TRADE & INVEST | This is high value manufacturing:



On the road, to net zero.

The Welsh Government has set legal commitments to achieve net zero emissions by 2050, but is pushing to 'get there sooner' with a stronger, greener, fairer Wales.

 Transitioning to a net zero society is vital to improving the social, economic, environmental and cultural well-being of Wales and the rest of the UK.

— Wales aims to be globally recognised as a leading location for the development and delivery of emerging technologies, particularly in the automotive sector, by 2027.

— More than half of Wales' electricity already comes through renewables. We're changing our whole energy system so that it's more localised, flexible and smarter.

 New energy ideas both onshore and offshore, are being explored to harness Wales' natural resources to deliver the low carbon transition.

— Wales collaborates – and through this collaboration with businesses, academia and social partners, has produced a manufacturing action plan. The plan provides a focus for future proofing our manufacturing capability and identifies the steps needed to develop a resilient, high value manufacturing sector with a highly skilled and flexible workforce able to deliver the products, services and technologies necessary for our future economy.

— Wales is building a smart environment that joins together our low-carbon capabilities into a single, seamless system.

 That ambition has led to an investment in skills and research, matched with a desire to innovate.

Wales is on the road, to net zero.



ront cover:

Riversimple is aiming to offer customers affordable, hassle free, fun-to-drive bydrogen powered eco cars



VAUGHAN GETHING MS Minister for the Economy, Welsh Government

he mobility sector in Wales, and in particular the many highly skilled automotive companies, is of vital importance to the Welsh economy and I am determined to help ensure that it continues to be a cornerstone of a strong and green Welsh economy. We're immensely proud of the world-leading ecosystem we helped foster here in Wales. It is a high potential network, translating state-of-the-art research and innovation capabilities into world-class Welsh manufacturing for new and emerging global technology markets.

Highly innovative technology is already shaping and improving our lives today and will be a force for good as we move quickly towards our Net Zero Targets. Key, yet diverse, sectors such as electric vehicles, alternative fuels and satellite manufacture all have their part to play in the decarbonisation, automation and competitiveness of the Welsh economy.

From aerospace to automotive, mobility is of huge significance to Wales, providing high value and highly paid jobs and is a real magnet for foreign direct investment. It also underpins development in so many other industries and will deliver against our Programme for Government by driving a stronger, greener economy, and contributing to the net-zero, decarbonisation challenge.

We will continue to invest in infrastructure to bridge academic discovery and commercial application, supporting companies to develop innovative products for new markets, and encourage collaboration through adopting open innovation practices to ensure Welsh industry is at the forefront of technological change to ensure it remains competitive on the global stage.



Caung by example: Our parliament building, the Senedd, was the first in Wales to be awarded an 'excellent' rating by BREEAM, the global benchmark for environmental standards.

What Wales is doing today, we hope the world will do tomorrow.

Wales is building a smart environment that joins together our low-carbon capabilities into a single, seamless system. Shared expertise across many disciplines. all with the same goal.

Wales' strong history. ON THE ROAD, TO NET ZERO

AMRC Cymru:

As a cutting edge R&D facility, AMRC Cymru will be driven by industry, for industry.



In 1839, Swansea born judge and inventor, Sir Robert William Grove, known as the father of the fuel cell, developed a platinum-zinc voltaic cell, the 'Grove' cell. He went on to create the voltaic battery in 1842, which was to become the forerunner of the modern fuel cell.

The transition to a net zero economy in Wales is being supported by the proactive collaboration between innovation and academic expertise, including:

Advanced Manufacturing Research Centre (AMRC Cymru Wales)

Welsh Government's £20m R&D facility in North Wales run by the University of Sheffield Advanced Manufacturing Research Centre (AMRC). The Centre enables businesses to access advanced technologies, helping them to drive improvements in resilience, productivity, sustainability and quality. It focuses on advanced manufacturing sectors, including aerospace, automotive, food and renewable energy.

The centre operates a 2000m² open access research area. Airbus were the first major tenant and have a platform to develop its next generation wing technologies aligned to its Wing of Tomorrow programme, which is part of a global Airbus investment in research and innovation.

In March 2020 AMRC Cymru was transformed into a production facility for life-saving medical ventilators by the industrial consortium *Ventilator Challenge UK*. In fewer than two weeks, the state-of-the-art research institute was stripped out to allow 88 operators to work simultaneously (while maintaining safe social distancing) and assemble over 10,000 ventilator sub-assemblies in under five months.

ACADEMIC EXPERTISE

The traditional motorised vehicle needed a combustion engine. The vision to make Wales a net zero economy is supported by academic expertise throughout the country. But the technology isn't just about engines any more...

Welsh Universities built on their core competencies and excellence in materials, chemistry, combustion and energy systems to grow research capability and collaborate with industry to apply this knowledge to solve the challenges of net zero mobility.

Cardiff Catalysis Institute (CCI), Cardiff University South Wales

Catalysis can make a major contribution to the development of economic and environmentally sustainable manufacturing processes and the Cardiff Catalysis Institute (CCI) is recognised as a global leader. The centre has a successful track record, working with a range of businesses, including leading automotive companies.

The CCI's research includes exhaust-gas reforming for waste heat recovery and after treatment. Cardiff University is also one of the lead universities in the UK Catalysis hub alongside Bath and Manchester.

The Centre for Automotive & Power System Engineering (CAPSE), University of South Wales

The Centre is a nationally recognised independent research, development, test and certification house with a reputation for cutting edge research and knowledge transfer activities within the advanced automotive and power systems engineering sectors. CAPSE's mission is to support businesses and organisations to develop the next generation of low carbon technologies, backing the creation of new jobs and economic opportunities.

The Electrical Vehicle Centre of Excellence , Cardiff University, South Wales

Focuses its research activities on all aspects of electrical vehicles including design and manufacture; innovative business models; consumer expectations; energy supply and charging infrastructure. This group leads on the Decarbonising Transport through Electrification (DTE) Network+ is a £1M EPSRC funded multidisciplinary project addressing the challenges of implementing an electrified, cost effective and holistically operating transport sector for the UK.

The National Spectrum Centre, Aberystwyth University

The largest site in the South Wales Valleys A centre for innovation, engineering and experimentation in radio spectrum technologies.

A wide range of research opportunities include Intelligent transport systems (road, rail, air), IoT, LoRaWAN, Autonomous Vehicles, Space Instrumentation and Sensors, Sensor Development and Networks, Improving communications and connectivity to local communities, smart/future cities in rural areas, Agri-tech, Precision Farming, and 5G.

iCORE

The use of electric vehicles has significantly increased in recent years. The core component of an electric vehicle is the electric motor, which needs to be highly efficient and lightweight and to generate low amounts of heat and noise. Achieving this is not straightforward, and there are a number of challenges associated with design, manufacturing and testing that still need to be addressed in order to optimise the overall performance of an electric motor.

With SMART Expertise funding led by Cardiff University, the iCORE project focuses on design and development of a high-performance electric motor, using various novel techniques, aiming to create a revolutionary supply chain for electric vehicle motor manufacturing in Wales and the UK. Cardiff University working with TATA Steel, Motor Design Limited, Dragon Laser Limited, Wiltan Limited, Batten and Allen Ltd and the Welsh Automotive Forum are investigating new materials, manufacturing processes and techniques for novel motor designs. The project will explore the manufacturing of ultra-thin electrical steel, material handling, novel laser cutting and stamping technologies, new bonding materials and interlocking methods for laminations within the motor core. The project will also look toward developing a supply chain that covers the entire electric motor commercialisation process, from motor design and component manufacturing to final performance testing. This novel supply chain is expected to not only strongly support the 2030 goal of full electrification, but also create a new driving platform for other applications, such as trains, buses, marine and aviation.

Exploration and discovery: Swansea University is a research-led university offering a balance of excellent teaching and research, matched by an enviable quality of life. Bold and ambitious:

Flexible Integrated Energy Systems (FLEXIS)

A multi-disciplinary research operation designed to build on the world class energy systems research capability within Welsh universities. This is led by Cardiff University, Swansea University and the University of South Wales.

Research focuses on developing flexible energy systems, a major current strategic need within the energy world. At the heart of the project is the development and strengthening of research and innovation of energy systems technologies across Wales, highlighting Wales as a leader in this area. Building on achievements over five years of research, the FLEXISApp programme will take forward the research and demonstration capacity of FLEXIS and part fund the commercial development of energy technologies that focus on industrial decarbonisation and greenhouse gas reduction.

FLEXIS works closely with several research centres with strengths in:

The Hydrogen Centre, University of South Wales, South West Wales

The Centre provides a platform for the experimental development of renewable hydrogen production and novel hydrogen energy storage. The centre enables further research and development of hydrogen vehicles, fuel cell applications and overall hydrogen energy systems. The Centre is the focal point for a series of collaborative projects between the University of South Wales and other academic and industrial partners.

Gas Turbine Research Centre, Cardiff University

Cardiff University's GTRC undertakes research in the field of novel combustion systems, components, and fuels, including hydrogen and ammonia. Research at the Centre is informing application of alternative fuels and new combustion systems in order to develop decarbonised, clean, and efficient energy systems for the future.





Creativity and curiosity: Cardiff University exists to create and share knowledge and to educate for the benefit of all. ©Cardiff University

SPECIFIC Innovation and Knowledge Centre, Swansea University

SPECIFIC is leading energy technology research and full-scale demonstration of 'Active Buildings', which can generate, store and release solar energy in one integrated system.

It is the only UK centre combining solar thermal generation and storage technology with photovoltaics and batteries for electricity generation and storage, and specialises in scale-up from fundamental materials chemistry to application. The centre also investigates the role that these buildings could play in national energy and transport systems.

SPECIFIC is led by Swansea University with strategic partners Tata Steel, Akzo Nobel, NSG Pilkington, Cardiff University and more than 50 other partners from academia and industry. It is funded by EPSRC and the European Regional Development Fund through the Welsh Government.

South Wales Industrial Cluster (SWIC)

A Group of major industrial companies in the region stretching from the Pembrokeshire Coast to the Severn Bridge along the M4 corridor.

Set up in 2019, Cluster brings together industry and academia in order to explore and develop their route to NetZero. SWIC has been awarded £1.5m by UKRI's Industrial Decarbonisation programme to map what is needed to support South Wales in becoming a net zero carbon region by 2050.

Reducing Industrial Carbon Emissions (RICE)

A £9.2million WEFO funded RD&I programme led by Swansea University to test and driving forward next generation technologies to help reduce carbon emissions from industry.

BETTER TOGETHER

The World's First Cluster of Excellence dedicated to Compound Semiconductor (CS) Technology is here in Wales, and at the heart of the next industrial revolution.

Working together

The Institute of Compound Semiconductors provides cutting edge facilities that help researchers and industry work together. ©Mike Hall/Cardiff University



ompound semiconductors are integral to the development of power electronics for electric vehicles, smartphones, wifi, satellite communication systems, robotics and efficient LEDs to name but a few. Customers can work with the Cluster to design and prototype their own bespoke chips for next generation products in one location.

Intense government, academic and private sector collaboration has built on advanced semiconductor R&D and manufacturing capability in South Wales, driven by a collective vision first published in 2015. The resulting Cluster ecosystem, CSConnected, is based on interdependency and common goals, and a co-ordinated manufacturing supply chain in a 75-mile corridor from Monmouth to Swansea. It currently supports over 2,100 high value-add jobs, with approximately 30% of the workforce engaged in Research Development and Innovation (RD&I) intensive activity.

The industrial output of approximately £500M pa is in excess of 90% export, and is characterised by high productivity, higher than average wages, and GVA (gross value-add) per job well in excess of 2x the Welsh average at £86K per job, and worth in excess of £172M pa to the region.

The Cluster aim is to more than double the workforce and GVA in the next 5 years as the demand for high-end advanced semiconductor manufacturing expands in a global market worth approximately \$50billion. The Cluster is already recognised as the UK's premier integrated centre for advanced semiconductor science and manufacturing, and is supporting UK-wide efforts in emerging vertical sectors supported by UKRI such as:

 Power Electronics for Electric Mobility (Newport is home to one of the four Driving the Electric Revolution Centres of Excellence in Materials – industrialisation centres housing state-of-the-art equipment to enable faster design, development, testing and manufacturing of electrification technologies, across seven sectors – including automotive, aerospace and energy)

 Quantum Technologies (UK National Quantum Component Foundry)

 High-value add manufacturing (Centre for semiconductor capital equipment manufacturing
EPSRC Future Semiconductor Manufacturing Hub) and

low-loss electronics (communications and sensing) for NetZero.

There has been a co-ordinated expansion of RD&I capacity by leveraging UKRI and Welsh Government capital investment:

 The Compound Semiconductor Centre – a Joint Venture between IQE Plc and Cardiff University (£24M joint investment) to address the commercialisation of advanced semiconductor materials.

— The Institute for Compound Semiconductors (Cardiff University, \pounds 75M investment). A new large scale research facility for novel semiconductor device manufacturing scale-up.

 The Compound Semiconductor Applications Catapult (Newport, £50M investment).
A UK Government funded innovation centre focused on the integration of CS technology in UK supply chains.

— The Centre for Integrative Semiconductor Materials (Swansea University, £90M investment). A new RD+I facility dedicated to the development of 'over the horizon' semiconductor materials and processing solutions of the future.

In addition, there is a range of large scale RD&I projects designed to provide a pipeline of new capability, skills and IP to feed the Cluster expansion:

- 'CSConnected': Co-ordination and expansion of the South Wales CS Cluster (Strength-In-Places Wave 1, £45M investment 2021-2025).

 Future Compound Semiconductor Manufacturing Hub: (Cardiff University (lead), UCL, Manchester, Sheffield) £20M investment in manufacturing scale up research, 2018-2024).

 Centre for Doctorial Training in Compound Semiconductors: (Cardiff University, £8M investment to train approx. 65 PhDs 2019-2023).

The aim is to double academic capacity in excess of 400 researchers and support staff across



Cardiff and Swansea by 2025, and increase the Research and Engineering headcount in the Cluster to 25% of the total workforce, around 1000 staff.

Significant recent manufacturing expansion has been driven by the core indigenous semiconductor industry (IQE Plc, SPTS, Newport Wafer Fab, Microchip Technology) via leveraged investment from Welsh Government and the Cardiff Capital City Deal, with an expansion commitment of in excess of £500M in the next 5-10 years. The strength of the cluster is evidenced in the recent relocation by Rockley Photonics and Microlink Devices who also have future expansion plans.

It's been a tough year for everyone. When the pandemic is behind us, we'll be rebuilding our economy. But there's no point building it back the same. It's going to be greener. And better for it. Making electronics possible: SPTS Technologies provides advanced wafer processing solutions to the world's manufacturers.

THE INDUSTRY IN WALES

Some of the low carbon economy companies who are already within Wales.

Toyota

Vehicle & powertrain

Supported with Welsh Government business finance, Toyota currently manufactures its 4th generation ZR hybrid engine at Deeside supplying to both UK and overseas car assembly plants. Toyota hybrids have already contributed a 100 million tonne reduction in carbon emissions worldwide.

Tim Freeman, DMD and Engine Plant Director, said: "Toyota has a long and successful record of building low carbon engines in North Wales. Toyota are pursuing a range of low and zero emission technologies including BEV, hybrid, plug-in hybrid and hydrogen for the future. In addition to low carbon vehicles we also have the ambition to achieve zero CO² manufacturing by the end of 2024, utilising energy efficient technology and the use of sustainable electricity and biogas."



OMPAN

One every 44 seconds: Deeside currently exports engines and machine components to South Africa, Turkey, Brazil and Japan and were the first overseas plant to produce Toyota's class leading hybrid engines. ©Toyota.

Riversimple

Vehicle & powertrain

Established their R&D site in Wales to develop hydrogen fuel cell vehicles in line with their ambition to eliminate the environmental impact of personal transport. Their first car, the Rasa, is currently in customer trials in Wales before setting up for volume production.

Founder, Hugo Spowers states "We are firmly embedded in Wales and looking to set up volume manufacturing in Powys. We've got a great relationship with the Welsh Government and they really have been extremely supportive. We share a focus on the wellbeing of future generations".

Hydro Aluminium

Lightweighting

Hydro have locations across the UK which consist of manufacturing plants, fabrication and components, extrusion die, casthouses, surface treatment, thermal break, building systems and pole products. Hydro's Bedwas site has a 14,000m² footprint and houses long and short length CNC machines with machining capabilities of up to 12,000mm in length. They also offer bending, welding, punching, recut services, assembly and kitting across a broad range of industries and their dedicated team work closely with customers to develop products, from initial concept, through design support and across all processes to the finished product.

Hydro have recently launched Hydro RESTORE which is a range of aluminium products made from a combination of recycled pre-consumer scrap, recycled post-consumer scrap and primary aluminium.





A "Whole System Design" approach:

Riversimple's Purpose: To pursue, systematically, the elimination of the environmental impact of personal transport. ©Riversimple.

Vanguard of aluminium technologies:

Helping customers to benefit from sustainable solutions by replacing conventional parts with redesigned aluminium profiles. @Hydro.



Battery & Energy Technology

DG Innovate Ltd

Battery technology & components

(DGI, previously Deregallera Holdings Ltd)

DGI's vision is to develop sustainable and environmentally considerate improvements to electric mobility and energy storage, using abundant materials and the best engineering and scientific practices.

The company has secured £2.3m of Innovate UK funding for the development of Sodium Battery Technology and a novel ultra-high efficiency Electric Drive System. DGI's platform technologies meet multiple sector needs:

- Electric Drive Technology that significantly increases vehicle range using the same battery;
- Sodium Battery Technology reduces cost and environmental impact, whilst increasing safety compared to lithium;
- 3) Supercapacitor material is 50% higher specific capacity than the leading commercial material.

EV Recycling Ltd

Battery technology & components

The first company in the UK with an Environmental Permit allowing for the processing of EV battery waste, with an ABTO licence on the operations and facilities along with the relevant waste carrier licences.

As registered battery producers EV Recyling are able to re-categorise and re-purpose waste batteries using their expertise, processes and specialist equipment.

Batteries are inspected onsite or offsite, then treated. The treatment captures all the elements of the batteries, from the frame to the anode and cathode materials.

CastAlum Ltd

Lightweighting

CastAlum supply a range of products in both High Pressure and Squeeze Cast. They supply cast, cast and machined, assembled and tested, as per their customers' requirements.

The company has invested heavily in the development of new products, processes, and capabilities, creating solutions for meeting world class quality standards. Their investment and understanding of Additive Material Technology to aid with conformal cooling has changed their view as to what's feasible within the auto industry.

CastAlum support the development of lightweight casting technology without sacrificing properties or durability for electric and low carbon vehicle technology.

ePropelled

Research, design & development

ePropelled is a leading expert in magnetic engineering innovations that dramatically improve electric motor and generator efficiency for propulsion systems.

ePropelled's patented eDTS (Dynamic Torque Switching) solution produces a more energyefficient method of electric propulsion that increases vehicle range and life expectancy of the battery pack or allows for smaller batteries for the same range.



SPECIALISMS

Driving the Change: Smaller, Lighter, More Powerful: Produces a much more energy-efficient method of electric propulsion that increases driving range or allows the manufacturers to reduce battery sizes.

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EV Marine Ltd

Battery technology

Specialising in the integration and management of high voltage battery technology within the marine Industry, EV Marine have developed a range of all-electric outboard propulsion systems which are creating quite a stir within the marine industry due to their class leading power, performance and economy. EV Marine Ltd, together with their partners, have developed a range of hydrogen fuel cells capable of parallel functions of up to half a megawatt. They use the latest advanced hydrogen containment technologies, materials and processes to provide the storage solutions required for larger scale marine applications.

Reid Lifting

Manufacturing

REID Lifting, based in Monmouthshire, is a green innovator in its own right, designing and manufacturing lightweight, fully recyclable aluminium lifting systems. It is using its expertise in portable lifting to help the likes of Mercedes and Tesla to overcome some of the 'how to' challenges associated with the roll out and execution of their own low carbon technologies. For example, REID gantries are becoming a familiar site at approved Mercedes retailers around the UK, making it easy for service teams to remove and replace the EV battery packs used in electric cars and vans. With a Working Load Limit of 2000kg, the Porta Gantry with an electric hoist are proving the ideal solution for lifting and manoeuvring the batteries, which can be up to 2m long and weigh as much as 750kg. For these retailers, the REID solution gives them an easy to assemble. easy to pack away and store option which they can use whenever they need to replace an EV battery, without having to invest in their own bulky, fixed steel lifting gantry.



Tri-Wall UK

Packaging

Tri-Wall is the World's largest technical packaging manufacturer with expertise focussed on the automotive industry, UN Dangerous Goods and 4G battery packaging. As a key partner within LIBRIS (Lithium Ion Battery Research in Safety), Tri-Wall has made significant advances in the safety of lithiumion battery packaging by developing products which can contain and extinguish a thermal runaway event. Tri-Wall's new product range sets the standard for safety in transportation of lithium-ion batteries.



Raw Materials

GTS Flexibles

Power electronics & electronic systems

The manufacturer of printed flexible circuitry. Materials found in a wide range of automotive electronic and electrical systems suited to battery management and electrical distribution modules within hybrid and fully electric vehicles.

Vale Europe Ltd

Battery technology & components

A global mining company, with the largest nickel refinery in Europe, the Clydach refinery refines nickel oxide into high purity nickel products, complementing the battery supply chain, and could supply pre-cursor material for active cathodes. A by-product from their nickel refining is cobalt which would support a circular economy initiative. Smarter packaging: Using decades of experience and drive for continuous improvement to keep Tri-Wall evolving and adapting to ever-changing market conditions and customer needs.

Components

Treharne Automotive Engineering Ltd

Battery technology & components

Treharne Automotive Engineering Ltd, based in South Wales, built their reputation as electromechanical specialists and since 2008 have been involved with Research and Development. As experts in this field, they have organically expanded the EV capabilities within the company, providing OEMs with advice and guidance. They design and manufacture market leading tooling, software and diagnostic strategies. They're continually developing tooling in the areas of safety, warranty and procedure, including the development of the first full battery test tool of its size which can evaluate all attributes of a high voltage battery assembly. Treharne are proud to be involved in projects which are pushing the boundaries of technology.

United Aerospace

Lightweighting

Designers, manufacturers and finishers of composite components and assemblies. Supplying either build to print designs or working together to develop a prototype idea through to manufacture.



Electric Powertrain

Dawson Shanahan

Power electronics & systems

Dawson Shanahan design, prototype and precision engineer customer specified components and assemblies, to the highest quality. Since their foundation in the 1930's Dawson Shanahan has been heavily involved in the automotive sector, in both high volume manufacturing and in the development of specialised components for motorsport, commercial and passenger vehicles. As the industry transitions to alternative powertrains, the company continues to play an important role, partnering global electrical connector companies with the development of high power connectors for electric vehicles using cold forming and machining techniques.

Meritor, Inc.

Vehicle & powertrain

Meritor is a leading global supplier of drivetrain, mobility, braking, aftermarket and electric powertrain solutions for commercial vehicle and industrial markets.

In March 2021 they were the recipient of the Advanced Propulsion Centre's (APC) Core Competition Program in the UK to partially fund the design and development of Meritor's 17Xe[™] electric powertrain system for heavy-duty electric trucks and buses equipped with a single drive axle. Meritor, in consortium with its partners Danfoss Editron and Electra Commercial Vehicles, submitted the EPIC (Electric Powertrain Integration for heavy Commercial vehicles) Project.

The consortium will develop a game-changing electric powertrain for heavy-duty 4x2 and 6x2 vehicles up to 44 tonnes without wheel-end reduction and up to 65 tonne vehicles with wheel-end reduction. This technology will provide commercial vehicle OEMs with the optimal solution to meet EU 2025 CO2 reduction targets and enable Meritor to significantly expand its Blue Horizon technology portfolio brand into Europe.



There's something on the horizon: It's a future that's electric today and even more so tomorrow. ©Meritor, Inc.

Composite materials: United Aerospace provides a complete solution for all your composite needs.



YASA

Electric machines

YASA is the leading manufacturer of revolutionary electric motors and motor controllers for hybrid and electric vehicles, delivering the greatest efficiencies and highest power densities in class for the smallest size and weight. Their innovative designs are matched by world-class series manufacturing for Tier 1 and OEM customers. YASA have been working with the Welsh Government who have supported the build of their new research and development centre in Offa's Dyke, Wales.

YASA has recently become a wholly owned subsidiary of Mercedes-Benz.AG.

Lightweighting & Materials

Applied Component Technology Ltd

Lightweighting

ACT supply a range of structural composite, injection mouldings and assemblies to global OEM and Tier 1 customers.

Gestamp Tallent

Lightweighting

A multi-national metal stamping and forming manufacturer supporting light-weighting activities associated to battery casings. The manufacturer of other vehicle architecture structures supporting light-weighting initiatives.

Haydale

Lightweighting

Haydale is a global technologies and advanced materials group that facilitates the integration of nanomaterials into the next generation of commercial technologies and industrial materials. With expertise in graphene, silicon carbide and other nanomaterials, Haydale is able to deliver improvements in electrical, thermal and mechanical properties, as well as toughness. Collaborating with BAC Mono, Haydale claimed a world first, using graphene in the wheel arches and diffuser body panels of the single seater Mono supercar. The result; increased mechanical performance and weight reduction.



Creating material change: Haydale is harnessing the potential of advanced materials through rigorous technical development, creativity and a focus on profitable business outcomes.

Thermal Efficiency

Bergstrom

Battery technology & components

The manufacture of Thermal cooling systems (HVAC similar) for heat flow management around the battery. Bergstrom are already established and working with last mile delivery vehicle manufacturers in the new net zero emission marketplace.

Marelli

Battery technology & components

Marelli design and manufacture heat exchange and cooling systems including thermal management for new EV battery applications.

Reflexallen

Battery technology & components

Design, develop and manufacture energy transfer products for automotive and commercial vehicle sectors. Reflexallen also provide energy efficient solutions in thermal and pneumatic fluid power management.

Senior Flexonics

Battery technology & components

Part of Senior Plc, Senior Flexonics Crumlin is a Sales and R&D headquarters which has been based in Wales for over 25 years. They are experts in designing, developing and manufacturing thermal management and fluid transfer solutions for electric, hybrid and hydrogen drivetrains, supplying major global OEMs from its highly skilled global manufacturing sites.

LoveMyEV

Comparison website

LoveMyEV is a website for anyone thinking about switching to an electric car, with free assessments for total cost of ownership and reassurance on range and longer journeys. The site also compares time-of-use energy tariffs, combining car-use patterns and home energy profiles to estimate savings.

Founders Mat and Laura Thomson wanted to ensure that switching was rewarding and easy for consumers, and that the connection was made to cheaper and greener energy.

LoveMyEV has been funded by UKRI to use open-source data to simplify the suitability tool. An App is being developed, aimed at small businesses.



The future is electric:

Electric cars are the future. Plugging in our EVs at home has the potential to drive us further and faster towards a cleaner, greener future.

A major mileston

North Hoyle Offshore Windfarm, Prestatyn, was Wales' first offshore wind farm, and the UK's first major offshore renewable power project.

> Did you know – more than half of Wales' electricity already comes through renewables. We're changing our whole energy system so that it's more localised, flexible and smarter. We're exploring new energy ideas both onshore and offshore, harnessing Wales' natural resources to deliver the low carbon transition.

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WHY WALES?

As well as a strong automotive sector and commitment to develop net zero infrastructure in Wales, there are many reasons to consider Wales.

WHY WALES?

Establishing a business

Wales is part of the UK, the world's fifth largest economy. It takes just 13 days to establish a business in Wales.

Location

Cardiff to London is 2hrs by train. Flights from Cardiff to major European and Middle Eastern hubs enable access to destinations around the globe.

University

Wales' leading universities feature among the UK's top institutions and are internationally recognised for their research and development facilities.

Business

You probably experience Wales every day. The chip in your smartphone, the wings of your plane, that film/TV series you enjoyed, your car's engine. All Wales made.

Tax

At Budget 2020, the government announced that the Corporation Tax main rate (for all profits except ring fence profits) for the years starting 1 April 2020 and 2021 would remain at 19%.

Law

As a devolved Government, we have the flexibility to ensure you succeed in Wales. Wales shares the same legal jurisdiction as England which provides stability, security and expertise.

People

A population of 3.1m with a skilled workforce of 1.4m.

Language

A modern bilingual nation. Welsh, spoken by one in five. English spoken by everyone.





An epic shore:

Wales Coast Path – an 870-mile journey along our entire coastline from north to south Wales.

Wales is investing in R&D and innovation.

Benefits include:

- Access to world-renowned academic support

 One of Europe's most comprehensive support systems for industrial research, experimental development and feasibility studies

- On-going investment into Europe's first eco-system dedicated to compound semiconductor applications, growing and integrating this high spec material into innovative new products.

The Welsh Government helps businesses to grow in Wales.

Many global companies in Wales re-invest. Wales has its own elected Welsh Government as well as representation to the British Government in London Foreign investors are taken good care of by a small but dedicated team at the Welsh Government from beginning to end of the investment project.



The Welsh Government has pledged to invest £100m in the Tech Valleys programme between 2017 and 2027 to support the creation of more than 1,500 jobs in cutting edge industries including automotive.

Tech Valleys is creating an environment for the development and delivery of emerging disruptive technologies, including advanced materials and manufacturing, plus autonomous processes and products.



Location Blaenau Gwent, South Wales Announced 2018



Centre of excellence: The Works site in Ebbw Vale includes (above) Coleg Gwent and (below) the Bocs Hwb Start up Units. Image by VisEngine Digital solutions. ©Blaenau Gwent County Borough Council.



WHY WALES?

Welsh Automotive Forum (WAF)

An independent company, incorporated in 2001, to develop a common approach in achieving sustainable continuous improvement for the Automotive Industry in Wales promoting continued growth across the membership using "strong" and "well established" networking to enhance the long established and well-respected supply chain.

The Forum is a pivotal industry led organisation, supported by its key stakeholders including members, Industry Wales and the Welsh Government. The "Voice" of the automotive industry in Wales, WAF has excellent lines of communication into the Welsh Government and as an arm's length body provides significant input into FDI opportunities.

WAF has a strong interface with automotive sector teams at The Departments of International Trade and Business, Energy and Industrial Strategy (BEIS) as well as other regional trade bodies. WAF actively promotes and signposts support programmes associated to competitiveness, upskilling, innovation, and technology. WAF's overarching objective is to facilitate, enhance and strengthen the relationship between industry, government and academia "Together Stronger".

What next?

Edinburgh

Manchester

London

Paris

Dublin

Cardif

Madrid

Lisbon

Bristol

We can offer your business a future in Wales. If you are creating new technologies and implementing new ideas – let's talk.

Find out what Wales can do for your business:

Tel: +44 (0) 3000 603000 Web: tradeandinvest.wales Email: inwardInvestment@gov.wales

Twitter: twitter.com/InvestWales Linked-in: linkedin.com/showcase/trade-&-invest-wales

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