Aston University
BIRMINGHAM UK

Aston University
Building a greener future

Globally connected Locally committed

Aston University's impact of sustainability research and business support on society

UNIVERSITY OF THE YEAR 2020 The Guardian

Welcome

The future of the environment is the responsibility of us all, both collectively and individually. The products we buy, the journeys we make, the actions we take all impact on the world around us, and it is vital that we make an effort to reduce the damage we are doing to the environment.

At Aston University, we take a holistic approach that embeds sustainability through all our external activities at local, national and international level in order to deliver real impact from our research.

Aston University is committed to tackling global issues through collaboration and knowledge sharing. We're proud to say that we're one of the 'greenest' universities in the UK; in 2020, we were named the Guardian University of the Year, with judges noting that sustainability has been embedded into the Aston Culture.

As we recover from the pandemic, we are offered a window of opportunity to change policies and plans in such a way as to build a cleaner, greener and more resilient world. This is why COP26 couldn't come at a better time, as a chance to reflect and reassess. We also have an opportunity to do things differently and create real change.

Saskia Loer Hansen,
Deputy Vice-Chancellor (Engagement)

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Sustainability

As a civic university, with both local roots and global reach, and at the leading edge of research and knowledge, sustainability is a key element of our responsibilities and values.

We have always understood that a commitment to society and the environment go hand-in-hand, and that commitment has been evident. Our sustainability strategy which embeds sustainability across our research, our student experience, and through our innovative campus management and development.

Our research is strongly aligned to the challenges of sustainable development and social responsibility.

We have created this brochure to show our commitment to sustainability.

The following pages highlight some of our research, business support and campus projects that are helping to reduce the effects of climate change.

Engaging students, staff and the community is how we work to deliver upon our goals and we know we can achieve greater impact through forming partnerships with others. Recognising this is both a local and global issue requiring both short-term action and long-term planning.

Environmental sustainability and resilience

The Energy & Bioproducts Research Institute (EBRI) at Aston University has helped a wide range of businesses from many industry sectors.

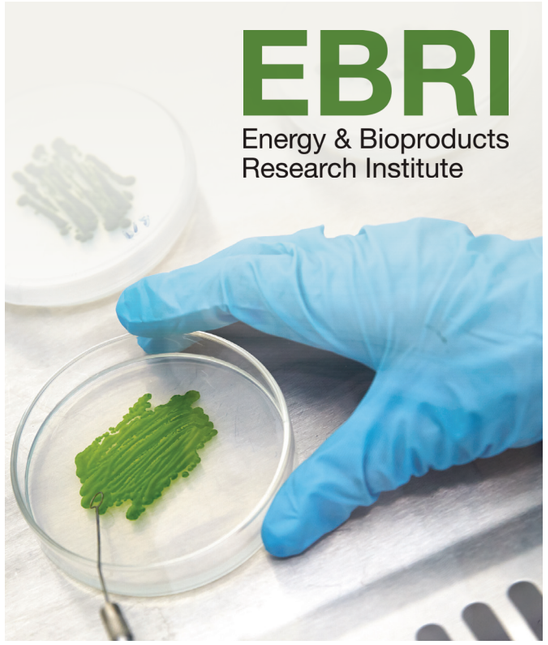
Sustainability health checks:
help for businesses from EBRI

In order to help businesses in the West Midlands maximise their opportunities by adopting sustainability best practice, the Energy & Bioproducts Research Institute (EBRI) at Aston University is offering one-to-one health checks to help small-and medium-sized companies get to grips with their sustainability goals and to solve energy, waste and environmental challenges.

EBRI's ERDF programme has helped over 300 small-and medium-sized businesses to expand their horizons for their own benefit and that of the Midlands region, creating over 234 jobs and £29 million in regional impact (GVA). Its team of scientists and business experts has helped entrepreneurs investigate and develop new low-carbon products and solutions from a whole range of different waste streams including; bicycle tyres, charcoal, car tyres, food waste, wood and wine corks.

Book now

To book a Sustainability Health Check, interested businesses can email: **bioenergy@aston.ac.uk**



Supported over
300 SMEs

Created over
234 jobs

£29million
regional impact

Urban Biochar & Sustainable Materials Demonstrator

Achieving net zero targets is important for our local environment and economy. Carbon capture and the recycling of waste materials are two ways of meeting this goal.

Organic waste, such as tree and shrub cuttings, offers a number of opportunities. Urban environments generate a multitude of such material from our gardens, streets and parks, which can be shredded and upcycled into an innovative, useful product known as 'biochar' - a sustainable form of charcoal. This valuable bioproduct offers a wide variety of benefits including carbon capture, water treatment, odour control, industrial applications and soil improvement.

The Energy & Bioproducts Research Institute (EBRI) at Aston University has been granted Local Growth Funding from the Greater Birmingham and Solihull Local Enterprise Partnership (GBSLEP), as well as the EU European Regional Development Fund (ERDF) to deliver an Urban Biochar and Sustainable Materials Demonstrator project which can benefit the local region both environmentally and economically.

The main objectives of this initiative are to:

- develop biochar for the benefit of city and town environments, and local economies; research how biochar can be used as a soil enhancer in urban landscapes;
- conduct scientific modelling to assess the carbon capture merits of biochar.

Biochar can offset
1.8 billion metric tons
of carbon emission annually

Source: DOE/ Pacific Northwest National Lab, 2010

Greater Birmingham & Solihull Local Enterprise Partnership

MIDLANDS ENGINE

European Union
European Regional Development Fund

The EBRI team and its project partners have developed a mobile production unit situated at Birmingham City Council's Cofton Nursery, a horticultural site near the Lickey Hills on the outskirts of the city. This innovative demonstrator is devised to thermally convert wood cuttings from around Birmingham and Solihull into biochar. When wood and other plant material is heated without oxygen by a process known as 'pyrolysis' it produces a number of valuable byproducts including gases, oils and biochar. Processing organic waste materials in this way prevents them from releasing greenhouse gases and provides a safe and long-term way of capturing carbon.

Project partners:
Aston University (EBRI), Birmingham City Council, Combind Industries Ltd, Cranfield University, Greater Birmingham and Solihull Local Enterprise Partnership, Nationwide Boiler Hire Ltd.

Project funders:
Greater Birmingham and Solihull Local Enterprise Partnership (Local Growth Fund), Midlands Engine, Aston University, Combind Industries Ltd, European Union (European Regional Development Fund).

This project was also supported by:
Barton Firtop Engineering Company Ltd, FuturEnergy Ltd, J & U Services Ltd, RGR Fabricating and Welding Services Ltd.

Helping your business on the path to Net Zero

As customer demand for low-carbon goods and services is rising, it is becoming increasingly important for suppliers to demonstrate their carbon footprint. More and more businesses are reviewing their supply chain emissions. All of these factors will drive growth in the low-carbon market sectors including bioenergy, energy-from-waste, energy systems and bioproducts.

Ambitious government targets to increase the security of energy supply and to reduce greenhouse gas emissions will drive growth in the bioenergy, energy-from-waste, energy systems and bioproducts sectors over the next ten years.

According to the Committee on Climate Change, bioenergy alone could provide up to 15% of UK energy demand in a low-carbon economy by 2050. It is now the largest contributing renewable technology in the UK, providing 7.4% of primary energy supply.

96%

of attendees have rated it 'Excellent' or 'Very Good'.*

* Surveys issued to 90 EBRI Master Class attendees 2017-2018

Master Class:

Sustainability, Energy and Bioproducts

Opportunities for your Business

The Energy & Bioproducts Research Institute (EBRI) at Aston University will be running a new series of its highly acclaimed Master Class to help business decision makers and entrepreneurs explore the growing bioeconomy and the opportunities it offers.

Course programme

Topics covered in this two-day course will include:

- Putting Sustainability into Practice
- Carbon Footprint Assessment
- Opportunities from Waste
- Insights into New Technologies and Bioproducts
- Energy Efficiency Solutions

Register now

Email: bioenergy@aston.ac.uk
Call 0121 204 3383 or visit
www.bioenergy-for-business.org

Practical help for businesses

EBRI provides practical support to companies like Modus Waste & Recycling Ltd, helping them to discover and explore new business opportunities.

Originally specialising in domestic bulk waste collections, Modus Waste & Recycling provided residences in the Black Country with services to collect and recycle materials such as wood and metal. After attending one of EBRI's Value from Waste Master Classes at Aston University, their founder was inspired to explore a brand new direction for the company – collecting commercial food waste and putting it to good use.

This new venture offers its clients, including breweries, restaurants, pubs and cafés, a weekly waste collection service. The company then collates and delivers it to a 3rd-party Anaerobic Digestion (AD) plant-based in Staffordshire. The plant takes this food waste and converts the organic material in a digester, creating methane-rich combustible biogas and a digestible residue called 'digestate', which acts as a fertilizer.

A valuable and useful alternative to landfill, Anaerobic Digestion prevents between 0.5 and 1.0 tonne of CO_2 from entering the atmosphere for each tonne of food processed in this way. (Source: Biogen)

MODUS Waste & Recycling

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Source: Biogen

The Supergen Bioenergy Hub

Supergen Bioenergy

The Supergen Bioenergy Hub works with academia, industry, government and societal stakeholders to develop sustainable bioenergy systems that support the UK's transition to an affordable, resilient, low-carbon energy future. The hub is based at Aston University under the direction of Professor Patricia Thornley.

The hub is funded jointly by the Engineering and Physical Sciences Research Council (EPSRC) and the Biotechnology and Biological Sciences Research Council (BBSRC) and is part of the wider Supergen Programme, which represents one of the UK Government's largest single investments in fundamental research on low-carbon energy generation, sustainable networks and use.

The Hub's whole system research approach encompasses all aspects of bioenergy expertise to identify pathways for delivering bioenergy with wider social, economic and environmental benefits. The Hub's research also includes the development of innovative bioenergy technologies through the different technology readiness levels (TRLs) in order to deliver cost-effective, efficient and sustainable energy. In this way, UK academics support policy and industry in identifying and characterising sustainable bioenergy systems that can be prioritised to provide power, heat, liquid and gaseous fuels, and value-added chemicals.

Two of the Hub's research topic groups (TG) are based at Aston: Pre-treatment and Conversion TG, which aims to identify and select preferred bioenergy pathways and develop new technologies and systems that support the Hub's vision for UK bioenergy; and Systems TG, which works to evaluate sustainability impacts and identify the systems that maximise the benefits of bioenergy to the energy trilemma of affordability, resilience and carbon reduction.

Creating impact through policy

Bioenergy has significant global potential for reducing carbon emissions, but remains controversial. To apply bioenergy effectively, policymakers need access to robust and relevant evidence. Aston University research enables this by providing data on the efficiency, costs and carbon reduction potential of bioenergy technologies. This is synthesised and delivered to policymakers via the Aston University-led Supergen Bioenergy Hub, a partnership between universities, industry and policy stakeholders, and a flagship national programme for UK bioenergy research.

The Hub maintains regular contact with UK government to understand their policy needs and provide scientific information so that policies are based on the latest evidence. Research is developed by Aston University and Hub partners, and we collate, synthesise and communicate the outputs, transforming them into accessible and relevant material addressing UK government's key bioenergy questions. We also inform government-commissioned research and studies by working with government departments to synthesise existing knowledge and identify future prospects and gaps/innovation needs that are impeding progress.

Our assessments of cost, deployment and carbon reduction potential enable government officials to appropriately scope the scale of government targets, and establish the relevant mechanisms and calculation methodologies. Through this evidence-based approach, the public also benefits from improved global climate protection and carbon reduction.

Bioenergy is an SME-dominated landscape and engagement with trade associations is vital to mobilise commercial interests in the sector. Aston University and Hub researchers contributed to the Renewable Energy Association's biomass strategy steering group, helping to set the direction and aims of the report, and in November 2020, in part due to the REA's bioenergy strategy, the Government committed to producing a new biomass strategy for the UK. Aston now has a dedicated Biomass Policy Fellow, who works closely with government departments and provides a direct link between academia and policy to inform the new biomass strategy.

The impact of our research also extends overseas through the funding and development of technologies that help deliver sustainable development goals in low- and middle-income countries, including in South-East Asia and Sub-Saharan Africa.

www.youtube.com/watch?v=X5H5Bx0384s

Tackling some of the biggest energy challenges

The Energy Research Accelerator (ERA) draws on the expertise and world-class facilities of the Midlands Innovation group of universities – Aston, Birmingham, Cranfield, Keele, Leicester, Loughborough, Nottingham and Warwick, plus the British Geological Survey.

The purpose of ERA is to work with UK government, industry and the higher education sector to undertake innovative research, develop the next generation of energy leaders, and demonstrate low-carbon technologies that help shape the future of the UK's energy landscape. It is funded by Innovate UK, with match funding and support supplied by a range of industrial partners who are working with ERA partners on a range of projects across the Midlands.

ERA ENERGY RESEARCH ACCELERATOR

The government aims to reduce CO_2 by 80% by 2050. ERA is working with industry to deliver real change quickly.

Source: https://www.era.ac.uk/Energy-Integration

ERA and Aston University

ERA is working collaboratively with Aston University and other partners to drive the development and integration of a range of thermal technologies. These will deliver jobs and apprenticeships, wealth creation and the next generation of scientists and engineers in the energy sector and emerging industries.

The Energy and Bioproducts Research Institute (EBRI) at Aston University is leading the '5BIO' project within ERA. The main objective of this project is to stimulate research, innovation and knowledge transfer between businesses, scientists and chemical engineers across five key areas: biomass, biorefining, bioenergy, biofuels and bioproducts.

The integration of these areas through the creation of a thermal energy and renewable chemicals centre of excellence at EBRI will help:

- accelerate industry driven applied research;
- empower local companies in collaborative development of new processes and products;
- attract inward investment from around the world, stimulate indigenous growth and drive new export markets;
- facilitate long-term regional growth in the Midlands.

Established track record of research and demonstration

EBRI's areas of expertise include:

- feedstock assessment;
- catalyst development, production and characterisation;
- thermal process research and development;
- product upgrading and refining;
- biofuels and chemicals production;
- heat and power system design and evaluation;
- bioenergy and biofuel markets;
- technology evaluation;
- consultancy and training.

The Low-Carbon SME project finalists in the Green Gown Awards 2021

The free service brings together Aston University academics, industrial expertise, and a solid understanding of the low-carbon drivers that impact on SME businesses in the Black Country, Greater Birmingham and Solihull.

The six-year project was set up in 2017 to help 165 businesses reduce their carbon footprint substantially – up to 7 tonnes per company – and make the transition to a net zero industrial future.

The programme attracted a £1.7million grant from the European Regional Development Fund (ERDF), bringing together an expert team of over 20 members from Aston Business School comprising leading academics and industry practitioners.

The impacts of this work continue to influence regional and national decarbonisation policies and supports the UK Government's Clean Growth Strategy.

In four years, we have brought a blend of world-class applied research and industry-led consulting leading to the "greening" of 85 businesses to date, largely from the energy-intensive manufacturing sector, yielding average energy cost and CO_2e savings per company of £8,879 and 40 tonnes CO_2e.

ADVANCEDENGINEERING
COMPUTER AIDED MANUFACTURING

Case Study: Advanced Engineering

Description: Cost saving £15,000 per year, carbon saving of 60 tonnes

The Low-Carbon SMEs team has been working with Birmingham-based Advanced Engineering, and the company has significantly reduced its relative carbon footprint, which was originally 240 tonnes, by 60 tonnes, which equates to a 25% reduction in the company's overall carbon footprint. What's more, with the help of the University's Low-Carbon Project team and Advanced Engineering's delivery partner, Pro Enviro Ltd, the company has managed to slash its electricity consumption by 87,650kWh, which equates to a £12,000 reduction in costs.

"The project has radically improved overall SME sustainability performance through the adoption of low-carbon initiatives leading to business growth and improved employee productivity."

Professor Prasanta Dey, Project Director of Low-Carbon SMEs

Greening of 85 businesses:

£8,879 in reduced energy costs per company

40 tonnes of CO_2e saved per company

Tackling food waste in Nigeria

Aston University has been awarded Global Challenges Research funding to undertake research and development with ColdHubs Ltd and the University of Port Harcourt, both of whom are based in Nigeria.

This unique two-year partnership aims to tackle food waste by developing a novel hybrid solar-powered, off-grid pre-cooling storage system for smallholder farmers' clusters in Nigeria. Although the produce sector in Nigeria is worth over £3 billion, new technology is urgently needed as the country currently loses nearly half of its annual vegetable and fruits production due to the absence of adequate cold storage.

A key element of the new ColdHubs will be the development of a hybrid solar-powered, pre-cooling technology based on novel vapour compression-absorption technology developed at Aston University

Academics will seek solutions to optimise land for the installation of sorption cooling units and integrated solar subsystems, and overcome commercial conflicts between technology solutions and the business model.

The Academic team working on this Knowledge Transfer Partnership (KTP) includes Dr Muhammad Imran, an established researcher in the area of thermal energy systems and hybrid energy from te department of Mechanical, Biomedical and Design Engineering, alongside Dr Ahmed Rezk, who is a lecturer of Thermal-Fluid Sciences in the School of Mechanical Engineering. Dr Rezk has extensive first-hand research experience in adsorption cooling, both in modelling and experimentation.

This project is co-funded by the UK's innovation agency, Innovate UK

"The beauty of this project is that it comes with three significant impacts after completion – climate action, food security and improved income."

Dr Muhammad Imran, Lecturer Engineering And Technology

Harnessing waste heat to achieve zero carbon heating for UK communities

Dr Ying Miao is currently part of a £1.3 million project to develop a novel, low-carbon energy storage system to supply cheap, on-demand heat for people living and working in UK neighbourhoods. The Aston University research team is responsible for leading the social science work packages in this project.

The technology will help to decarbonise the building sector, while also addressing issues of fuel poverty and pollution, in multidisciplinary collaboration with the University of Nottingham, industry partners and local government.

The Variable-Temperature Thermochemical Energy Storage System and Heat Networks for Decarbonising the Buildings Sector (VTTESS) project will help to develop sustainable district heating systems, while addressing socioeconomic barriers and constraints in the uptake of community-based heating networks. This project is part of the UK's 2050 carbon neutral target.

From 2030, individual homes and commissioned buildings won't be able to use individual gas boilers, so we need low-carbon and zero-carbon heating systems that can replace fossil-fuelled systems. A key alternative is district heating systems, which distribute hot water into multiple properties via networks of communal pipes.

District heating systems are advantageous, because they can use excess heat – a free raw material – from industrial processes or sustainable sources such as geothermal to heat water for large numbers of homes. It's very common in Scandinavia, Germany and China.

"This multidisciplinary project provides a real opportunity to bridge the gap between technological advancements and the wider socioeconomic implications of decarbonisation. We want to make sure that a sustainable future is one where no one is left out."

Dr Ying Miao,
Lecturer in Politics, Aston University

Why waste plastic bottles are a valuable resource

It is hard to avoid awareness of plastic pollution throughout the world. With an estimated 8 million tonnes dumped into oceans every year, choking out wildlife, there is an urgent need to provide global solutions to this crisis.

Researchers at Aston University are investigating ways PET (plastic bottles) can be used for 3D printer filament. This will not only increase the value of recycled PET but also enable people around the world the opportunity to decentralise the manufacture of products and will allow anyone to create products which meet their specific needs.

The process of 3D printing is simple; firstly 3D geometry is created using specialist 3D modelling software. This geometry is then virtually sliced into layers and outputted as a numeric code. This code is read by the 3D printer, which prints layer by layer to create the final part.

Although still at an early stage, there is a real opportunity to add significant value to plastic waste and enable people in developing countries to locally manufacture products which meet their specific needs, while not polluting the oceans.

Dr Timothy Whitehead, Lecturer in Product Design for Low-Income Countries at Aston University, has identified that one of the main reasons plastic is put into landfill or just dumped into the ocean is that it is not seen as a valuable resource, worth saving and reusing, especially in the developed world.

Partnership reveals new heat-as-a-service model

THE ADVANCED SERVICES GROUP

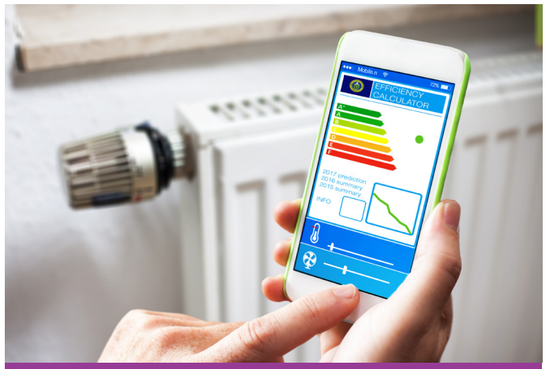
BAXI BDR THERMEA

A public-private partnership between UK manufacturer Baxi-BDR Thermea and the Advanced Services Group (ASG) at Aston University, could signal an innovative way for the UK to meet its decarbonisation goals.

The project aims to explore the viability of Baxi offering a new heat-as-a-service model to customers through servitization. Working with customers and business partners this would be a heat plan that bundles a new heating system, servicing, maintenance, and energy for a fixed monthly price. Baxi's "fit and forget" solution changes the focus from selling energy in kilowatt-hours to selling warmth and the outcome-based offer helps the manufacturer drive the adoption of low-carbon technologies.

This servitized approach to delivering energy could make the UK Government's proposals to ban gas boilers in favour of heat pumps more affordable and viable for homeowners, since it would remove the cost of ownership of expensive heat pumps. Instead, residents could have the heat pump installed free of charge and lease the energy they use.

The UK Government recently revealed it is considering pushing back the gas boiler ban deadline by five years, due to backlash over the soaring cost of 'net zero' on households. A typical heat pump can set homeowners back up to £14,000, with ministers warning that such measures could cost households £400 billion. Heating homes accounts for 14% of total UK emissions and it is hoped the ban will help guarantee a more sustainable future.



Shifting the focus

The Advanced Services Group believes that heat-as-a-service (HaaS) could offer the opportunity to overhaul the UK's energy system and break the link between levels of fuel consumption and profitability.

Supported by £1.7million of Innovate UK funding. Co-funded by Made Smarter Innovation at UK Research and Innovation. Baxi is working with Aston Business School's Advanced Services Group to develop a Digital Servitization Demonstrator. Designed to drive adoption of advanced services, the demonstrator will combine advanced services and digital servitization technologies to create a digital model of Baxi's manufacturing and service business.

Iain McKechnie, Director of Strategic Programmes, Advanced Services Group, commented:

"By moving from selling a boiler to providing heating as a service, it suddenly becomes possible to marry energy efficiency with sustainable business models.

Manufacturers are incentivised to save energy and are enabled to pilot and exploit low-carbon technologies without requiring the consumer to pay up front. This way, providing more heat by consuming less energy becomes the name of the game and it is service levels and ecosystem efficiencies that determine profit margins."

UKRI Innovate UK

Progressing to a Net Zero Business through the Circular Economy

The manufacturing industry in the UK is facing growing productivity challenges due to supply and price volatility of raw materials. Manufacturing firms are consequently embracing the opportunities of circular economy approaches as a means to save costs, prevent disruptions in materials input and generate additional revenue from waste streams.

The development of circular economy capability and competence requires an industrial symbiosis approach. Industrial symbiosis is a fundamental building block of the circular economy. It provides a means to build industrial competitiveness through the creation of manufacturing ecosystems involving networks of organisations that generate new economic value through the continuous exchange of resources.

The industrial symbiosis capability of the UK manufacturing industry as a whole remains underexploited, with most of the circular economy initiatives being developed in sectoral silos. Such fragmented condition holds the economy back from achieving better sustainability performance overall. To unlock the untapped circular economy potential of the manufacturing industry in the UK, a cross-sectoral industrial symbiosis approach is necessary.

Dr Luciano Batista is Director of CEAS (Centre for Circular Economy and Advanced Sustainability) at Aston Business School, Aston University.
He is also Principal Investigator of the EPSRC UKMSN+ (UK Manufacturing Symbiosis NetworkPlus – www.ukmsn.ac.uk), a large community of academic and practitioners concerned with industrial transitions to the circular economy.

UKMSN+

Aston University contributes to the development of a real-time wheel alignment fault detection system

AutoAlign™

Led by a team of academics from Aston University's College of Engineering and Physical Sciences, technical expertise is to be used to extend the functionality of RL Capital's AutoAlign, opening them up to a market 20x the size they currently operate in.

RL Capital (RLC) is an automotive technology company that develops intelligent tyre and wheel monitoring systems, reducing carbon and micro-particle vehicle emissions. RLC's strategy is to develop and commercialise a portfolio of novel automotive fault detection systems.

RLC are developing AutoAlign, a wheel alignment fault detection system for Heavy Goods Vehicles (HGVs) funded via a Small Business Research Initiative (SBRI) project.

Once completed, this project will produce a number of significant environmental benefits:

A recent survey by Protyre of 376,000 cars showed that 46% of cars had misaligned wheels. With AutoAlign, this could be significantly reduced, contributing to the Government's Clean Air Strategy by decreasing CO_2 and non-exhaust particulate emissions.

The project outcomes will be integrated into Aston's curriculum via teaching case studies developing well-equipped graduates.

This project is co-funded by the UK's innovation agency, Innovate UK.

Dr Yu Jia, a Senior Lecturer in Mechanical Engineering at Aston University and lead of the Smart Microsystem Research Group stated:

"The successful outcome of this project will eventually result in a reduction in micro-particulate air pollution from the wheels of road cars, thus resulting in a cleaner environment, improvement to public health as well as reducing the vehicle on-cost from the reduced wear and tear."

Aston Centre for Membrane Proteins and Lipids Research (AMPL)

The Aston Centre for Membrane Proteins and Lipids Research (AMPL) is a collaborative team of principal investigators in biochemistry, molecular modelling, pharmacology, protein/lipid chemistry, cell biology and polymer science. We study the structure and function of membrane proteins and associated lipids, using interdisciplinary approaches and our novel technologies.

Our research feeds into one of the College of Health and Life Sciences' four key multidisciplinary themes; cellular and molecular biomedicine.

Membrane proteins are the subject of intense study in industry and academia because they underpin fundamental biological processes and are therefore critical targets for the development of new therapeutics. All of the current top-ten-selling pharmaceutical drugs worldwide target a membrane protein, while understanding membrane proteins is an essential step in discovering the medicines of tomorrow.

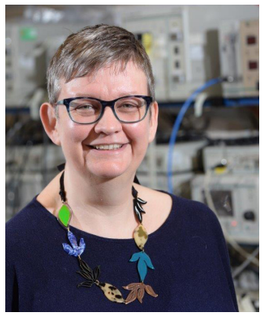
Membrane proteins are also biomarkers for health and disease and regular candidates for genetic modification to improve livestock, crops and to control pests. However, membrane proteins are challenging to work with, as they are neither naturally abundant nor stable, meaning very few laboratories have the expertise or capacity to consistently synthesize and purify the large quantities of high-quality protein required to meet these needs.

Our activities to date show our ability and expertise in meeting these challenges, creating synergistic projects over a range of scales with demonstrable real-world impact.

Funders

Our research has been funded by a variety of sources including:

- Biotechnology and Biological Sciences Research Council (BBSRC)
- Engineering and Physical Sciences Research Council (EPSRC)
- The European Commission
- The Wellcome Trust
- IB Catalyst.



Prof Roslyn Bill,
Centre Director

Industrial Biotechnology

The global economy has an unsustainable dependence on fossil raw material. Concerns about environmental sustainability are becoming more acute; thus, alternatives to traditional, fossil-fuel-based chemical production are urgently required.

Cell factories, which use microorganisms to produce materials from renewable biomass, are an attractive alternative, and an increasing number of platform chemicals are being produced at industrial scale using engineered microorganisms. These are expected to have a transformative impact in industrial biotechnology, but, first, we must meet the challenges of designing and optimizing high-yielding cell factory strains that can produce commercially viable amounts of product. One reason for poor product output is that the production conditions are ultimately toxic to the producing cells.

In addition to damage to intracellular components such as enzymes, the lipid cell membrane and associated proteins are vulnerable to biomolecules e.g. ethanol and propionate, as well as to physical parameters during production such as osmotic stress, pH, and temperature.

Our focus is to tune the lipid and protein content of membranes so cells become more resistant to stresses brought about by toxicity. Additionally, expression of efficient membrane transporters to export 'toxic' products can mitigate intracellular damage. These approaches will ultimately enable production of higher concentrations of the desired molecules or cells making the bioprocesses more efficient, increasing product yield, reducing cost, and helping to drive the move away from fossil-based raw materials.

A sustainable, integrated campus

Our mission is to deliver and maintain a sustainable campus and infrastructure that enhances the student experience and provides high-quality accommodation.

With a strong commitment to embedding sustainability, Aston University is one of the 'greenest' universities in the UK and is in the top 10 of the People and Planet University Green League, 2019.

In 2020/21, Aston Students' Union achieved an EXCELLENT Green Impact Students' Union award, which is an improvement from 2019/20. Green Impact is a United Nations award-winning programme designed to support environmentally and socially sustainable practice in organisations.

"Aston students get the best of both worlds – a green, well-equipped campus located centrally in a vibrant city."

Balraj Purewal,
Students' Union President

And the WINNER is…. Aston University, Student Union Building

Aston's new Students' Union building won the Guardian's 'Buildings that Inspire' category, which celebrates our newly built student-centred students' union building. Both staff and students were involved throughout the project, resulting in the new building reflecting the needs of a bigger, more diverse and modern student body that genuinely cares about sustainability and inclusivity. Made of sustainable wood, the building incorporates a low-carbon heating system drawing energy from more than 100 solar panels.

ASTON
STUDENTS'
UNION

Embedding sustainability in our education

Education is key to solving sustainability challenges worldwide. We want to make sure students leave university with the knowledge they need, while promoting inclusive and equitable education for all.

Environmental and sustainability themes are embedded in a wide variety of our undergraduate and Masters programmes, enabling our students to graduate with the sustainability skills required to prosper in their future careers.

As a university, we're committed to providing inclusive access to learning and education for students from all backgrounds.

Aston University
BIRMINGHAM UK

UNIVERSITY OF THE YEAR 2020 The Guardian

For more information contact:
rke@aston.ac.uk
www.aston.ac.uk/environment