive but linked specialisms offer global impact and lucrative investment opportunities - with more than 23% of funding already sourced from overseas.

LAB WORK AT LIVERPOOL SCIENCE PARK

MATERIALS CHEMISTRY

Liverpool City Region is a world leader in both the core science and industrial application of materials chemistry.

Ninety-nine percent of materials chemistry research at the University of Liverpool is ranked world leading or internationally excellent and much of it is undertaken in partnership with top multi-nationals – including Unilever whose relationship with the institution started in 1906.

This has led to the unique 'Liverpool model' of industry-academia partnership based on 'open by design' access to specialised space and high-throughput facilities. The model also offers access to industry-grade methodologies, digital platforms and academic excellence - all with an emphasis on knowledge-sharing.

The model is supported by state-of-the-art computing and professional management and business engagement services. The Liverpool model has been perfected over the last two decades and culminated in the formation of the Materials Innovation Factory (MIF).

Close partnerships also exist with industry giants Johnson-Matthey, BASF, and Croda, whose Centre of Innovation for Formulation Science is based in the MIF. Croda located its UK biotechnology laboratory at Daresbury in 2021 to be close to its existing manufacturing base in Widnes.

On opposite banks of the Mersey, Widnes and Runcorn have long been chemical industry powerhouses and they remain one of the UK's largest clusters of chemical companies, including Ineos and its subsidiary Inovyn. The latter is Europe's largest operator of electrolysis, the critical technology required to produce hydrogen for power generation, transportation and industrial use.

In April 2022, the Centre for Process Innovation (CPI) opened its first North West base at Liverpool Science Park alongside the Manufacturing Technology Centre. Both are members of the UK Government's High Value Manufacturing Catapult.

MATERIALS INNOVATION FACTORY

CASE STUDY

MATERIALS INNOVATION FACTORY

Opened in 2017 with the help of a £33m Government grant, the Materials Innovation Factory (MIF) is a world-leader in the computer and robotics-assisted discovery and design of materials.

The result of a unique partnership between the University of Liverpool and Unilever, it builds on the work of their joint £16m Centre for Materials Discovery and £9.3m High Throughput Formulation Centre.

Having received £92m funding to date, the facilities provide open access to cutting edge technology and world-class expertise in materials chemistry and formulation, driving the next generation of discoveries.

MIF engages with companies of all sizes – from multi-nationals to local SMEs - helping projects progress faster and further while setting the standard for industry-academia collaboration.

Originally established through the Government's UK Research Partnership Infrastructure Fund, MIF is also a spoke of the national Sir Henry Royce Institute.

MIF was further accelerated by £10m investment from the Leverhulme Trust and now several hundred Unilever R&D employees are actively involved in the MIF. The facility also generates income through the commercial application of its discoveries.

Spinning out of the MIF-based research of Professor Andy Cooper, pioneering company Gearu has created AI-enabled robot chemists that will define the automated laboratories of the future well beyond chemistry.

Its eye-catching innovation featured on the cover of Nature magazine in summer 2020.

"The strength of material science in the North West is, to a great extent, built on the collaboration between academia and industry which is so well embodied in the Materials Innovation Factory."

UNILEVER'S ADVANCED MANUFACTURING CENTRE AT PORT SUNLIGHT, WIRRAL

CASE STUDY

UNILEVER

Unilever has a proud history of Research and Development in the Liverpool City Region, with Lever Brothers founding its first laboratory at Port Sunlight, in 1911, to design soap.

The €52bn company remains a R&D powerhouse and has expanded its research capabilities in recent years – partly in the MIF - to employ more than 850 scientists, including more than 200 with PhDs. Through its combined assets in Port Sunlight and Knowledge Quarter Liverpool, including its global R&D HQ and biggest R&D facility, Unilever remains firmly embedded in the Liverpool City Region.

Many of the world's best-known household and hygiene products are developed in Port Sunlight and at the Materials Innovation Factory. In 2021 Unilever made 524 patent applications globally, half of which originated from Unilever's team in the Liverpool City Region. That's more than any other UK-based R&D organisation – including GSK, Rolls Royce and BAE Systems.

In 2018 Unilever opened its Advanced Manufacturing Centre (AMC) at Port Sunlight - part funded by the UK's Regional Growth Fund and the largest of its type in Unilever. It houses fully digitised replicas of large-scale manufacturing facilities around the world, including advanced packaging technology. This enables rapid translation from laboratory scale to full manufacturing scale, often without the need to interrupt factory production and generates the data to build 'digital twins' of existing and future production processes. The AMC combined with the Materials Innovation Factory, keeps Unilever globally competitive by harnessing digitalisation and Artificial Intelligence to accelerate innovation.

INFECTION CONTROL

The Liverpool City Region has the UK's largest concentration of translational public sector research, development and innovation into infectious diseases.

£2bn
of infectious disease research and development a year

This is achieved through the combined capabilities of the Liverpool School of Tropical Medicine (LSTM) and the University of Liverpool, which have been collaborating for more than a century. Together, with neighbouring Cheshire and Warrington, the Liverpool City Region delivers £2bn of infectious disease research and development a year - the biggest concentration in the UK and one of the biggest in Europe.

LSTM was the world's first institute dedicated to research and teaching in the field of tropical medicine and was founded in 1898 to break the cycle of poor health and poverty when Liverpool was one of the world's foremost trading ports. LSTM Lecturer Ronald Ross is considered the first British Nobel laureate, having received the Prize for Medicine in 1902 for his work on malaria.

Today the School has a research portfolio exceeding £500m, employs around 530 regional staff and a further 650 worldwide. It trains 400 postgraduates every year and leads the high impact £200m Infection Innovation Consortium (iiCON) project.

In 2017/18, LSTM attracted £980,000 of research income per full time academic – more than ten times that of Oxford University (£87,000) which is itself one of the UK's lead performers. It is actively collaborating with many of the world's poorest countries, saving hundreds of thousands of lives a year in partnership with organisations such as the World Health Organisation and the Bill and Melinda Gates Foundation – of which LSTM is the UK's largest grant recipient.

LSTM also houses the Global Health Clinical Trials Unit, the Centre for Drugs and Diagnostics, the Clinical Diagnostic Parasitology Laboratory, and the Liverpool Life Sciences Accelerator - which provides business access to specialist anti-microbial, parasitology and insectary provision and rapid biological screening services.

The University of Liverpool employs around 400 academic and research staff working on infection-related research with 20 staff worldwide, and trains more than 200 postgraduates in infection-related research each year. The University is a core partner and co-directs the National Biofilms Innovation Centre, through its commercially focused Open Innovation Hub for Antimicrobial Surfaces.

In tandem, the Microbiome Innovation Centre (MIC) works with industrial, clinical and academic partners, nationally and internationally to accelerate research and deliver real world impact from discovery science.

Liverpool City Region is also home to one of Europe's largest biomanufacturing clusters with Seqirus, AstraZeneca, and TriRx all having significant facilities in Speke with potential for further R&D expansion.

CASE STUDY

INFECTION INNOVATION CONSORTIUM (iiCON)

Set up in 2020 with £18.6m of Government backing, iiCON quickly became a flagship of UK place-based innovation, hitting its 5-year UKRI target within the first 12 months.

It was the only north of England project to receive backing from the Government's Wave 1 Strength in Places Fund and is firmly on track to achieve its aim of increasing regional R&D investment in infection by £1bn within 10 years.

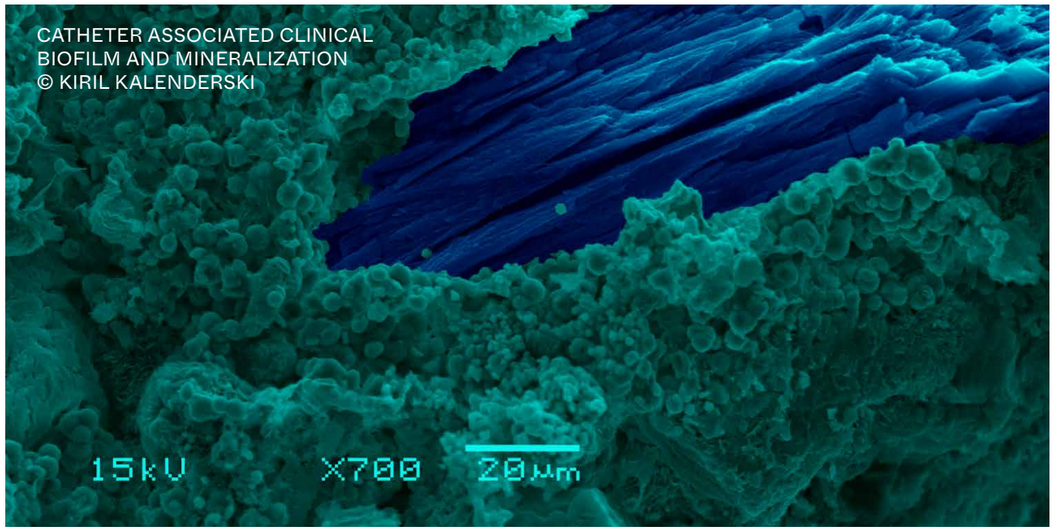
Led by the Liverpool School of Tropical Medicine, iiCON's primary consortium members are the Liverpool University Hospitals NHS Foundation Trust, University of Liverpool, Unilever, Evotec Ltd and Infex Therapeutics, based at Alderley Park, Cheshire.

It bridges the gap between industry, academia and the NHS and provides access to 10 specialist commercially sustainable research platforms, co-developed and operated by its industrial, academic, and clinical partners.

These platforms remove market barriers and give companies access to world-leading research, market intelligence, and cutting-edge facilities to accelerate and support the discovery and development of new anti-infectives, diagnostics, and preventative products.

To date, iiCON has 298 major commercial and industrial stakeholders, a global network of 489 links, and spans 40 contract research organisations and 54 laboratories. After less than two years, iiCON has already helped to bring seven new products with a further 12 in late stage development, highlighting the pace at which it is delivering new innovations.

ICON DIRECTOR PROF. JANET HEMINGWAY, FRS, AND PRESIDENT OF THE ROYAL SOCIETY OF TROPICAL MEDICINE & HYGIENE



CATHETER ASSOCIATED CLINICAL BIOFILM AND MINERALIZATION
© KIRIL KALENDERSKI

CASE STUDY

NATIONAL BIOFILMS INNOVATION CENTRE

Biofilms are thin, often resistant layers of micro-organisms such as bacteria that coat various surfaces and can be very costly to industry and society.

The National Biofilms Innovation Centre is a £26m joint project established to deliver the breakthroughs needed to prevent, detect, manage and engineer biofilms. It also seeks to accelerate the use of new technologies, products and services in a global industry worth £3.75bn.

Funded by the Biotech and Biological Sciences Research Council (BBSRC), Innovate UK, and the STFC Hartree Centre, it is a collaboration between the University of Liverpool and the universities of Southampton, Nottingham and Edinburgh with 59 associate research institutions and a growing base of more than 250 companies.

Co-directed by the University of Liverpool's Professor Rasmita Raval, NBIC's highly commercial remit is to develop new processes and technologies to tackle the impact and cost of microbial activity on materials, surfaces and interfaces in UK industry, plus the urgent societal problem of increasing antimicrobial resistance.

By late 2021, the NBIC had already provided 81 proof of concept projects worth £6.7m, made 226 connections as a direct result of partner searches and produced 178 peer reviewed publications – helping to place the Liverpool City Region at the very forefront of breakthrough innovation in a critical and expanding scientific field.

AI SOLUTIONS

& EMERGING TECHNOLOGIES

Liverpool City Region's capabilities in high performance and cognitive computing have positioned it at the vanguard of technology driven industrial solutions.

As with materials chemistry and infection control, the Liverpool City Region's world-leading Artificial Intelligence (AI) capability is a highly productive blend of world-leading science coupled with industry.

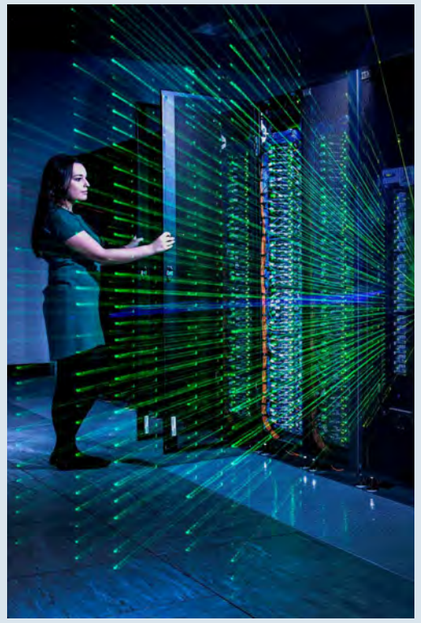
On the academic side, the University of Liverpool is the UK's top-rated computer science Department for 4* and 3* research, with 97% of its research rated as world-leading or internationally excellent.

For industry, the STFC Hartree Centre at Sci-Tech Daresbury is home to what's thought to be the world's most powerful supercomputer dedicated to applying high performance and cognitive computing to solve real world challenges. Integral to its success is a unique global collaboration with IBM Research.

The Hartree Centre helps UK businesses and other organisations of any size to explore and adopt supercomputing, data analytics and AI technologies to deliver increased productivity, smarter innovation and economic growth.

It is part of the Science and Technology Facilities Council (STFC) – one of Europe's largest research organisations, which operates other top UK science assets including the Diamond Light Source and Jodrell Bank.

STFC is one of seven Research Councils that, together with Innovate UK and Research England, make up UK Research and Innovation (UKRI)



STFC HARTREE CENTRE, SCITECH DARESBURY

The Hartree Centre was established in 2012 at Sci-Tech Daresbury – the sister national science and innovation campus to STFC Harwell - to help the UK stay at the forefront of computational science and digital innovation. In 2015, it secured a further £115.5m of government funding to become the UK Centre of Excellence in Cognitive Systems and Big Data. That levered a £200m investment by IBM involving access to its global IP - including the Watson AI platform - plus the onsite expertise of 30 staff to create a new global IBM research lab.

The campus is also home to the Quantum Learning Machine developed by Atos which is one of the highest performing quantum simulators in the world. This underlines Sci-Tech Daresbury's credentials as a centre for developing and applying the next generation of industry solutions. This is complemented by the advanced modelling and simulation capability of the industry-facing Virtual Engineering Centre, also based there.

Liverpool City Region's NHS Trusts are also at the forefront of digital innovation, with four NHS-designated Global Digital Exemplars.

These include Alder Hey which, as well as being one of the UK's largest children's hospitals, is a beacon of innovation. The hospital uses technology to revolutionise healthcare through solutions co-created by clinicians, patients, academics and businesses of all sizes. Its innovation engine room is a 1,000 square metre 'bat cave' with a rapid prototyping centre, a dedicated AI team, a UK-first NHS open innovation portal, and a world-first healthcare chatbot created with IBM.

Meanwhile, Liverpool City Region's global pedigree in games development, linked to Sony Psygnosis's former base, has paved the way for an immersive technologies sub-sector to flourish. The evidence for this includes Liverpool John Moores University (LJMU) and the University of Liverpool's collaboration with Aardman Animations to create a £1m immersive Shaun the Sheep experience in China. SME vTime is at the forefront of metaverse development, and is one of many innovative small companies based in Liverpool's Baltic Triangle. The district is the epicentre of Liverpool's digital & createch sector and was designated the coolest place to live in the UK by The Times in 2017.

As if that isn't enough, the Liverpool City Region is also leading innovation that is literally out of this world. Scientists from the city region are heading an international collaboration to create the world's largest and fastest robotic telescope. Located in La Palma, this New Robotic Telescope and all associated data will be remotely operated and analysed by the Astrophysics Research Institute at Liverpool John Moores University, ensuring the UK continues to lead the world in robotic time-domain astronomy.

CASE STUDY

HARTREE NATIONAL CENTRE FOR DIGITAL INNOVATION (HNCDI)

In June 2021, the new £210m Hartree National Centre for Digital Innovation was announced on the back of £172m investment from UKRI, matched by £38m from IBM.

The 5-year partnership between STFC and IBM Research aims to boost discovery and develop innovative solutions to practical problems raised by UK industry. This will be achieved through access to new digital technologies - particularly AI, high performance computing, data analytics, quantum computing, and cloud technologies. The centre will work across sectors, with a focus on Liverpool City Region's other world-class specialisms of materials, life sciences and the environment plus manufacturing.

In addition to creating the only IBM discovery accelerator outside the USA, the move consolidated Sci-Tech Daresbury as a permanent IBM global research lab.

Then Science Minister, Amanda Solloway, said: **"Artificial intelligence and quantum computing have the potential to revolutionise everything from the way we travel to the way we shop. They are exactly the kind of fields I want the UK to be leading in, and this new centre in the north west is a big step towards that.**

Thanks to this fantastic new partnership with IBM, British businesses will have access to the kind of infrastructure and expertise that will help them boost innovation and grow the economy – essential as we build back better from the pandemic."

Professor Mark Thomson, Executive Chair of STFC, said: **"This programme has the potential to transform the way UK industry engages with AI and digital technologies, to the benefit of not just research communities but all of society."**

Dario Gil, Senior Vice President and Director, IBM Research, said: **"The world is facing grand challenges which demand a different approach towards science in computing, including AI and quantum computing, to engage a broad community across industry, government, and academia to accelerate discovery in science and business. This partnership establishes our first Discovery Accelerator in Europe driven by our two UK-based IBM Research locations in Hursley and Daresbury as they contribute to our global mission of building discovery-driven communities around the world."**

CASE STUDY

INSTITUTE OF DIGITAL ENGINEERING & AUTONOMOUS SYSTEMS (IDEAS)

The Institute combines the University of Liverpool's existing Virtual Engineering Centre (VEC) at Sci-Tech Daresbury with a new £12.7m state-of-the-art Digital Innovation Facility (DIF) launched in May 2022 at the heart of the main university campus.

The VEC is already one of the UK's leading digital engineering impact centres for industrial and commercial applications, having been established in 2010, by the University of Liverpool, BAE Systems and the National Nuclear Laboratory. The DIF is dedicated to maximising both advanced research and the real-world application of emerging technologies, in an environment that's purpose-built for collaboration.

Co-locating leading academic researchers and commercial partners, it will put the University and Liverpool City Region at the forefront of industrial application and integration in the fields of Autonomous Systems, Robotics, Data Analytics and Artificial Intelligence.

NET ZERO & MARITIME

For centuries, the River Mersey has defined the Liverpool City Region and its industries, bringing trade, prosperity, and innovation.

Its importance is set to continue as the city region's favourable geography offers new opportunities to lead the Green Industrial Revolution through harnessing wind and tidal energy - while the UK's leading trans-Atlantic port enhances its position as a global gateway.

Development has started on the massive Mersey Tidal project - with the potential to power more than a million homes with clean, green, predictable energy. The north west's picturesque coast is also home to one of Europe's largest clusters of offshore wind farms bringing billions of pounds of international investment, with plans for even greater expansion this decade. These developments coupled with an ambitious scheme to produce green hydrogen fuel, while capturing carbon dioxide, have led to the city region being heralded as the UK's Renewable Energy Coast.

The Liverpool City Region's hydrogen economy plans include the development of transport and housing infrastructure alongside industrial decarbonisation. The city region's first fleet of hydrogen buses along with refuelling facilities will be deployed in late 2022. Further Zero Emission Refuelling Centres (ZERC's) featuring hydrogen and ultra-rapid electric vehicle recharging are in development to support key economic and transport hubs across the City Region.

The westward Port of Liverpool has undergone huge modernisation in recent years including £400m of private investment to create Liverpool2 – a new deep-water container terminal capable of handling the world's largest vessels. And in 2021 the UK Government designated Liverpool City Region as a Freeport.

The city region's location and natural assets have long attracted industry: from Cammell Laird and Orsted in Birkenhead, to Alstom's hydrogen train R&D facility in Widnes, Inovyn and Ineos in Runcorn, to ABB's UK HQ and robotics/automation R&D at Daresbury.

Our research is already shaping climate policy on the world stage. The University of Liverpool's National Oceanography Centre (NOC) has been at the forefront of scientific research since the 1840s. It remains one of the leading centres for research into sea level rise, tidal movements and the Earth system and supplies data to governmental bodies worldwide to inform responses to climate change, including the 2015 Paris Agreement.

Just as the Liverpool City Region was a cradle of the world's first industrial revolution, it is now playing a lead role in finding solutions to the challenges of decarbonising energy intensive industry, with world firsts in glass innovation and hydrogen fuel switching.

GLASS FUTURES, ST. HELENS

BURBO BANK OFFSHORE WIND FARM

CASE STUDY

HYNET NORTH WEST

Hydrogen has offered the tantalising prospect of zero carbon, low-cost fuel for many years. Finally, the UK's leading industrial decarbonisation cluster, HyNet North West, promises to bring hydrogen into the mainstream – helping cut carbon emissions across multiple sectors of the economy.

Hynet's ambitious target is to reduce carbon emissions by 10 million tonnes every year by 2030 – equivalent to 4 million cars – as well as creating 75,000 local jobs by 2035. Its pioneering goal is to fuel energy-intensive industries such as glass, chemicals, automotive, food and beverage, agrochemicals and consumer products that together account for around 20% of the UK's industrial emissions.

HyNet's dual mission is to produce, transport and store hydrogen for fuel while at the same time preventing carbon dioxide emissions across the North West and North Wales polluting the atmosphere. The greenhouse gas will be locked away via a network of underground pipelines, hydrogen production plants and storage facilities.

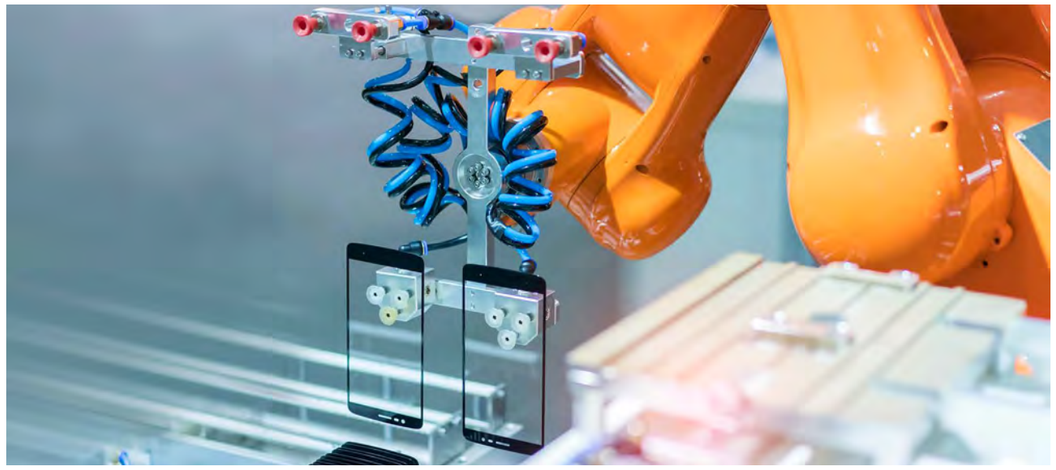
HyNet is on course to deliver one of Europe's largest industrial decarbonisation clusters in the next decade covering the North West of England and North Wales. The first of HyNet's new facilities are in development and are expected to be operational by 2027.

In the last year, world first industrial fuel switching trials have taken place at Pilkington's float glass furnaces in St Helens and Unilever's consumer products manufacturing facility in Wirral. Both trials used 100% hydrogen to power energy-intensive industrial processes whilst the plants remained fully operational. The trials were sponsored and co-funded by the UK Government.

"Glass Futures' collaborative approach to cutting industrial emissions is a prime example of the joined up thinking needed to build a more sustainable and inclusive economy.

I was delighted to meet the Glass Futures team at COP26, an organisation at the forefront of developing and delivering new technology for the glass industry."

DPROFESSOR DAME OTTOLINE LEYSER
CHIEF EXECUTIVE OF UKRI AND REGIUS PROFESSOR OF BOTANY
AT THE UNIVERSITY OF CAMBRIDGE



CASE STUDY

GLASS FUTURES

Glass Futures is on a mission to decarbonise glass production by creating a first ever industry-led global centre of excellence in open innovation, R&D and training. And it's doing it in the home of the global glass industry, St Helens.

Co-funded by the UK government, this new Research & Technology Organisation (RTO) involves some of the world's biggest names in glass and technology – Diageo, Encirc, Guardian, Heineken, Owens Illinois, Siemens and UK trade body British Glass, in collaboration with the Universities of Liverpool, Cambridge, Leeds and Sheffield.

The £53m facility will include an open access 35-tonne-per-day pilot plant with dedicated R&D, training and office space.

It is intended to create a wider industrial decarbonisation campus, with Glass Futures already supporting the British Ceramics Federation and other foundation industries.

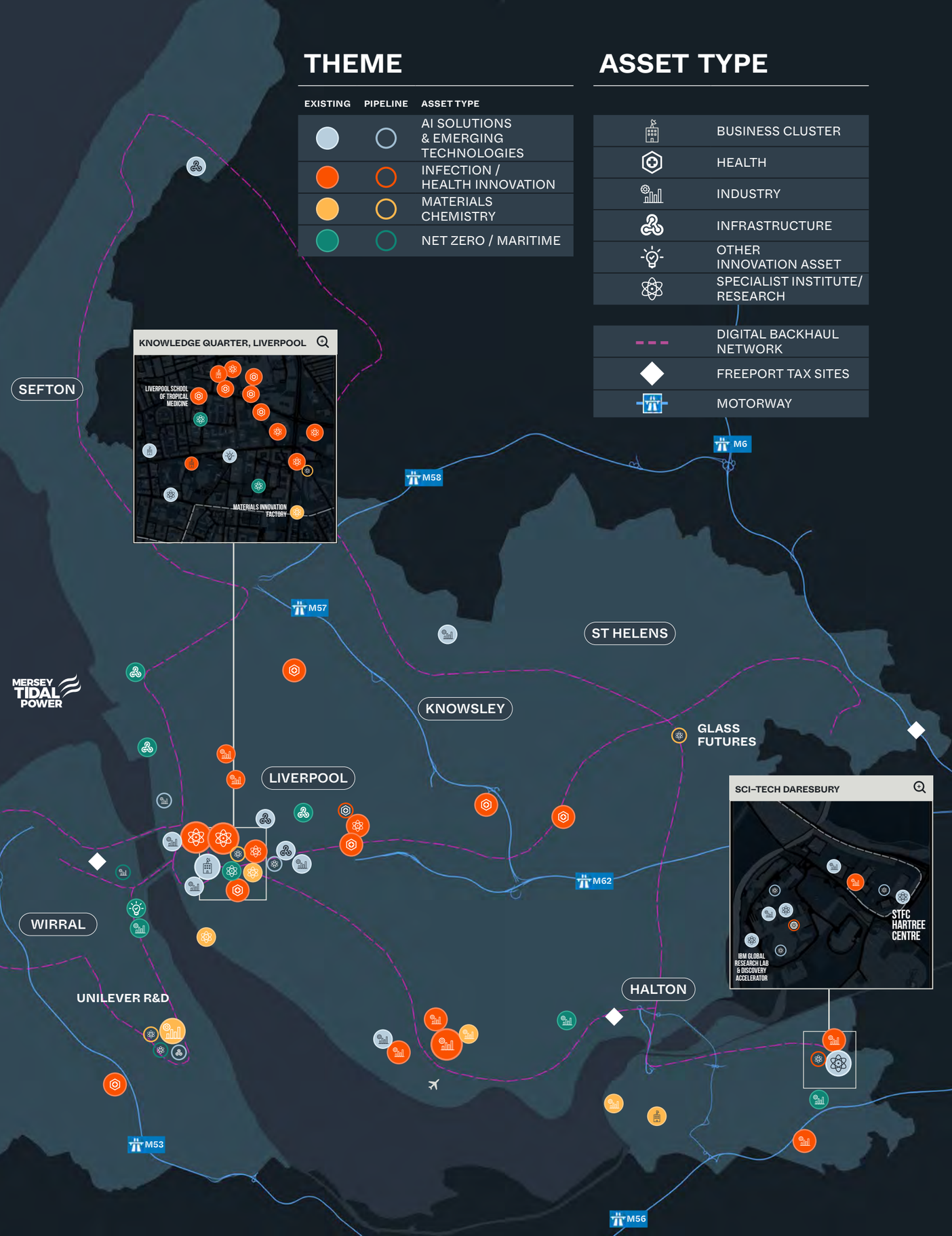
In a 2021 trial, Glass Futures teamed up with industry giant Encirc to produce the world's most sustainable bottle, made from 100% recycled glass and using only the energy from ultra-low-carbon biofuels, creating a 90% carbon reduction.

The world's first trial of a 100% hydrogen-fired commercial float glass furnace took place at nearby Pilkington's in late 2021. Going forward, Glass Futures will also have access to HyNet's hydrogen fuel network that is currently in development, and is actively developing plans for a UK Hydrogen Technologies Catapult to be co-located there. Meanwhile sibling project Glass Futures 2 is already approaching full funding and will focus on innovations in medical glass manufacturing.

The Liverpool City Region offers the ideal combination of natural assets, connectivity, and world-leading science, innovation, and industry required to translate research into real world solutions.

With close links to other North West, national and global centres of excellence, the city region offers major new investment opportunities for both Government and business.

- ABB UK HQ
- AIMES
- Albea Creative UK
- Alder Hey Chldren's Hospital (GDE)
- Alder Hey Innovation Centre
- Alstom Transport Cechnology Centre
- Anti-Viral Surfaces Innovation Hub (UoL)
- Arrowe Park Hospital (GDE)
- Astra Zeneca
- Atos Quantum Learning Machine
- Baltic Triangle
- Bristol Myers Squibb
- Burbo Bank wind farm
- Cammell Laird
- Centre for Drugs & Diagnostics (LSTM)
- Centre for Low Energy Accelerators Research
- Centre for Process Innovation (CPI)
- Civic Data Cooperative
- Clatterbridge Cancer Centre
- Clatterbridge Cancer Centre
- Clinical Diagnostic Parasitology Laboratory (LSTM)
- Croda Centre of Innovation for Formulation Science
- Croda Europe Ltd.
- Croda UK Biotechnology Laboratory
- DIgital Innovation Accelerator
- Digital Innovation Facility
- Digital Innovation Facility
- Digital Tech Cluster
- EuPRAXIA Plasma Accelerator Centre of Excellence
- European Space Agency Business Incubation Centre UK
- Everton FC
- Everton Minds - National Dementia Centre
- Glass Futures
- Glass Futures 2: Medical Glass Manufacturing & Innovation Centre
- Global Health Trials Unit (LSTM)
- GTT transatlantic fibreoptic cable landing
- Hartree Data Centre
- Hartree National Centre for Digital Innovation
- HEMISPHERE
- IBM Global Research Lab & Discovery Accelerator
- iiCON Phases 2 & 3
- Ineos
- Infection Innovation Consortium (iiCON)
- Inovyn Rocksavage International
- Ion Beams Cancer Therapy Research Centre
- Jaguar Landrover
- Leahurst Veterinary Centre (UoL)
- Life Sciences Accelerator
- Liverpool 5G network
- Liverpool Clinical Trials Centre (UoL)
- Liverpool FC
- Liverpool Health Partners
- Liverpool Heart & Chest Hospital
- Liverpool John Lennon Airport
- Liverpool School of Tropical Medicine (LSTM)
- Liverpool Science Park
- Liverpool Surface Science Research Centre (UoL)
- Liverpool Women's Hospital
- LJMU Astrophysics Research Institute
- LJMU School of Pharmacy & Biomolecular Sciences
- LJMU Sports Science
- Manufacturing Technology Centre (MTC)
- Maritime Knowledge Hub
- Matalan HQ
- Materials Innovation Factory (UoL)
- Mersey Care (GDE)
- Microbiome Innovation Centre (UoL)
- MIF Labs of the Future
- Nanotherapeutics Centre for the North
- National Biofilm Innovation Centre
- National Oceanography Centre (UoL)
- National Packaging Innovation Centre
- National Thin Films Centre
- NIHR Clinical Research Facility
- NIHR Clinical Research Facility
- Nuclear AMRC Modular Manufacturing R&D
- NW HealthTec Cluster
- NW Space Cluster
- Open Innovation Hub for Antimicrobial Surfaces (UoL)
- Ørsted
- Pandemic Institute
- Pharmaron Biologics (UK) Ltd.
- Port of Liverpool
- Project Violet
- Royal College of Physicians
- Royal College of Physicians North
- Royal Liverpool University Hospital & Clinicl Research Unit
- RUEDI: Relativistic Ultrafast Electron Diffraction & Imaging Facility
- Sensor City
- Seqirus
- Sony
- Stephenson Institute for Renewable Energy (UoL)
- STFC Cockcroft Institute
- STFC Hartree Centre
- Teva UK
- The Centre for Genomic Research (CGR) (UoL)
- The Heath
- The Innovation Agency (NW Coast Academic Health Sciences Network)
- The Walton Centre
- TriRx
- UK Compact Light Source Grid
- Ultraviolet
- Unilever Advanced Manufacturing Centre
- Unilever Global R&D HQ
- Very Group HQ
- Virtual Engineering Centre (UoL)
- Whiston Hospital

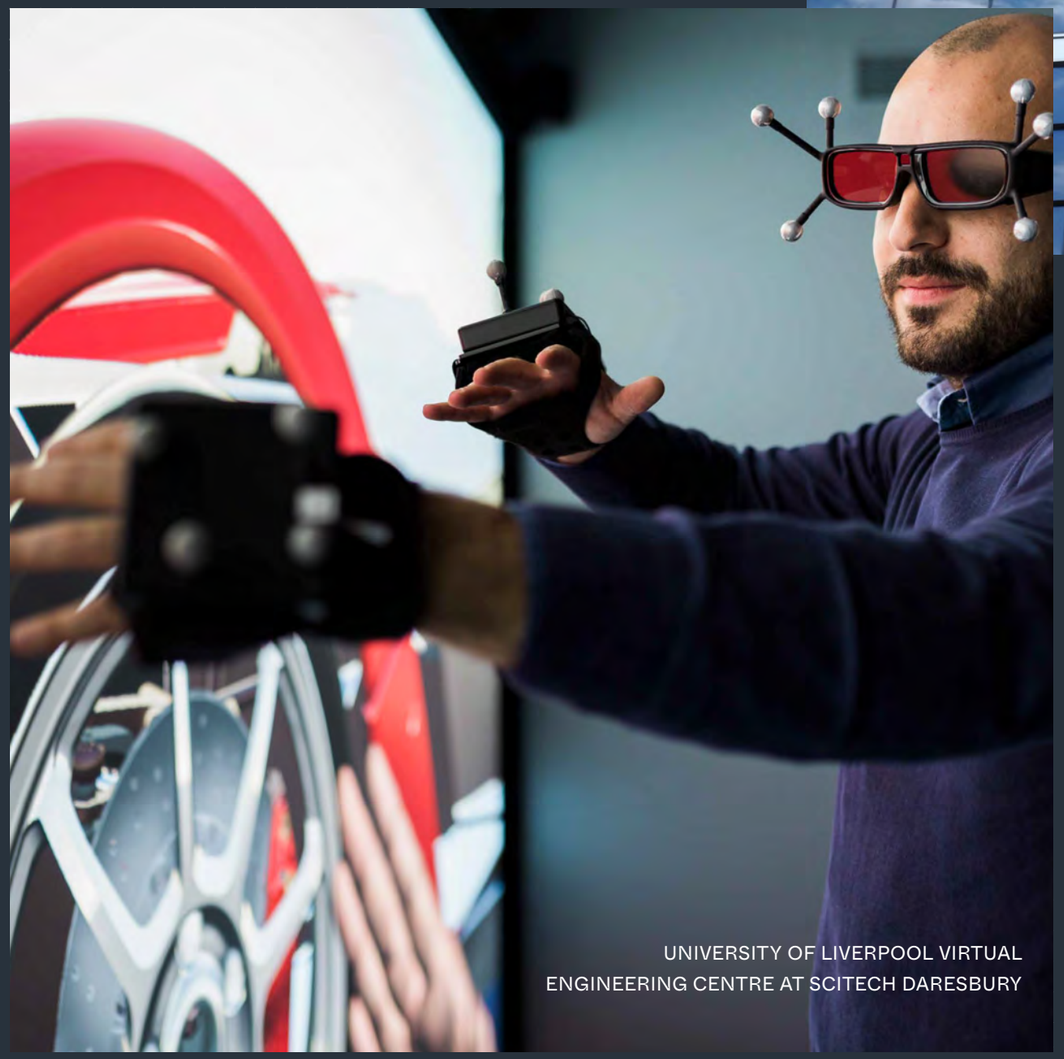


£3BN + £4BN + £5BN INVESTMENT OPPORTUNITIES

Liverpool City Region's innovation ambitions are firmly rooted in a £3bn pipeline of investment opportunities based on the city region's world-leading science and innovation assets and capabilities.

With a further £5bn investment in Hynet and between £4bn and £15bn in Mersey Tidal, the total opportunities equate to more than £12bn.

LIVERPOOL SCHOOL OF TROPICAL MEDICINE



UNIVERSITY OF LIVERPOOL VIRTUAL ENGINEERING CENTRE AT SCITECH DARESBURY

From materials science to AI, health innovation and net zero, with industry and government co-investment the LCR can and will continue to deliver some of the most relevant and urgently needed R&D and innovation anywhere in the UK in order to attract new businesses, investors and talent.

High Potential Opportunity (HPO) in Vaccine Manufacturing

In spring 2022, the UK Department for International Trade launched a High Potential Opportunity in vaccine manufacturing covering Liverpool City Region's world class expertise in infection control. HPOs are selected opportunities officially promoted by the UK Government to drive foreign investment into the UK's regions and nations.

The opportunity is directly linked to the city region's innovation, academic and industrial strengths in vaccine research, manufacture and distribution, underpinned by its skilled workforce, digital infrastructure, and global port.

This includes world-class translational research at LSTM and the University of Liverpool coupled with multi-national bio-manufacturing facilities at Speke and the prospective 'Glass Futures 2' medical glass manufacturing initiative in St Helens – this is intended to provide national resilience by enabling the UK to produce its own glass for vaccines vials.

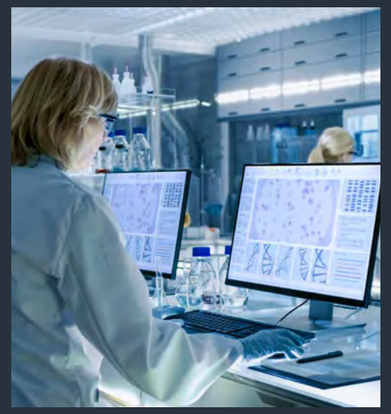
This comprehensive offer will enable companies to develop, validate, produce, and supply new global vaccines and vaccine technologies better and faster.

Infection Innovation Consortium (iiCON) Translational Facility

This £83m three-phase project is intended to scale out the existing capabilities centred around the Liverpool School of Tropical Medicine to deliver on the iiCON programme's objective to lever £1bn R&D investment within 10 years.

The £6m phase on facilities will provide a bespoke centre for world-class collaborative and interactive learning, industry collaboration, and community engagement consolidating the Liverpool City Region and UK as a world leader in infection innovation.

Health Innovation Liverpool (The HILL)

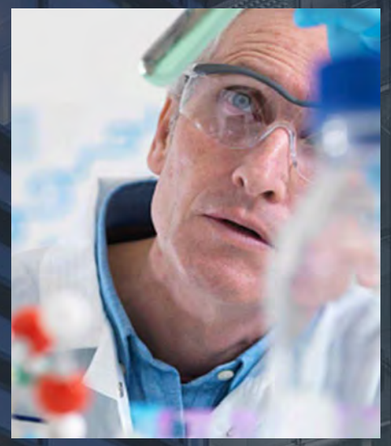


This health innovation cluster development programme is creating a critical mass of health and life science assets in Liverpool's Knowledge Quarter.

It places world-class academic research at the heart of physical and digital infrastructure shared with health and social care providers and industry partners. The 10-acre campus will provide agile health research and clinical trial facilities, with ultrafast digital connections and the UK's first Civic Data Cooperative, connecting innovators with trustworthy data-uses and communities.

An intended centrepiece will be the £250m Pandemic Institute, building on world-leading responses to the COVID-19 pandemic for Government, and on the UK's leading convergence of research into human, animal and zoonotic infections, public health and data science.

MIF Labs of the Future



£26m is required to grow a new high-tech cluster in Digital Labs of the Future.

The growth would come from five workstreams centred around the world-leading capabilities of the Materials Innovation Factory (MIF), working with its sister institute, the Digital Innovation Facility (DIF), both operated by the University of Liverpool.

It will combine academic knowledge platforms, innovation leadership, and significant collaborative partnerships with local SMEs and blue-chip R&D intensive corporations, notably Unilever, Croda, AstraZeneca, Pfizer, GSK, NSG-Pilkington, Johnson-Matthey, Boots and Siemens. If successful, 1,000 new high-value jobs would be created in and around the Liverpool City Region, plus a further 1,000 across the UK.

National Packaging Innovation Centre

This £60m open-access innovation facility aims to double the UK sustainable packaging market by 2030 and put the Liverpool City Region and UK at the forefront of the £1 trillion global packaging market.

The pilot project is being led by CPI - who operate the Medicines Manufacturing Innovation Centre and National Formulations Centre - with the support of the Liverpool City Region Combined Authority, Unilever and wider industry partners and investors.

Full scale government and industry co-investment will enable the creation of a dedicated facility, with 60 direct jobs and up to 2,000 indirect jobs.

"Innovation is the future, it's how we develop the next products and services that go on to influence everybody's day to day lives."

PAUL VERNON
EXECUTIVE DIRECTOR OF BUSINESS & INNOVATION, SCIENCE & TECHNOLOGY FACILITIES COUNCIL

National Centre of Excellence in Modern Methods of Construction:

This £155m multi-phase programme will establish a new National Centre of Excellence in Modern Methods of Construction (MMC) for Housing.

It would build on the presence in the Liverpool City Region of the Manufacturing Technology Centre (MTC), part of the national High Value Manufacturing Catapult, plus existing activities in both housing retrofit and new low-carbon construction methods.

The centre would deliver 24,500 new low-carbon, energy-efficient homes, alongside 10,000 refurbishments over the next decade, create 201 highly skilled and well-paid full-time jobs and deliver 100 apprenticeship opportunities each year.

MARITIME KNOWLEDGE HUB
CG IMAGE BY UNIFORM

Maritime Knowledge Hub

This £23m industry-led, innovation, R&D, education and skills centre of excellence in Wirral is backed by the Department for Transport's Maritime 2050 strategy and is intended to once again place the Liverpool City Region at the heart of UK maritime and marine innovation.

Built around Birkenhead's Grade II listed Hydraulic Tower, which was modelled on the Palazzo Vecchio in Florence, the Maritime Knowledge Hub will focus on creating new technologies and solutions to dramatically reduce carbon emissions across a wide range of maritime operations.

The key delivery partners are Mersey Maritime, Peel L&P, Wirral Council, and the Liverpool City Region Combined Authority.

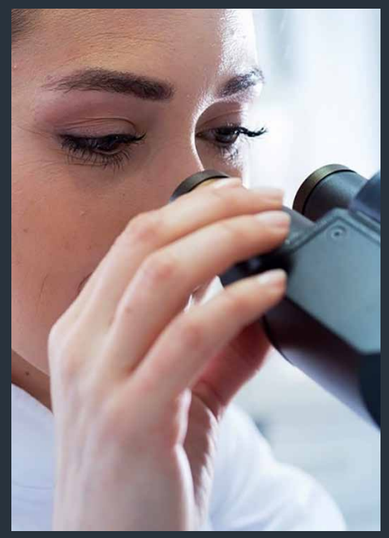
RUEDI (Relativistic Ultra-fast Electron Diffraction and Imaging Facility)

£1.4m has already been secured as the first phase of developing a new £30m national materials science centre, to be located at Sci-Tech Daresbury.

The facility, which will be unique in the UK, will support R&D at the forefront of new sustainable technologies.

These will include advanced materials, batteries, biomaterials, personalised medicine, environmental science, energy storage, functional nanomaterials, liquid crystals, nuclear science, electronic/photonic materials, pharmaceuticals, and surfactants.

Nanotherapeutics Centre for the North



Nanotherapeutics are already revolutionising the treatment of cancer, diabetes, and infectious disease, including COVID-19. However scientific and technical challenges to clinical use still mean long development times and high failure rates.

The proposed Nanotherapeutics Centre for the North (NCN) will provide expertise, design tools, analytical and manufacturing capabilities, physical assets, biological testing, and model development to de-risk the development process.

It requires an initial £6m investment but the potential rewards are huge - with the lucrative nanopharmaceuticals market projected to rise to around US$125bn by 2026. In collaboration with the National Measurement Laboratory, and the Centre for Process Innovation (CPI), the centre will create a new centralised infrastructure and "one-stop shop" expertise to support the developers of advanced materials and nanotherapeutics and drive commercial investment.

Alder Hey Innovation Centre

This £20m Child Health high-tech cluster will harness, drive and deliver cutting-edge products and solutions that tackle healthcare inequalities. It will also advance local and global child health.

The funding will grow the incubator tech labs in AI, immersive and health tech prototyping - combining globally renowned expert science and technology capabilities with integrated research and product development partnerships between health clinical innovators, SMEs, industry (Microsoft, CGI, Philips, Roche, Pfizer, Sarepta) investors, entrepreneurs and academia.

The Innovation Centre fuses an acute understanding of real world needs with a commercial focus. It will deliver, 100 direct and 250 indirect high-value jobs and apprenticeships in and around the Liverpool City Region, plus a further 500 across the UK.

"Everton Minds" National Dementia Centre

Proposed in tandem with development of its £600m new stadium, and as a centrepiece of its Goodison Legacy programme, Everton FC is facilitating a £25m project to create a dedicated centre of excellence that will harness the very latest technology to address all aspects of dementia care.

In partnership with LJMU, specialist NHS Trusts Alder Hey and The Walton Centre, National Museums Liverpool, O2, and metaverse-creating local SME vTime, Everton Minds will use digital immersive experiences and harness the emotive power of football to engage with people living with dementia.

Everton Minds would be part of a portfolio of innovative dementia research and support programmes. Drawing on the global appeal of Liverpool FC and Everton, the local reach of Everton in the Community, and LJMU's UK-leading sports science expertise, the programme could be expended into wider health and commercial uses.

Hydrogen/Hynet Future Phases

The HyNet project will deliver one of Europe's largest, integrated industrial decarbonisation clusters with multiple projects and investment sites centred around the River Mersey, Ship Canal and Liverpool Bay.

This will require £5billion investment over the next decade to deliver the Hydrogen and CCS infrastructure that will remove over 10 million tonnes of CO2 every year from the region.

This will generate up to £17bn GVA, 6,000 jobs, and produce 5GW of low carbon Hydrogen which is 50% of the UK Government's 2022 H2 target.

The project is currently split into three distinct delivery phases over the next ten years but there is significant potential to accelerate deployment.

This acceleration would be commercially beneficial as the production and supply infrastructure assets work most efficiently at scale.

Along with clean energy projects such as Mersey Tidal and Liverpool Bay offshore wind expansion, HyNet will provide a new Net Zero industrial backbone that would enable and support a range of new investments in manufacturing and transport technologies across the region, and link up its major industrial sites via a network of dedicated Hydrogen and CO2 pipelines.

THE RIVER MERSEY

Mersey Tidal

With options for barrage or lagoons producing indicative costs ranging from £4bn-15bn, Mersey Tidal represents the Liverpool City Region's biggest single investment opportunity and is the UK's largest prospective public sector-led renewable infrastructure project.

The project would deploy new technological solutions to harness the colossal energy of the Mersey's rising and falling tides. The river has one of the highest tidal ranges in Europe. With an envisaged 100-year lifespan, the project could create 5,000 new jobs during construction and produce between 1-6TWh of predictable, renewable, low carbon energy each year.

The scheme could power 1 million homes and cater for up to 30% of electricity demand across the region. To be both delivered and commercially viable it will require numerous innovative approaches - from digital twinning, to engineering solutions, construction materials, additive manufacturing and financial modelling - and there is undoubted scope for a major new UK R&D challenge fund to unlock these.

Mersey Tidal will require huge scale public funding and industry investment but the project helps address the city region and UK's net zero ambitions and comes as other generation assets are retiring and the cost of carbon-based energy is rising exponentially.

L2, PORT OF LIVERPOOL

Freeport

Liverpool City Region is one of eight government-designated UK Freeports, where a range of economic incentives will be deployed covering customs, business rates, planning, regeneration, innovation and trade and investment support.

The expansive Freeport zone will create a low-carbon, multi-modal, multi-gateway trade platform spanning strategic sites across the city region. It will attract high-value investment, and support indigenous growth, employment and regeneration, aligned to three themes: net zero, innovation and skills. A key focus will be The Port of Liverpool, which serves as the main coastal access point for the UK's largest concentration of manufacturing and is the UK's largest westward port - already handling 45% of trade from North America.

Targeting the automotive, biomanufacturing/pharmaceuticals and maritime sectors, the LCR Freeport aims to contribute £850m GVA and create 14,000 jobs, whilst directly contributing to the city region achieving its goal to be net zero by 2040 or sooner. The Freeport's Innovation Strategy will address five specific challenges and opportunities, which it will be seeking co-investment to deliver:

- Optimising and decarbonising Freeport gateways, port operations, vehicles, and vessels in ports
- Optimising and decarbonising ancillary freight and logistics operations
- Facilitating "Smart Borders" in line with the UK 2025 ambition
- Decarbonising the marine and maritime sector,
- Identifying and delivering R&D solutions to deliver the Mersey Tidal programme.

AN OPEN INNOVATION ECOSYSTEM

GREATER THAN THE SUM OF OUR PARTS

World-leading scientists, assets, industry and clusters are an excellent starting point for innovation, but they do not guarantee maximum success. For that, the ecosystem must be right: so that inter-connected strengths are bound together, great ideas can be nurtured, and innovation can move at pace. Put simply, to deliver effective R&D, place matters - as does connectivity and relationships.

The Liverpool City Region has been perfecting innovation for many years, and it knows exactly what's required to make it thrive. It is large enough to have the critical mass but compact enough to get things done – at speed. An agile, highly integrated ecosystem has been cultivated to enable high impact, scaleable innovation across sectors and disciplines, where collaborators are fully connected and can do more, faster.

Our world class assets and innovation hubs - notably the Materials Innovation Factory, Liverpool School of Tropical Medicine, and STFC Hartree Centre – are key to fostering a dynamic environment to cultivate ideas, discovery, invention, translation, and commercial application. Their success is already attracting large-scale investment and generating future growth.

But it does not end there. New and future assets - Glass Futures, Manufacturing Technology Centre, Alder Hey Innovation Centre, the National Packaging Innovation Centre, and the Maritime Knowledge Hub - all have the potential to become nuclei for future growth clusters.

Even more critical are our two UK-leading Science and Innovation Campuses which offer investment and expansion potential and that complement each other perfectly.

MERSEY GATEWAY RIVER CROSSING, HALTON

LIVERPOOL SCIENCE PARK WITHIN KNOWLEDGE QUARTER LIVERPOOL
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KNOWLEDGE QUARTER LIVERPOOL

KQ Liverpool is a thriving 450-acre innovation district that spans more than half of Liverpool City Centre. It is home to the University of Liverpool, Liverpool John Moores University, the Liverpool School of Tropical Medicine, the Liverpool Health Campus and the Hope Street cultural hub.

KQ Liverpool contains world leaders in disease and infection control, accelerated by the iiCON programme, as well as strengths in public health through Health Innovation Liverpool (The HILL) and the Civic Data Cooperative.

Anchored by the £92m Materials Innovation Factory, KQ Liverpool's strength in materials chemistry is developing a Materials Innovation Zone. This has already attracted investment from two High Value Manufacturing Catapults – the Manufacturing Technology Centre (MTC) and the Centre for Process Innovation (CPI) – located at Liverpool Science Park.

KQ Liverpool includes the new £1bn Paddington Village development which in 2021 saw the opening of The Spine – lauded as the world's healthiest building and home to the Royal College of Physicians' £35m northern base. Liverpool City Region's first operational net zero carbon office building HEMISPHERE is set to become the newest addition to the Knowledge Quarter skyline.

KQ Liverpool's collective strengths are underpinned by a shared motivation to promote inclusive innovation through delivery of its 2025 Vision, which focuses on education, collaboration and Levelling Up. This will advance the plans of the KQ Liverpool development company Sciontec, which is a partnership with the Universities, Liverpool City Council and property company Bruntwood SciTech.

The KQ Liverpool team offers direct support to both investors and companies located within the innovation district including the KQ Base, KQ Grow, and KQ Reward programmes.

BACKGROUND IMAGE © BEN BLACKALL

SCI-TECH DARESBURY

Sci-Tech Daresbury is a national science and innovation campus that serves as UKRI's primary base in the North. Ideally located between Liverpool, Manchester and Warrington and close to the M56, M6 and North West mainline, at its core is the STFC Daresbury Laboratory, sister site to STFC Rutherford Appleton Laboratory, at Harwell, Oxfordshire.

More than 1,300 staff are located at Sci-Tech Daresbury, with scientists specialising in data analytics, high performance computing, simulation and sensor technologies on particle accelerators and intense radiation source.

This includes strong links between the Cockcroft Institute and the universities of Liverpool, Lancaster, Manchester and Strathclyde, while staff from CERN, the European Space Agency and North West Coast Academic Health Science Network are also located there.

The campus is home to nearly 150 high-tech companies, mainly in advanced engineering, digital, biomedical and energy and environmental technologies. Businesses vary from start-ups to international corporates such as IBM, Atos and Croda and one in six companies are headquartered outside the UK.

THE INNOVATION CENTRE AT SCI-TECH DARESBURY

PROJECT VIOLET AT SCI-TECH DARESBURY

Sci-Tech Daresbury operates an open innovation model with dedicated investment support staff. It houses large-scale facilities including the University of Liverpool's Virtual Engineering Centre and the flagship STFC Hartree Centre, used by many UK universities as well as multinationals such as Unilever, Bentley Motors, Astra Zeneca, and BAe Systems.

The campus is also the nucleus for an established North West MedTech Cluster, new NW Digital Tech Cluster, and emerging NW Space Cluster, and it continues to grow with the latest Project Violet phase to develop new office and innovation space now complete.

Sci-Tech Daresbury ultimately plans to create 10,000 high tech jobs and 1 million square feet. The next phase of development, Ultraviolet, already has planning approval and will comprise nearly 17,000 square metres of Grade A office and laboratory space to meet identified regional and national demand.

DIGITAL INFRASTRUCTURE

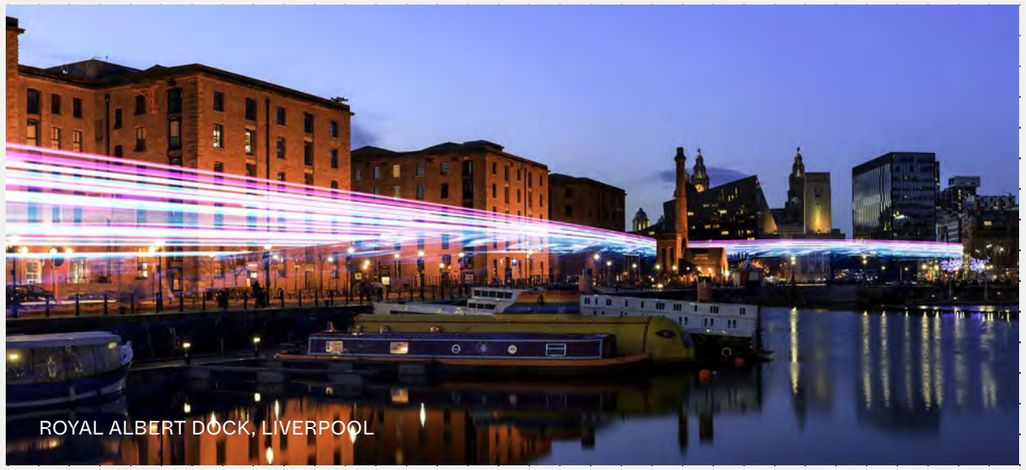
High-capacity digital infrastructure is a vital pre-requisite for delivering Liverpool City Region's top-line 5% R&D investment and net zero carbon ambitions. Three nationally significant programmes are helping achieve this:

- LCR Connect is a ground-breaking (literally) £30m commercial Joint Venture between the Liverpool City Region Combined Authority, French multi-national NGE, and North West based contractor ITS that is delivering a 212km full-fibre, gigabit-capable network and will connect key innovation assets across the city region.

- Liverpool 5G created, manages and operates the largest 5G mm wave mesh network in Europe, with a focus on delivering direct health and social care services in one of the UK's most deprived communities.

  The unique consortium of Liverpool City Council, the NHS, social care suppliers, academics, local SMEs and a leading UK 5G technology vendor backed by ARM holdings, was initially formed to deliver the DCMS-funded Liverpool 5G Testbed. This is now extending to educational uses underlining its clear potential to be scaled up across a wider regional and national footprint.

- Any effective innovation ecosystem relies on the collection of robust data. To that end the UK's first Civic Data Cooperative is also in development and operation. Its mission is to maximise health improvements in the general population through data collection, storage, analysis, assets and initiatives. As with Liverpool 5G, while the initial focus is on health, the expertise, tools and platforms developed have significant potential to be applied to other sectors and uses, from transport to maritime and culture.



ROYAL ALBERT DOCK, LIVERPOOL

PHILIPPA GLOVER
MD, CNC ROBOTICS

BUSINESS SUPPORT

The Liverpool City Region provides premium investment and business support through its Invest Liverpool 'one front door' approach, and the dedicated Growth Platform.

Established by the Local Enterprise Partnership and Combined Authority, the Growth Platform was created to help strengthen, simplify and coordinate the business landscape and make it easier and faster for businesses to start, grow and invest in the city region.

The quality of the offering is exemplified by the UK-leading 4IR initiative LCR4.0, which provided pioneering digitalisation support to advanced manufacturing.

The initiative was a collaboration between the LEP, STFC Hartree Centre, the University of Liverpool and LJMU, and generated more than £30m GVA and 955 indirect jobs. LCR4.0 gave rise to three successor projects that have supported SMEs from a range of sectors to develop digital tools, strategies, and supply chains. LCR4.0 was also the direct prototype for the North West National Made Smarter Pilot that is now a major UK programme.

LCR4.0

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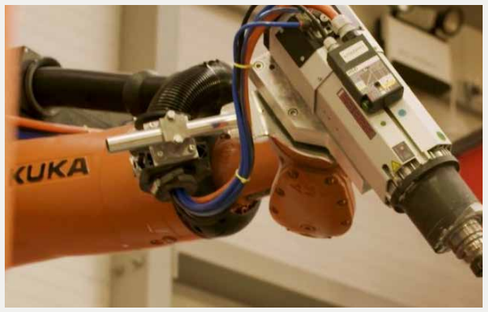
ADVANCED ENGINEERING AT CNC ROBOTICS



GROWTH TECHNOLOGY BUSINESS VALUECHAIN

LCR VENTURES

LCR Ventures is the Liverpool City Region's first standalone innovation commercialisation vehicle aimed at further stimulating the regional ecosystem and turning great ideas into businesses. The £7.5m Phase 1 is underway, creating a Research and Technology Organisation (RTO) to promote early-stage health and life sciences innovation through business consultancy and a £5m seed fund.

Phases 2 and 3 intend to scale out activities and funding to DeepTech, net zero and maritime. These will provide enhanced innovation support to established businesses, develop 3-5 large scale business-academic consortia opportunities, help develop growth clusters around the city region's world class innovation assets, and drive further private investment into the region.

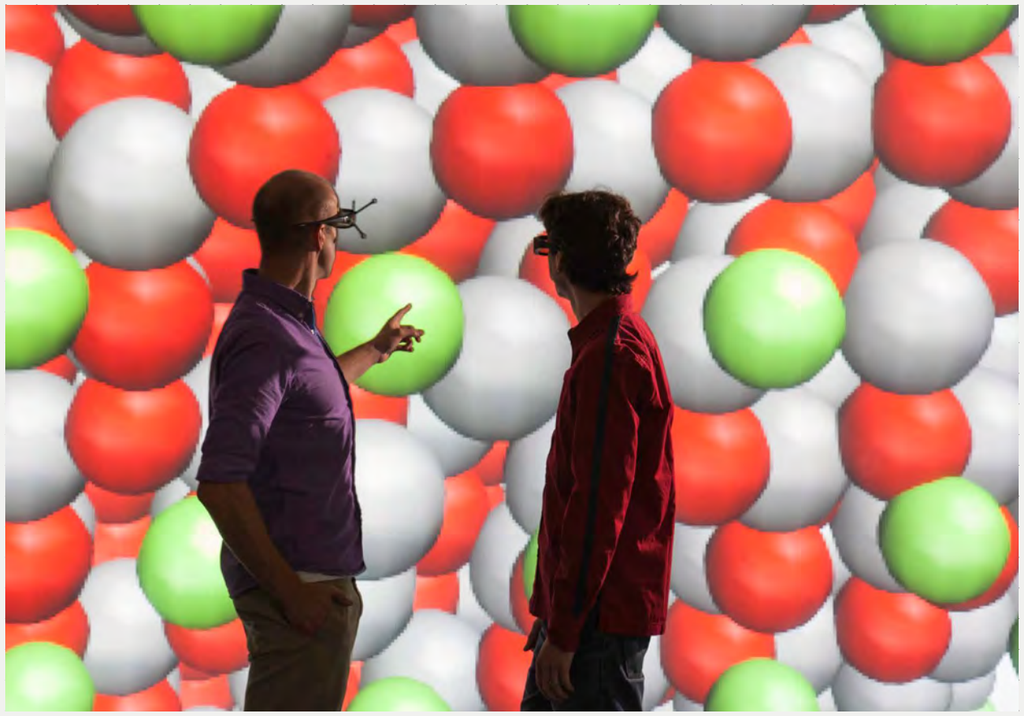
LCR Ventures comes on the back of the Future Investment Fund that disbursed £2m of grants to regional SMEs. Funding of up to £100,000 was available for near to market innovations during the COVID-19 pandemic. A Tech Accelerator and Angel Network are also in line for support from the city region's Strategic Investment Fund.

INNOVATION SKILLS FOR GROWTH

Innovation and growth are impossible without the right skills. Through its Innovation Skills for Growth plan – the only one of its kind in the UK – the Liverpool City Region is ensuring specialist skills are readily available when needed.

As well as supporting careers at a grassroots level, the programme is ensuring existing and future organisations can draw from a talent pool tailormade to deliver transformative and innovative projects.

Linked to this is the Research England funded Prosper initiative. Led by the University of Liverpool, and involving the Universities of Manchester and Lancaster, the programme creates new career pathways for post-doctoral researchers to become high-performing technical and business leaders by working directly with major employers in the North West, including Alderley Park, Ashfield Health, Astra Zeneca, Bristol-Myers Squibb, Cancer Research UK, Elanco, Environment Agency, IBM, Koura Global, and Unilever.



IN SILICO MODELLING AT THE VIRTUAL ENGINEERING CENTRE

LEADERSHIP & COORDINATION

The Liverpool City Region's drive for a future founded on innovation comes with the unflinching support of its Metro Mayor and expert guidance from the UK's first regional Innovation Board.

OUR INNOVATION BOARD

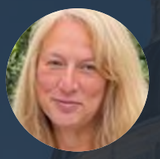
Securing government and industry investment in Liverpool City Region's distinctive world-leading science and innovation is a top priority for the Metro Mayor. With this commitment comes the organisational influence, assurance, and administrative capacity of the Liverpool City Region Combined Authority, that is responsible for economic development in an area with 1.6 million people.
This includes a dedicated innovation function responsible for connecting and co-ordinating organisations, sectors, ideas and projects, plus liaising with government and industry, across the UK and globally.

Equally key to driving the innovation agenda is the strategic leadership of the LCR Innovation Board. Established in 2013 and chaired by a Unilever Vice President, it was the UK's first cross-sector, industry led innovation board at regional level. Comprising some of the UK's most respected innovators, the Board's primary objective is to realise the City Region's 5% R&D investment target by 2030. It has an explicit focus on commercialisation, growth cluster development, and ensuring the supply of skills and talent required to deliver on the city region's innovation potential.

DR JON HAGUE (CHAIR)
UNILEVER

DR PETER GALLAGHER
GLOBAL CONSULTANT

PHILIPPA GLOVER
CNC ROBOTICS



LORNA GREEN
LCR VENTURES

DR ARUN HARISH
CPI

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