



OXFORDSHIRE FUTURE MOBILITY

Invest in the UK's innovation engine for autonomous, connected, electric and shared automotive technologies





INVESTING IN THE FUTURE OF MOBILITY?

10 REASONS TO CHOOSE OXFORDSHIRE

1. Within the UK's Testbed region for developing future mobility.
2. At the heart of the UK's Motorsport Valley.
3. Opportunities to collaborate with exciting spin-outs from the University of Oxford.
4. Deploy testing facilities at world-recognised centres of excellence, including the CAV pit lane facility at RACE.
5. Manufacturing, distribution facilities and Grade A office space for businesses of all sizes, with opportunities to scale up.
6. Proven success in attracting international manufacturing and R&D companies.
7. Highly-educated population and technically-skilled workforce in engineering, physics and motorsport.
8. Thriving mobility and energy ecosystems, facilitating knowledge exchange.
9. Flourishing low carbon energy sector, generating around £1.14bn a year.
10. Excellent connectivity to London, the Midlands and south coast ports by rail and road, plus easy access to major airports.

A GLOBAL HUB FOR MOBILITY SOLUTIONS

Oxfordshire has some of Europe's most successful clusters in connected and autonomous vehicles, motorsport, and energy storage solutions, each one stimulating innovation through multidisciplinary collaboration.

Home to the [University of Oxford](#) and [Oxford Brookes University](#), it has unrivalled centres of academic research into software, machine learning and AI, robotics, alternative energy sources and advanced engineering.

With a track record of establishing and attracting investment from around the world, it has seen over £2 billion in foreign direct investment since 2015.

New vehicle technology will play a major part in making Oxfordshire one of the world's top three innovation ecosystems by 2040 – the vision for OxLEP's [Local Industrial Strategy](#).

The county forms a large part of [Testbed UK](#), a uniquely-resourced central UK region where CAV technologies can be taken from concept to manufacture. Geographically, Testbed runs between London and the Midlands, placing Oxfordshire at its centre.

Foreign-owned companies which have expanded or established operations in Oxfordshire during the last three years include [Waymo](#), [BMW](#), [Hyundai](#), [Kia](#), [Oxis Energy](#), [Andretti](#), [Zoox](#) and [Mahindra Group](#).

COMPANIES INVOLVED IN FUTURE MOBILITY IN OXFORDSHIRE:



SETTING GLOBAL STANDARDS IN ACADEMIC RESEARCH

Oxford Brookes University is #2 for teaching among the UK's young universities

THE Young University Rankings 2020

Through their world-leading research and teaching, Oxfordshire's universities continue to push the boundaries of technology.

Several departments within the [University of Oxford](#) are making future vehicle technology a focus of their research, including the [Oxford Robotics Institute](#). The University is a global centre for AI research, and its [chemistry department](#) is actively researching the storage and utilisation of hydrogen in transport.

Some of the region's fastest-growing companies have grown out of the University of Oxford, including universal autonomy developer [Oxbotica](#). Incoming businesses can benefit from collaboration with an array of exciting and highly-successful University spin-outs. The University's commercialisation arm, [Oxford University Innovation](#), has successfully spun out over 200 companies.

[Oxford Brookes University](#) runs highly-regarded courses in automotive and motorsport engineering and technology, and carries out research into cognitive robotics, artificial intelligence and vision. Its [High Voltage and Energy Storage Laboratory](#) specialises in electric motorsports and its outstandingly successful student racing [team](#) provides hands-on experience for students preparing to join the EV and CAV industry. It has strong links and fruitful partnerships with the

county's motorsport companies, and was BMW's academic partner in the [MINI E project](#). The University is also researching into configuring the urban environment for healthy and sustainable mobility.

The cutting-edge technologies developed by Oxfordshire's Formula One, Formula E and motor racing teams have led to new advances in all forms of road transport as well as aerospace and energy.

World-leading connected and autonomous vehicle companies already have a presence in Oxfordshire. Investments already secured for Oxfordshire, for example in the [CAV Pit Lane](#) at [RACE](#) (Remote Applications in Challenging Environments), are encouraging others to follow and become part of rapidly-growing and thriving ecosystem.

The [Oxford Martin School](#) is researching the economic, social and business impact of autonomous transport systems. The [Said Business School](#) has an acknowledged programme to help the business community understand AI and its true potential and is where Oxfordshire's [Hydrogen Hub](#), formed to drive investment in hydrogen and fuel cell projects, launched in 2018.

The University of Oxford is ranked #1 in the world for the past five years

Times Higher Education 2020



WORLD-LEADING SCIENCE AND INNOVATION CENTRES

Oxfordshire has the key ingredients that make up a world-class innovation ecosystem: a flourishing environment for innovation and business creation; world-leading experts in knowledge and technology development; and a dynamic, agile, and skilled workforce.

Over 200 research and technology companies in health sciences, med tech, space applications and energy operate on **Harwell Campus**. The site houses Western Europe's largest space cluster of over 100 growth companies. Critical assets include the [Diamond Light Source](#), the [Rosalind Franklin Institute](#), [Faraday Institution](#), [UK Space Agency](#), [European Space Agency](#), [Rutherford Appleton Laboratory](#), and [VMIC](#), the UK's first dedicated [Vaccines Manufacturing Innovation Centre](#).

Culham Science Centre hosts over 2,000 scientists carrying out world-leading research into areas such as fusion power and autonomous vehicles. Critical assets include the [Culham Centre for Fusion Energy](#), which will design and build the world's first compact fusion reactor by 2040, [RACE](#), and the [Culham Innovation Centre](#).

Oxfordshire is the centre of FI and Formula E motor racing technology development. The cutting-edge advances made within an area known as **Motorsport Valley** have led to breakthroughs in all forms of road transport as well as aerospace and energy. Key assets include the [Williams Innovation & Technology Campus](#) with office, industrial and R&D space located at the nearby [Grove Business Park](#).

The **Bicester Motion Innovation Quarter** will establish a world-leading automotive engineering centre of excellence and offer new accommodation for international technology businesses.

Heyford Park provides a range of commercial accommodation warehousing, workshops, lab space and offices and is already home to over 100 businesses.

University of Oxford's **Begbroke Science Park** focuses on advanced engineering and medical tech for 35+ world leading research & technology companies. By 2032, a £2 billion programme will co-locate engineering, physical and life sciences research to Begbroke's global innovation campus, to work directly with industry.

Within the **Oxford City Science Area**, key development work is ongoing in sectors such as life sciences, digital health, AI technologies and quantum computing. Key assets include the [Centre for Applied Superconductivity](#).

The **Oxford Science Park** is home to more than 100 companies, from start-ups to multinationals, working within a vibrant R&D and commercial community. It offers a variety of design-and-build office and laboratory accommodation.

Milton Park is a science and technology park home to 250 companies and 9,000 people and forms one of the largest science clusters in the UK. It is part of a trial to introduce autonomous vehicles in the area.

Oxford Technology Park is a new science and technology park that offers flexible office and R&D space to the north of Oxford. The site is located adjacent to [London Oxford Airport](#) and with [nearby access](#) to London by rail.

Oxford Business Park is an innovation based community and home to Oxbotica. It is close to the city centre and hosts over 60 science, technology and service companies. It offers workspace to suit all sizes of businesses and an amenity rich environment.

Howbery Park is the UK's first solar powered business park. It provides a range of sustainable office space for science and technology businesses set within parkland on the banks of the River Thames.

INNOVATION CLUSTERS ACROSS OXFORDSHIRE

Western Europe's highest concentration of science research facilities





Arrival's electric bus will be built in Bicester

TESTING FACILITIES



The [CAV Pit Lane](#) at Culham Science Centre enables vehicle manufacturers and self-driving vehicle developers to improve and test advanced driver assistance systems (ADAS) and autonomous systems. Over 80 R&D projects have used the facility since it opened in 2019.

Culham's [RACE](#) facility operates jointly with Millbrook in nearby Bedfordshire as a proving ground for the development of CAV technologies. Together, the two sites offer controlled and real-world testing urban environments over 90km of roads on secure sites, along with 5G, data storage, digital modelling, vehicles and simulation, purpose-built workspaces with integrated accommodation.

Electric motor developer and manufacturer [Saietta](#) chose to locate at Heyford Park, giving it access to 20 miles of private test tracks nearby.

Harwell's Space Cluster, which encompasses major assets of national and international significance such as the [European Space Agency](#), provides a range of test facilities. At [Culham Science Park](#), Space and hypersonic travel company [Reaction Engines](#) is pioneering technologies that can be applied to automotive and energy as well as aerospace. The company has recently completed a ground-breaking study on [ammonia fuel for a sustainable aviation propulsion system](#).

MANUFACTURING, DISTRIBUTION AND OFFICE SPACE

Banbury, in the north of the county, is one of the most central towns in the UK. The former market town, located next to the M40, with access to motorway connections in all directions, has been developing at an exciting rate in recent years to become a prime distribution centre and manufacturing hub, attracting companies such as [Prodrive](#) and [Arrival](#). The brand new [Catesby Tunnel](#) aerodynamic testing and vehicle development facility is located nearby.

Bicester, Oxfordshire's eco town and home to the famous retail outlet Bicester Village, is becoming the centre of the county's low-carbon innovation among its 13,000 new homes and its growing number of microfactories.



Motorsport and advanced engineering group Prodrive is based in Banbury

LEADING ADVANCES IN...

CONNECTED AND AUTONOMOUS VEHICLES

Images: Waymo, Streetdrone



The global market for CAV technologies will be £100bn by 2035

Oxfordshire is a global centre for CAV development, including simulation and modelling and is in the CAM Testbed UK region.

Alphabet subsidiary [Waymo](#) has chosen Oxford for its first European engineering hub. In 2019, it acquired Latent Logic, which was spun out of Oxford University just two years previously. Latent Logic's deep learning helps autonomous vehicles coexist and interact safely with humans.

[Oxbotica](#), a spin-out from the University of Oxford, was the first company to move into the [RACE](#)

CAV facility, in February 2020. Using the latest in computer vision and machine learning, its work is enabling autonomous vehicles to operate independent of external infrastructure. Oxbotica is part of the Oxford-centred [DRIVEN](#) consortium which includes the [Oxford Robotics Institute](#), Oxford cybersecurity company [Nominet](#), [RACE](#), Axa XL insurance and Telefonica. In October 2019, the consortium demonstrated the capabilities of a fleet of self-driving vehicles in London's complex urban environment.

Bringing together the best minds in AI, engineering and mobility, [Five's](#) Oxford site is working on a fully autonomous shared transport service for Europe's cities. It is currently developing technology to help test and measure the accuracy of a vehicle's driving systems for autonomous car makers. It has raised \$77m in funding from investors such as Swiss VC firm Lakestar and Russian investor Sistema.

[StreetDrone](#) in Oxford was the first company globally to offer subscription-based autonomous driving software, and the first in Europe to run an open-source self-driving vehicle on the road. Its technology will make it faster and safer to deploy autonomous vehicles at scale.

The [Darwin Satcom Lab](#) at Harwell, announced in October 2020, will make use of 5G and satellite technology for trialling autonomous cars. Led by telecommunications company O2, it is backed by the UK and European Space Agencies.



"The UK is a world leader in AI research, including autonomous vehicles."

Guardian, December 2019.

CASE STUDY

Oxbotica

Oxbotica was spun out from the University of Oxford in 2014 and has grown from a UK robotics start-up to one of the world's leading companies in autonomous vehicle software. Headquartered at Oxford Business Park, Oxbotica's product is a software platform providing Universal Autonomy. It is fast to deploy, low energy, hassle free, hardware agnostic autonomy and applicable to a vast array of vehicle types both on and off road. The advanced technology supports Oxbotica's unique horizontal B2B model providing operators, integrators and manufacturers the autonomy functionality and flexibility they need – be that a full stack or on a component-by-component basis.

In January 2021 it completed a \$47m Series B raise and has financial and strategic investors in Australia, China, UK and the USA.



Electric motor development at Yasa



ELECTRIC VEHICLES

Oxfordshire companies are contributing to a £15bn – and growing – market in electric vehicles.

BMW chose the iconic Cowley plant in Oxford to make its first electric [MINI](#). Since manufacture began in July 2019, 11,000 electric Minis have rolled off its production line.

'Unicorn' company [Arrival – valued at €3bn after significant investment from Hyundai, Kia and BlackRock](#) – is developing an electric bus and an electric small van and has deals with the Royal Mail and UPS. With sites in the Netherlands, Germany and the USA, it has located its R&D centre and van production in Banbury and has chosen Bicester as the site of its new microfactory to make zero-emission buses from 2021.



[Saietta](#), formed in 2015 by the merger of the Indian-based motor manufacturer Agni Motors and the electric motorcycle developer Agility Global, has engineered a breakthrough axial flux electric motor. It chose Oxfordshire to build its scalable, brushless, zero maintenance modular design motors for use in vehicles from scooters to buses. Its AFT40 model for final mile delivery vehicles and bikes is currently in low-volume production at Heyford Park.

[YASA](#) can produce up to 100,000 compact, lightweight, efficient and powerful electric motors every year. Developed and manufactured in Kidlington, the motors have applications in automotive, industrial, marine and aerospace. YASA has raised more than £30m from investors, including Canadian venture firm [Inovia](#) and Mauritian investment company [Universal Partners](#), since being spun out from the University of Oxford in 2009.

[Prodrive Advanced Technology](#) has helped Volta Trucks create the [Volta Zero](#), the world's first purpose-built full-electric 16-tonne commercial vehicle. The project was completed from a clean sheet to a fully running demonstrator vehicle in just 10 months.

A new [centre of excellence](#) for thermal propulsion has been set up by the University of Oxford's engineering department in partnership with Bath University, Siemens and Jaguar Land Rover, to help make electric vehicles more efficient and affordable.

FORMULA E AND THE MOTORSPORT FACTOR

Motorsport technology has powered many advances that are now deployed in everyday motoring and in other sectors. With close proximity to [Silverstone](#), Oxfordshire's distinguished track record in motorsport is continuing to contribute to smart mobility. There is no other location worldwide that offers so much relevant automotive sports technology.

[Williams Advanced Engineering](#) has created high performance batteries which are at the cutting edge of performance and management for Formula E. Williams' development work in motors and materials has found commercial applications in electrical vehicles from the Brompton E-bike to mining trucks as well as in solar-powered aircraft.

Formula E, the motorsport championship that uses only electric cars, is a testbed for electrification and new technologies that are being transferred into prototype vehicles and road cars and several practitioners have made Oxfordshire their base. [Roborace](#), the creator of the world's first driverless electric racing platform, has had its HQ in Banbury since 2017. It is backed by the Kinetik investment fund.

[Mahindra Racing](#) is one of the ten founding teams – and the only Indian team – of the FIA Formula E Championship. Its manufacturing base is in Banbury. Mahindra Group is one of India's largest companies, with a presence in over 100 countries through its conglomerate interests in electric vehicles, agricultural technology and IT.

Chinese automotive manufacturer [NIO](#) has based its Formula E performance technology research centre and advanced engineering group at [Begbroke Science Park](#).

No other location worldwide offers so much relevant motorsport technology.





SKILLS

Nexion is a world leader in engineered silicon materials for battery applications

BATTERY TECHNOLOGY AND ENERGY STORAGE

With 125m electric vehicles projected to be on the roads by 2030, demand for ever-more efficient batteries is growing. Pioneering work in battery technology is putting Oxfordshire in the vanguard of breakthrough electrical storage solutions.

The [Culham Centre for Fusion Energy](#) and the [Faraday Institution](#) at Harwell are the wellsprings of the UK's expertise in energy.

At [Harwell's EnergyTec Cluster](#), 35 companies and 900 people contribute to the UK's research into electrochemical energy storage. The Faraday Institution is a key stakeholder, linking 20 universities and 30 industry partners. Its Fast Start projects have helped to accelerate battery technology through research into new materials, increased capacity and weight reduction. It has supported innovators such as:

- [ZapGo](#), which is developing a new approach to energy storage based on Carbon-Ion (C-Ion), offering safer, faster charging. It avoids the use of rare-earth materials such as lithium and cobalt, and can be recycled.
- [Nextrode](#), a consortium of five university and six industry partners, led by the University of Oxford, is a project to revolutionise the way battery electrodes are manufactured and to make EV batteries longer-range and more durable.

[Oxis Energy](#), based at [Culham Science Centre](#), says it is leading the world in the development of Lithium sulphur chemistry and has plans to revolutionise the rechargeable battery market. Focusing on the aviation, defence and heavy vehicles markets, it has attracted £24m of international funding from companies including Aerotec Brazil, Sasol South Africa, French aerospace group Safran and chemicals company Arkema.

[Nexion](#), based in Milton Park, is a world leader in engineered silicon materials for battery applications. Its Li-ion battery anode technology uses silicon instead of graphite, and enables a dramatic improvement in the performance of EV rechargeable battery technology. It has raised £30m and has offices in Oxford and Yokohama, Japan.

[V2GO](#), or Vehicle to Grid Oxfordshire, is an EDF-sponsored project led by the University of Oxford involving a consortium of Oxfordshire partners that is investigating how electricity stored in EVs can be used to flow back into the grid, turning cars into energy storage units.

“The UK aspires to be a world leader in the development of new battery technologies in both the automotive and other energy storage sectors.”

Ian Ellerington, Head Of Technology Transfer, Faraday Institution.

Whether you are setting up a new business or investing in Oxfordshire's mobility sector, you will find a skilled and experienced workforce and a large pool of talent to tap into.

- Around 4,000 of the 23,000 people employed in manufacturing in Oxfordshire are involved in the automotive sector.
- Over 9,000 people are employed in the low carbon economy.
- Oxfordshire is home to 687,500 people, of whom 375,100 are economically active
- 50,000 new jobs have been created since 2011/12
- 51% of the working age population is qualified to degree level or above



CASE STUDY

Engineering a future in e-drive

Melissa Chigubu is a degree apprentice specialising in automotive electric drive systems. Over the next four years she will combine her work at the [GKN Innovation Centre](#) at Abingdon, south of Oxford, with studying at the University of Warwick. She grew her interest in engineering during a B-Tec engineering course in school and went on to complete a Level 3 apprenticeship, which led to a placement at GKN Automotive, a leader in drive system technologies.

Named in 2019 as one of the UK's top 50 women in engineering, Melissa has been a ground-breaker from the start. She was the first woman to complete the foundation course at the Advanced

Manufacturing Training Centre and was one of the first wave of apprentices at the at the GKN Innovation Centre. She works on all aspects of the electrical drive system such as designing, developing, electronics, software, vehicle integration, and testing – her favourite part. “I really enjoy working in the testing department and believe that the work we do here at the innovation centre will help make the future electric by making electric engines more efficient and affordable.”

Passionate about engineering, she is an OxLEP Apprenticeship Ambassador, visiting schools in the county and inspiring more young people – girls in particular – to consider a career in engineering.



Credit: A2Dominion



A VIBRANT AND DIVERSE PLACE TO LIVE

10 REASONS TO LIVE IN OXFORDSHIRE

Communities steeped in history: The UNESCO World Heritage site at [Blenheim Palace](#), Oxford's dreaming spires, and Banbury Cross of nursery rhyme fame are just a few of the landmarks dotted around the county.

Beautiful outdoor spaces: Many towns and villages sit within the Cotswolds, North Wessex Downs and Chilterns Areas of Outstanding Natural Beauty, and rivers and canals add to the landscape and host water-based activities.

Supremely well connected: The city of Oxford is an hour's drive from London and 45 minutes from [London Heathrow](#), the UK's largest airport. Trains run frequently from Oxford's two mainline stations, linking it to London in less than an hour as well as to Birmingham, and the north and the south coast.

A fusion of traditional and modern living: The historic streets of Oxford and thatched cottages in rural hamlets don't mean you have to live in the past - 97% of properties benefit from fibre broadband.

Museums and culture: A wide range of museums, galleries and theatres means you are never short of cultural opportunities to explore, including the [Ashmolean Museum](#) in Oxford and several National Trust properties.

Retail therapy: The new [Westgate Oxford](#) shopping centre and [Bicester Village](#) offer a wide range of global brands alongside exceptional dining and leisure facilities. Small independent traders can be found on many high streets, offering boutique products manufactured locally and from further afield.

Excellent educational opportunities: In addition to the two universities, there are many fantastic schools in the state and private sector, ensuring choice for all.

Safe and welcoming communities: Newcomers are welcomed by communities with many people willing to offer help and advice, and the county also benefits from low levels of crime.

Literary, TV and film connections: Home to filming locations for productions including; Inspector Morse, Harry Potter, His Dark Materials and Downton Abbey. The annual Oxford Literary Festival celebrates world-class writers in the city of Lewis Carroll, CS Lewis, JRR Tolkien and Phillip Pullman.

Gastronomical delights: From high end cuisine offered by Michelin starred restaurants to a pint of locally brewed Hooky Ale poured in the village pub, there is no shortage of places to eat and drink.



OXFORDSHIRE'S COMMITMENT TO LOW CARBON

The city of Oxford is leading the way in encouraging low carbon transport and in 2021 will become the first UK city to introduce a [zero emission zone](#) and aims to be a zero-carbon city by 2040. The City has the only licenced LEVC electric taxi service in the region and by 2023, 25% of its refuse collection vehicles will be electric.

[Energy Superhub Oxford](#) (ESO), a three-year £41m project announced in 2019, is one of four demonstrator projects part-funded (£10m) through the government's Prospering from the Energy Revolution Challenge. ESO will showcase electric vehicle charging and smart energy management technologies and it has funded six EVs for Oxford City Council to trial. Its partners include Invinity Energy Systems, Kensa Contracting, Habitat Energy, and Pivot Power.

[Bicester Motion](#), will be the world's first automotive leisure resort and visitor attraction. Dedicated to the experience of driving as well as demonstrating the very latest in high-tech engineering, this luxury resort will feature a 344-bed hotel, spa and conference development – and its own airfield. The resort's promoters are seeking investor partners for this £140 million project.

COMPREHENSIVE SUPPORT FOR INVESTORS

SUPPORT FOR BUSINESSES INVESTING IN OXFORDSHIRE

We provide comprehensive tailored assistance to help companies from across the world establish their new operation in the area.

Our [Inward Investment team](#) offers a range of support including:

- Identifying commercial premises and co-ordinating property viewings
- Facilitating introductions to the University of Oxford and Oxford Brookes University
- Making introductions to Oxfordshire's science and research facilities
- Connecting businesses with professional service providers, business support organisations and sector specific networks.
- Offering assistance with graduate recruitment and training support including apprenticeships
- Supporting the relocation of employees and their families
- Providing ongoing support to Oxfordshire-based companies

The UK government has already provided over £250m in funding, matched by industry, to position the country at the forefront of CAV research and development. £24 million of this has gone directly into modelling and simulation research and development.

*Bicester Motion:
artist's impression.*





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 @oxfordshirelep

 Oxfordshire Local Enterprise Partnership

