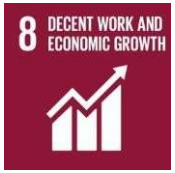
Annual Sustainability Report
2023 – 2024

Contents



Introduction

EXECUTIVE SUMMARY

I am very pleased to introduce this year's Annual Sustainability Report which showcases some fantastic achievements made throughout the year. Being ranked 48th in the world within the global THE Impact League demonstrates our truly international outreach, our sustainability commitments, and the positive impact that our research and teaching are having on communities around the world. We were delighted to have been shortlisted as Finalists for a Green Gown Award in recognition of our research work on renewable energy.

Our decarbonisation work continues via the replacement of inefficient gas boilers with state-of-the art Air Source Heat Pumps (ASHPs), which have been installed at our Coach Lane Campus as part of a multi-million pound project supported by a £1.9M grant provided by the Public Sector Decarbonisation Scheme (PSDS). We have secured a further £928k of grant funding from PSDS to install ASHPs onto two further buildings as part of our plans to remove gas fired heating.

This year has also seen continued global awareness of the urgency with which climate change must be addressed. Within the Extreme Environments theme, our research in regions such as Antarctica has informed the global understanding of climate change and potential tipping points relating to sea-level rises. We are, however, also working to find solutions. Examples include: clean and renewable energy sources developed though our new Energy Futures theme; supporting disaster management in communities around the world; and upskilling graduates and partner organisations so that they have the skills needed to support sustainable development.

This report provides just a snapshot of the work we do to support each of the United Nations' Sustainable Development Goals (SDGs) through our research, teaching, campus and operations. I encourage you to visit our website (www.northumbria.ac.uk/sustainability) to explore our contribution further or to get in touch. Despite the challenges to come, I am confident that Northumbria will continue to make a real and valuable contribution to the SDGs and look forward to the coming year.

Professor George Marston

Pro Vice-Chancellor Strategic Projects, Chair, University Sustainability Management Group

SUSTAINABLE DEVELOPMENT GOALS	Publications	RAI World	RAI UK	International Co-authorship (%)	FW Citation Percentiles Top 10% (%)	FWCI	Open Access %
GOAL 1: No Poverty	119	2.26	1.35	42.0	16.0	1.38	79.0
GOAL 2: Zero Hunger	**105**	**0.73**	**0.80**	**58.1**	**15.2**	**1.37**	**82.9**
GOAL 3: Good Health and Well-being	1008	0.56	0.52	57.2	18.2	1.86	86.4
GOAL 4: Quality Education	**260**	**1.65**	**1.38**	**32.3**	**15.4**	**1.19**	**68.8**
GOAL 5: Gender Equality	204	2.23	1.26	39.7	20.1	1.53	69.6
GOAL 6: Clean Water and Sanitation	**127**	**0.66**	**1.09**	**83.5**	**23.6**	**1.90**	**69.3**
GOAL 7: Affordable and Clean Energy	770	1.41	1.89	80.8	26.9	2.21	69.7
GOAL 8: Decent Work and Economic Growth	**285**	**1.49**	**1.27**	**57.5**	**21.8**	**1.74**	**68.8**
GOAL 9: Industry, Innovation and Infrastructure	576	1.78	1.79	67.5	24.1	2.16	65.1
GOAL 10: Reduced Inequality	**341**	**2.13**	**1.29**	**40.8**	**14.7**	**1.38**	**71.8**
GOAL 11: Sustainable Cities and Communities	375	1.46	1.57	52.8	16.5	1.64	72.5
GOAL 12: Responsible Consumption and Production	**258**	**1.50**	**1.53**	**70.2**	**22.9**	**2.85**	**69.4**
GOAL 13: Climate Action	343	1.77	1.35	78.1	30.9	2.52	73.5
GOAL 14: Life Below Water	**69**	**0.67**	**0.64**	**73.9**	**15.9**	**1.94**	**81.2**
GOAL 15: Life on Land	155	1.14	0.96	68.4	22.6	1.95	76.8
GOAL 16: Peace, Justice and Strong Institutions	**450**	**3.05**	**1.60**	**34.9**	**17.1**	**1.32**	**71.6**

All data is from the Scopus database and the year range 2019 - 2023 (5 year window).

Publications are mapped to SDGs using the same methodology applied in the Times Higher Education Impact Rankings 2023. More information can be found here: http://doi.org/10.17632/y2zyy9vwzy.1

Number of publications with a Northumbria University affiliation, mapped to queries used in the Times Higher Eductation Impact Ranking 2023.

Relative Activity Index (RAI) is defined as the share of an institute's output in a subject relative to the national/global share of outputs in the same subject. (1.00 = as expected)

For example, Northumbria published 3.04% of its outputs in SDG 10, while the World published 1.43% of its outputs in the same SDG, the RAI for Northumbria in SDG 10 is therefore 3.04%/1.43% = 2.13. In this case, it would indicate that Northumbria is twice more specialised in SDG 10 compared to the global average.

The proportion of outputs in each SDG that have at least one international co-author.

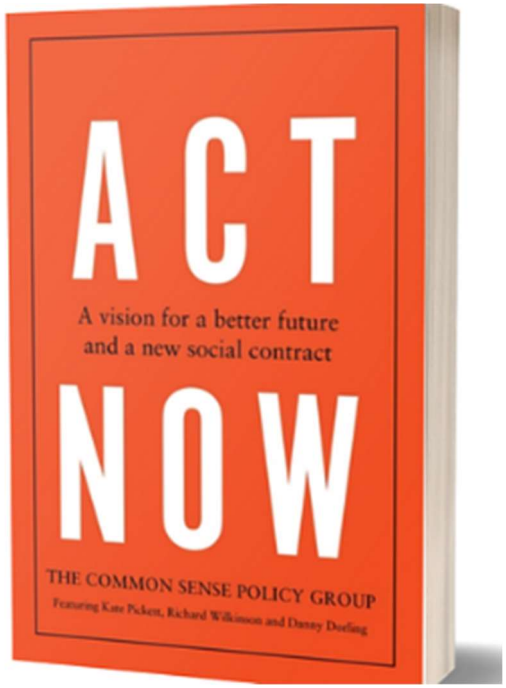
Field-Weighted Outputs in Top Citation Percentiles indicates the extent to which an entity's publications are present in the most-cited percentiles of a data universe, i.e. how many publications are in the top 10% of the most-cited publications?

FWCI is an attention indicator and is centred on citations. It gives us an indication of how the number of citations received by an entity's publications compares with the average number (1.00) of citations received by all other similar publications.

A publication is defined 'open access' when there are no financial, legal or technical barriers to accessing it, thus increasing the visibility and reuse of academic research results. Providing open access also ensures publications are freely accessible to society.

SDG 1 - No Poverty

Our staff and students work to not only address poverty with local and global communities, but to also address the needs of our own students.



Northumbria Researchers have led the creation of a blueprint for policy reform which aims to bring an end to poverty and inequality in Britain.

Professor Matthew Johnson and his public policy research team have published a research-informed report that outlines clear policies for the transformation of welfare provision, health and social care, education, housing and transport services, among other issues.

To develop *Act Now: A vision for a better future and a new social contract*, Northumbria researchers joined forces with fellow academics, policymakers, third sector leaders, community representatives and people with lived experience. Despite their different backgrounds and political perspectives, together they have created *Act Now* as a new collective they have named the Common Sense Policy Group.

In the book's foreword former Archbishop of Canterbury, Rowan Williams, writes: "The proposals in this book are detailed and pragmatic, set out with careful attention to how they might be implemented and how they might be funded. These chapters are not an idealistic rant demanding some sort of total recalibration of how we live. But they are unmistakeably radical, in the sense that they interrogate what the political establishment of both left and right take for granted, what they think is achievable and acceptable."

Connecting Services and Communities To Support People Experiencing Homelessness

Our researchers, working to transform the infrastructure of support available for people experiencing homelessness, have been awarded £1.4m from UK Research and Innovation (UKRI). The three-year project aims to better connect the care system and expand it to include creative health approaches such as art, crafts, sports, gardening or cooking to provide holistic support tailored to individuals.

At present, support services are not always integrated and often try to address in isolation the issues which can contribute to homelessness – such as abuse, trauma, addiction and mental or physical health challenges. But in reality, these complex and varied health and social care needs can rarely be treated in isolation.

The project aims to grow the care system, so it includes creative health approaches, with the research informed and guided by people recruited as experts by experience. Driven by six key organisations – Tyne Housing, Groundswell, Alphabetti Theatre, Art Gene, Chilli Studios and Helix Arts – a network of housing providers, arts organisations and healthcare services from across the North East and Cumbria will participate in the project. The research will also be supported by two regional community interest companies, Media Savvy and Roots and Wings design, making the project highly collaborative and grounded within the kinds of organisations it aims to engage.

The aim is to develop a model which supports the move from siloed working and crisis management to collaborative partnerships for early intervention and prevention. This will inform the development of an evidence-based regional policy for homelessness and a website featuring details of all support services available in one place. Researchers have developed a model which superimposes Maslow's hierarchy of needs with an adapted version of Tonkin's (1996) model of grief, to demonstrate that people can grow around trauma if they are provided with opportunities to do so.

SDG 2 - No Hunger

We recognise the risk of hunger within our own communities, and through our research we are also championing and informing UK policy to address hunger in communities across the country.

New Report Calls For More Support For Schools To Improve Health And Wellbeing In Children and Young People

Northumbria academics have contributed to a report which calls for more support for schools to fix the broken school food system and boost children's physical activity in order to tackle issues such as childhood obesity and food insecurity.

Greta Defeyter, Professor in Developmental Psychology, alongside Northumbria colleagues Emily Round and Rosie King, produced the report in collaboration with the N8 Research Partnership, Child of the North, Health Equity North and a number of universities including three Northumbria University academics, outlined overwhelming evidence that the health of children and young people in the UK is getting worse and children's education, as well as physical and mental wellbeing, is being impacted by inactivity and unhealthy diets.

A country that works for all children and young people – an evidence-based plan for supporting physical activity and health nutrition with and through education settings is the fifth in a series of reports published by the Child of the North and the Centre for Young Lives think tank which focuses on how both the Government and Opposition can reset their vision for children, to put the life chances of young people at the heart of policy making and delivery.

The report sets out evidence-based recommendations to give schools the power to develop their own holistic approaches to improving diets and physical activity and urges Government to support schools in diversifying the curriculum, developing teacher training and putting the health and wellbeing of pupils at the centre of the school environment. The report also identifies a number

of innovative and impactful approaches already being utilised to improve the health of children and young people through schools including, auto-enrolment for free school meals, The Holiday Activities and Food (HAF) programme and The Creating Active Schools (CAS) programme.

Early Intervention Can Reduce Food Insecurity Among Military Veterans

A study led by our Northern Hub for Veterans and Military Families Research looked at wider household poverty among veterans, with a particular focus on food security in veterans' families – meaning they are without reliable access to nutritious and healthy food.

The Tri-Service Food Insecurity Study, which was funded by the Armed Forces Covenant Fund Trust and SSAFA, the UK's oldest tri-service military charity, found that younger veterans of working age are most at risk of becoming food insecure.

Using survey data from UK veterans and their families, researchers have identified those veterans who may be at greater risk of food insecurity, which can be used to help identify those within the community who are likely to experience food insecurity, and wider financial hardship, before they reach a 'crisis' point.

Age, having a long-term medical condition, living in rented accommodation, receiving benefits, lower military rank on leaving the services and marital status are all associated risk factors. This information creates an opportunity to provide veterans who are at the most risk of food insecurity, with tailored support and in doing so, enables early intervention and the early allocation of resources. Using preventative measures would not only benefit veterans and their families, but could also reduce the economic cost of crisis and the need for additional support from the NHS and charities, which is often costly.

This study is part of a programme of research from the Northern Hub for Veterans and Military Families Research and the Healthy Living Lab at Northumbria University, working closely with SSAFA and their volunteer network to collect and analyse a range of anonymised data from serving personnel, veterans and families from all three branches of the Armed Forces community.

The Tri-Service Food Insecurity Study can be found on The Armed Forces Covenant Fund Trust website.

SDG 3 - Good Health and Wellbeing

We are committed to delivering education for sustainable development and ensure that all our programmes explore world challenges and seek sustainable solutions - from sustainability in fashion, to tackling global pandemics.

Contact Lenses To Diagnose Glaucoma

Glaucoma effects around 70 million people worldwide and can cause irreversible loss of vision if not treated – but around half of those living with the condition are not aware of it. Usually developing slowly over time, many cases of glaucoma are only picked up during routine eye tests, by which time lasting damage may already have been caused. This could change in future as academics from Northumbria and Türkiye have developed a contact lens which can detect changes in eye pressure which signal possible glaucoma.

Glaucoma occurs when the optic nerve, which connects the eye to the brain, becomes damaged, usually by a build-up of fluid in the front part of the eye which increases pressure inside the eye – known as intra-ocular pressure (IOP).

The new contact lenses contain micro-sensors which monitor changes in IOP over a period of several hours, sending the data collected wirelessly so it can be analysed by an ophthalmologist and a diagnosis given.

The research has been carried out by Northumbria's Professor Hamdi Torun and Professors Günhan Dündar and Arda D. Yalcinkaya, of Boğaziçi University, in Istanbul, and has been published in *Contact Lens and Anterior Eye*, the official Journal of the British Contact Lens Association.

Their paper, entitled *A first-in-human pilot study of a novel electrically-passive metamaterial-inspired resonator-based ocular sensor embedded contact lens monitoring intraocular pressure fluctuations*, sets out the findings from their initial pilot study of six participants.

Having determined that the technology works successfully, they now plan to carry out a further study with a larger group of participants, which will take place over the next year. The lenses will then be made commercially available through their spin-off company GlakoLens.

One of the benefits of using the GlakoLens contact lenses to diagnose glaucoma instead of carrying out a traditional examination is that measurements can be taken more easily over a longer period of time, giving a more accurate diagnosis.

The GlakoLens contact lenses use an electrically passive sensor embedded in a disposable soft contact lens, and a wearable electronic readout system to collect, store and process the data – making the lens more comfortable and allowing the patient to go about their day as normal.

As well as diagnosing glaucoma, there is also potential for the lenses to be used to detect other health conditions by measuring glucose, lactic acid and other molecules present in eye.

Researchers Secure Funds For Brain Health Study On Military Veterans

A pioneering multi-disciplined team of researchers from Northumbria University and Imperial College London has received funding to study that will explore biological, psychological and social factors associated with brain health in female military veterans.

Recent research has indicated that female veterans show poorer brain health in later life compared to male veterans and females from the general population.

Dr Tamlyn Watermeyer, Assistant Professor of Neuropsychology, Dr Paul Ansdell, Assistant Professor of Physiology at Northumbria University, and Dr Chi Udeh-Momoh, a Neuroendocrinologist based at Imperial College London have been awarded funding from the Office for Veterans' Affairs' (OVA) Health Innovation Fund, recently launched by the government to drive forward cutting-edge treatments and technologies to support veterans' healthcare.

It's anticipated that the findings from the research will help healthcare professionals provide more effective support and treatments for women who have been adversely affected by military life.

Dr Watermeyer, a specialist in brain, cognitive and psychological health, is co-leading the multi-disciplinary team on the project. Northumbria's research team spans the departments of Psychology, Sport, Exercise & Rehabilitation, and Social Work & Education.

The study is now underway and the team is actively looking to recruit female veterans, male veterans and female civilians aged 35 years and older to participate in the study. They will be asked questions on their background, mood and lifestyle and, for veterans, questions about their experiences of serving in the military.

Participants will also complete memory and thinking tasks, such as remembering word lists and colours of shapes, and provide biological samples including blood, saliva and hair that will uncover vital information about the state of their health. Neural tests will also be used to measure key brain regions involved in movement and sensory functions.

The team, which includes early-career researchers Christina Dodds who served in the British military and Elliott Atkinson who was a recruit with the Royal Marines, recently presented the research at the world's largest dementia research conference - the Alzheimer's Association International Conference.

The work forms part of the Female Brain & Endocrine Research (FemBER) Consortium, a research programme founded by Dr Watermeyer and Dr Udeh-Momoh that calls for more research into female brain health. The study's recruitment and community outreach is supported by a multi-disciplinary team of academics from Northumbria University including Dr Gill McGill, Co-Director of Northumbria's Northern Hub for Veterans and Military Families Research, and Professor Glyn Howatson, an Applied Physiologist and British Army veteran, who provide valuable input into the study design and insights on the UK's armed forces community.

SDG 4 - Quality Education

We are committed to delivering education for sustainable development and ensure that all our programmes explore world challenges and seek sustainable solutions - from sustainability in fashion, to tackling global pandemics.

Teaching Excellence Recognised With Two National Awards

Northumbria University academics have scooped two coveted national awards for teaching excellence. Two teams won Advance HE Collaborative Awards for Teaching Excellence for their work to improve teaching and support for students. The awards, known as CATE, recognise and celebrate collaborative teamwork that has had a demonstrable impact on teaching and learning at either an institutional or discipline level. Innovative work to support student teachers entering the teaching workforce led to an award for a team in the Department of Social Work, Education and Community Wellbeing.

Working with more than 300 students and school partners in Newcastle and the Caribbean, they developed a number of innovations to better prepare student teachers for the demanding situations they may face when entering the profession, such as safeguarding issues and managing conflict. The team developed new ways to mentor students and newly qualified teachers to increase their confidence, including simulation-based experiential learning and new action learning methods that guide their practice.

Meanwhile, the Playful Learning Association, a cross-institutional collaboration co-founded by Professor Nic Whitton in Northumbria's Department of Computer and Information Sciences, was recognised for its work to inspire change in higher education. The association champions playful approaches to learning, teaching, assessment, research and all other forms of academic

practice to create transformative learning experiences that improve inclusivity and make a real difference to students across the country.

Northumbria Retains Prestigious ‘Double’ AACSB Accreditation For Business And Accounting

Our Business School has once again cemented its reputation as a leading institution for business and accounting education by retaining its coveted accreditations from the Association to Advance Collegiate Schools of Business (AACSB).

The AACSB accreditation is a hallmark of excellence in business education, earned by fewer than 6% of the world's schools offering business degree programmes. Synonymous with the highest standards of excellence since 1916, AACSB connects students, schools and business practitioners to develop the next generation of business leaders. With many major companies reporting they recruit exclusively from AACSB institutions, accreditation also provides students with a career edge.

This dual accreditation is a testament to the University's commitment to excellence, innovation, and the highest standards in business and accounting education, further enhancing its global reputation and appeal to staff and students.

The AACSB Review Panel praised Northumbria for its ‘remarkable’ rise in research productivity, external funding, and impact, moving from 60th to 9th for Research Power in Business and Management in the UK’s latest Research Excellence Framework. Reviewers also commended Newcastle Business School for promoting societal impact, focusing on the UN Sustainable Development Goals, and leading in Responsible Management Education.

Northumbria Celebrates 100th Nursing Degree Apprenticeship Graduate

Over one hundred registered nurses have now been added to the region's NHS workforce through Northumbria University's 18-month nursing degree apprenticeship programme. Delivered in partnership with NHS Trusts across the region including Newcastle, Northumbria, South Tyneside and Sunderland and Gateshead, as well as Lancashire Teaching Hospitals NHS Foundation and other primary care organisations, the programme saw its first cohort graduate in March 2020.

The current cohort includes the 100th registered nurse to come through the programme and also the first 18 apprentices from South Tees Hospitals NHS Foundation Trust, which recently partnered with Northumbria to deliver the apprenticeship scheme to its staff.

The programme, which was the first of its kind to run in the UK, was specifically developed to open up nursing careers to more people and give individuals with previous clinical experience the opportunity to graduate as registered nurses within a compressed time frame.

SDG 5 - Gender Equality

We are committed to equality and are working hard to ensure that Northumbria University is a fair, equal and welcoming place to study and work, as well as using our education, research and partnerships to promote gender equality beyond our own campus.

Award Honours Research on Gendered Experiences In Engineering

A Northumbria Civil Engineering graduate has won the *Rising Star – Contribution to Gender Diversity* award at the 2023 Inspiring Women in Construction and Engineering Awards. Northumbria alumna, Abigail Brierley, was recognised at the event held in London for her work on producing a comparative study of the experiences of male and female engineers at different stages of their careers in both the UK and USA.

Abigail's research was inspired by her awareness of the continuing struggle to attract women into civil engineering, despite drives for equality in Britain and the US. Her work collected feedback during interviews carried out with men and women in both countries, ranging from students and graduates to those with long-established careers, to understand some of the key themes around their influences, decision making and different experiences once working in the industry.

Having graduated in 2021, Abigail now works as a Graduate Construction Manager with the international engineering and construction company, Laing O'Rourke. A video of Abigail accepting her award can be viewed here. The awards, which celebrated the role models and organisations empowering women in construction and engineering, were jointly hosted by *New Civil Engineer* and *Construction News*. In total, 15 winners were crowned during a glittering ceremony, recognising the women and teams that stand out as exceptional while showcasing both individual and organisation-wide initiatives.

Academics Collaborate With Charity For Research On Women's Safety

A study led by researchers from Northumbria suggests not enough is being done to ensure women's safety in the night-time economy. The inquiry into women's emotional responses to sexual harassment, or unwanted sexual intrusions (USI), found that women do not feel safe and free to engage equally with men in the night-time economy – a term used to describe businesses which stay open late such as bars, restaurants and event venues – because of the impact of unwanted sexual intrusions.

The national study commissioned by Shout-Up!, a campaign to tackle sexual harassment in the night-time economy, was conducted by Dr Ruth Lewis and Dr Amanda McBride from Northumbria and sought to understand women's emotional responses to sexual harassment. The outcome is the focus of a paper called *Fear, injustice, anger and shame in the night-time economy: Women's responses to unwanted sexual intrusions* recently published in the peer-reviewed journal *Violence Against Women*.

The key findings include:

- 44% of women who expressed an emotion said they felt fear as a result of unwanted sexual intrusions on a night out.
- 23% of women who expressed an emotion said they'd felt anger and 12% felt shame as a result of unwanted sexual intrusions on a night out.
- Many women described carrying out what the research team have called 'safety work' to manage what they experience during nights out. This includes leaving venues after an incident, reporting incidents to venue staff, avoiding certain areas or venues or deciding not to engage in the night-time economy at all.

The report sets out a number of solutions that are needed to ensure women can engage equally with men in the night-time economy:

- Support**:** Women should not be left to respond to USI alone because their own emotional reactions, and their assessment of the risk of exacerbated violence, mean they are not free to respond as they might wish. Venues must create environments where women can get help quickly.
- Knowledge**:** All staff working in the night-time economy (such as bar staff and door supervisors, for example) should be trained to understand USI, how it manifests and its impacts so that they can be alert to USI and confident about how to respond to it. This training should include consideration of the range and complexity of women's emotional responses to USI.
- Change**:** Venues should be expected to meet agreed standards around safety from USI as they would for other health and safety led initiatives and should be expected to publicly demonstrate their commitment to a zero-tolerance approach.

At Northumbria, researchers recognise that no single discipline has the answers to the complex problems of gendered violence and abuse and have developed interdisciplinary collaborations to analyse and address the social, political, cultural and technological structures that exist and enable many forms of violence and abuse.

SDG 6 - Clean Water & Sanitation

We want to minimise the amount of water we use on our campus, minimise pollution risk and support the global target of ensuring that everyone around the world has access to clean water and sanitation.

Impact Of Climate Change On Drylands To Be Examined With Royal Society Award

Dr Monika Markowska has been awarded a prestigious Royal Society Fellowship worth over £1.4 million to study how dryland landscapes respond to a changing climate. The funding for her eight-year project, *Unlocking the drivers of global desert expansion in warmer and colder worlds*, will look at the long-standing uncertainty of how subtropical desert regions respond in globally 'warmer worlds'.

Drylands cover almost half of the Earth's land surfaces and are home to one in three people in the world today. Far from being unproductive regions, drylands cover a large proportion of the regions that produce grain, known as "the world's bread basket" producing 44% of the world's crops. However, these already water-limited regions are predicted to expand by approximately 10% by the end of this century due to global warming, with newly formed hyper-arid regions potentially displacing populations and creating climate refugees.

Dr Markowska's research will use records of past climates stored in stalagmites recovered from caves in South Africa, Arabia and Southern Australia – known as climate proxy information - to explain what has caused dryland regions to expand and contract in the past, and therefore what we might expect for these regions in the future. She will work in collaboration with an international and interdisciplinary team of scientists in Australia, Germany, United States and South Africa, as well as paleoclimate model researchers at the universities of Leeds and Reading.

In joining the Department of Geography and Environmental Sciences, Dr Markowska will be working alongside a world-leading group of researchers using climate records preserved in caves to solve problems with forecasting change in various aspects of the Earth's systems.

SDG 7 - Affordable & Clean Energy

In addition to minimising our own energy usage and supporting cleaner energy provision and use, we have a strong reputation for our outstanding research and education in the field of future energy.

New Research Centre Driving Economic Growth and Sustainability

Northumbria are one of six northern institutions driving a new £5m research initiative to help boost UK economic growth and address regional needs. The *Northern Net Zero Accelerator - Energy Systems Integration for a Decarbonised Economy* will make, collate and translate knowledge from research on net zero technologies, policy, energy and industrial systems. The project will deliver impact in partnership with regional industry, civic bodies and the third sector, thereby delivering real change through our community of partners.

The new Accelerator sees Northumbria working in collaboration with the universities of Durham, Hull, Newcastle, Sunderland, and Teesside. Led by Newcastle University's Professor Sara Walker, the Accelerator received £5m investment to boost translation of research into applications and actions through collaboration with civic, industry and third sector partners.

The theme of the Northern Net Zero Accelerator is on Energy Systems Integration for a Decarbonised Economy. Three pillars to the theme have been identified:

- Low Carbon Energy Generation
- Energy Storage and Distribution
- Integration into End Use Sectors

The Northern Net Zero Accelerator brings together academic, civic, industry and third sector partners across the North East, Teesside and the Humber. This new partnership follows recent collaboration among the academic institutions involved and stakeholders towards an ambitious agenda for delivering economic and social impact aligned with regional growth strategies. We will focus on fostering the emergence of innovative collaborations benefiting the area.

Northumbria's Energy Systems and Materials peak of research excellence aligns seamlessly to the focus and ambition of the Northern Net Zero Accelerator. The University also leads the EPSRC Centre for Doctoral Training, Renewable Energy Northeast Universities (ReNU) with Durham and Newcastle Universities as partners, creating a pipeline of skilled doctoral graduates to drive innovation in small scale renewable and sustainable distributed energy.

Renewables Toolkit Aims To Help Smooth The Road To Net Zero

Economists and environmental scientists from Northumbria have joined forces with regional leaders across the North East to co-design a renewable energy toolkit.

Working with local authorities, the National Farmers' Union (NFU), the National Trust and industry experts, academics from the University have developed a renewable energy toolkit which provides clear and accessible guidance to those interested in developing local scale renewable energy projects in North East England.

Advice is tailored for use at a local level, prioritising individual farms or smallholdings, and takes into account the region's diverse energy needs, considering not only electricity generation, but also heat, energy efficiency, and energy storage. It covers frequently asked questions on the logistics, finance and planning considerations relating to solar panels, onshore wind turbines, heat pumps, hydropower, and anaerobic digestion, among other projects. Building this kind of diversity in energy supply will be critical to the UK achieving net zero by 2050.

Economist and Assistant Professor at the University's Newcastle Business School, Dr Dongna Zhang, co-authored the guidance with Dr Andy Suggitt, an Assistant Professor in the Department of Geography and Environmental Sciences, and Research Assistant, Natasha Johnson.

SDG 8 - Decent Work and Economic Growth

We are within the top 15 UK universities for the number of graduates in highly skilled employment (Graduate Outcome survey).

Helping To Keep Emergency Workers Safe In The Line Of Duty

A Northumbria academic is collaborating with County Durham and Darlington Fire and Rescue Service to investigate attacks on fire service personnel by members of the public. The research by Dr Colin Richardson, from Northumbria's Newcastle Business School, asks why there is a significant increase of attacks on fire service personnel when attending incidents. Home Office figures show there are currently around 1,000 attacks a year across the UK – but this is continuing to grow at an alarming rate of approximately 12% a year.

The research aims to understand this peculiar phenomenon in greater detail, working with the emergency services, highlighting opportunities to reduce risk through identifying potential causes of hostility and educate through engagement with local communities. These opportunities include utilising rich data and innovative technologies such as Artificial Intelligence (A1) and Machine Learning, to protect front line personnel from hostile encounters while also reducing risks for the public.

MAJOR £2M EXPANSION OF NURSING TEST CENTRE WILL BRING THOUSANDS MORE NURSES TO THE FRONTLINE FASTER

Northumbria's national nurse testing centre at has doubled in size to help to speed up the process of bringing more nurses to the NHS frontline. In partnership with the Nursing and Midwifery Council, Northumbria University opened a Competence Test Centre in March 2022 to provide the Objective Structured Clinical Examination, known as OSCE, for up to 7,000 candidates per year.

The Objective Structured Clinical Examination is the practical part of the Test of Competence that all nurses, midwives and nursing associates must take before they can be registered to practise. All overseas-trained nurses and UK nurses returning after a career break are assessed on how well they care for and communicate with patients and must pass the exam before they are permitted to work.By the end of 2022, Northumbria University was delivering 45 OSCE exams per day at its test centre, which is based at the Coach Lane Campus in Newcastle.

With the new centre running so successfully, and with an urgent need to recruit more than 100,000 nurses to the NHS, the Nursing and Midwifery Council asked the University if it could expand its current provision and offer more exams. Northumbria began a major £2 million project to expand the centre to increase its capacity in January, which has led to the creation of more than 50 additional jobs. An extensive renovation of existing teaching, office and social spaces has led to the University's Competence Test Centre doubling in size, from 15 to 30 testing bays.

The centre already employed more than 120 examiners, technicians, administrators and actors who play the role of patients in the exams. These numbers have now been significantly boosted to ensure the centre runs efficiently with its increased capacity and that exams meet the stringent national standards.

As each testing bay is now used to deliver three exams per day, Northumbria University will be able to offer up to 22,000 OSCE exams per year by the end of 2023, once all new staff are in post and fully trained.

Candidates sitting the OSCE examination mainly come from NHS Trusts or hospitals, care providers and international nursing recruitment agencies. Some candidates opt to sit the exam independently to prepare themselves to enter the workplace.

During the exam, the candidates demonstrate their skills, knowledge and ability to communicate with patients in simulations of real clinical work. The tests take place in a recreation of their working environment, using a combination of advanced simulation technology and actors presenting as patients. Candidates must pass the exam before they are permitted to work as qualified nurses.

Northumbria's centre has already provided a welcome boost to the North East economy, with thousands of candidates travelling to Newcastle from all over the UK to sit their exams.

Northumbria University is one of the largest centres for healthcare professional education in the North of England, offering a range of specialist degree and CPD programmes across many areas of nursing, midwifery, operating department practice, physiotherapy and occupational therapy.

SDG 9 - Industry, Innovation and Infrastructure

Our expertise and work with industry partners is driving innovation across the region and supporting sustainability economies. This drive for innovation is also instilled in our students – a new generation of sustainable, innovative thinkers and designers.

£50m Space Skills, Research And Development Centre Set To Transform The UK Space Industry

Northumbria has secured a total of £50 million in funding to create a world-leading space skills, research and technology centre in the North East of England.

The centre, which will be known as NESST, will be a “game-changer” for the UK space economy. NESST is expected to directly support the creation of over 350 jobs and inject over £260 million into the North East economy over the next 30 years, playing a critical role in the government’s levelling-up agenda and immediately becoming a catalyst for the wider development of the UK space sector in the North East region.

NESST will enable Northumbria University to continue to undertake world-leading research in the areas of optical communications, space weather and space based energy. Early research programmes in NESST will focus on in-orbit and ground-to-orbit satellite laser communications systems; space based renewable energy and power beaming and the design, development and space readiness testing for small satellite constellations and novel payloads.

Northumbria Professor Leads Development Of ‘Wonder Material’ For Real Applications

It’s the strongest material on Earth and has the potential to transform the performance and sustainability of everything from the cars we drive to the way we clean our drinking water. However, the ‘wonder material’ graphene is still rarely used in everyday life due to the difficulties and expense of manufacturing it commercially. But that could soon change thanks to a new €9 million EU-funded project in which Northumbria’s Ahmed Elmarakbi, Professor of Automotive Composites, is playing a leading role.

The *Pioneering Sustainable Graphene-based Solutions for Environmental Challenges* project, known as GIANCE, brings together major industry partners such as Stellantis and Boeing, with research and technology organisations and SMEs from

across Europe. Professor Elmarakbi has been appointed scientific coordinator for the three-year project, as well as technical board and steering committee chairman.

Discovered in 2004, graphene is made of a single layer of carbon atoms bonded together in a hexagonal, sheetlike structure. It is one million times thinner than human hair and 200 times stronger than steel. The only way most of us currently encounter graphene is through pencils – with the mineral graphite, which is used in pencil nibs, made up of hundreds of thousands of layers of graphene. However, the potential of graphene is huge, and the GIANCE project aims to explore ways the material could be used across a wide variety of industries – as composites, coatings, foams and membranes.

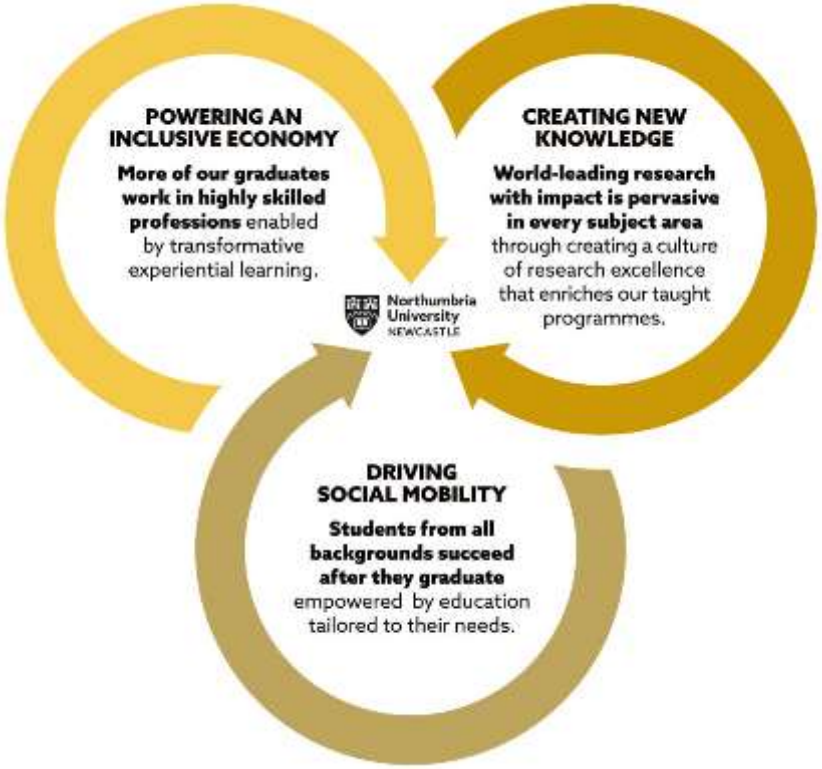
Project partners will work together to explore the potential functionalities of graphene, including wear resistance, corrosion resistance, chemical and fire resistance, hardness, impact resistance, high-temperature resistance, structural health monitoring, and ultralow friction surfaces.

SDG 10 - Reduced Inequalities

At Northumbria University we are committed to fostering a culture where diversity is valued and encouraged, where we advance equality of opportunity, and all colleagues and students feel respected.

University Strategy 2024-2030 – Strategic Ambition for Driving Social Mobility

Our University Strategy 2030 is a bold and ambitious statement of our future. At its core is the impact that the University has in changing lives, by enabling people from all backgrounds to succeed and supporting businesses and communities to thrive in the North East, London and beyond. It builds on both our heritage and our transformation over the last fifteen years, focusing on three Strategic Ambitions that will be delivered through our world-leading research and transformative education.



Northumbria's Strategic Ambition for Driving Social Mobility supports students from all backgrounds to achieve their ultimate ambitions. As fewer students from low participation backgrounds find their way into highly skilled jobs or further study that can open up new opportunities and transform their lives, our aim is to eliminate that difference, so that all of our students have the same likelihood of success after completing their studies. Experiential learning will be especially advantageous for these students, many of whom are first in family to go to university. It will help those who currently lack the social capital or networks to access employment opportunities. But it will not be enough on its own. We will further tailor our education offer so that how and when we teach better meets the needs of students. We will enhance onboarding and enable better access to student services and support with cost of living and mental health. Support will better meet the needs of different groups of students and educational analytics will enable us to direct it to those most in need. These changes will provide equitable help for students to stay at Northumbria, complete their degree and succeed in their post-study ambitions.

Under the requirements of The Strategy, we will ensure that we maintain the same proportion of undergraduate students recruited from low participation backgrounds. Our ambition is to ignite aspiration, remove barriers for the communities that we serve and offer routes for students from all backgrounds to access and succeed in higher education. Maintaining our access performance will be a challenge, not least because of cost of living pressures for students and limited prospects of fundamental reforms to student maintenance funding. We are committed to meeting these challenges. We will specifically evolve our own education offer to respond to demand from groups to study in different ways, for example by growing degree apprenticeships where possible. In recognising our civic responsibility and the lower participation rate in the North East, we will support prospective students to consider higher education wherever they choose to study.

We will explicitly embed our ambitions for access and success in our student recruitment, education and research, while maintaining the academic excellence that we have fostered over the last decade. These ambitions will apply wherever we operate. In London we

will recruit and support more students from the local community near our campus and, overseas, our TNE activity will support access to UK higher education for those unable to travel to the UK.

Northumbria Welcomes Talented Young Adults With Learning Disabilities And/Or Autism To A Life-Changing Transition To Employment Programme

A life-changing supported internship programme for young adults with learning disabilities and/or autism spectrum conditions, was launched in September 2023 with Newcastle City Learning, supported by Northumbria University.

Newcastle City Learning, run by Newcastle City Council, have teamed up with Northumbria University, Sodexo and national charity DFN Project SEARCH to form a collaborative partnership to give young people with learning disabilities and/or autism vital work-based learning opportunities, to help them to secure competitive employment.

The pioneering programme involves total workplace immersion at its very best, facilitating a seamless combination of classroom instruction, career exploration, and hands-on skills training.

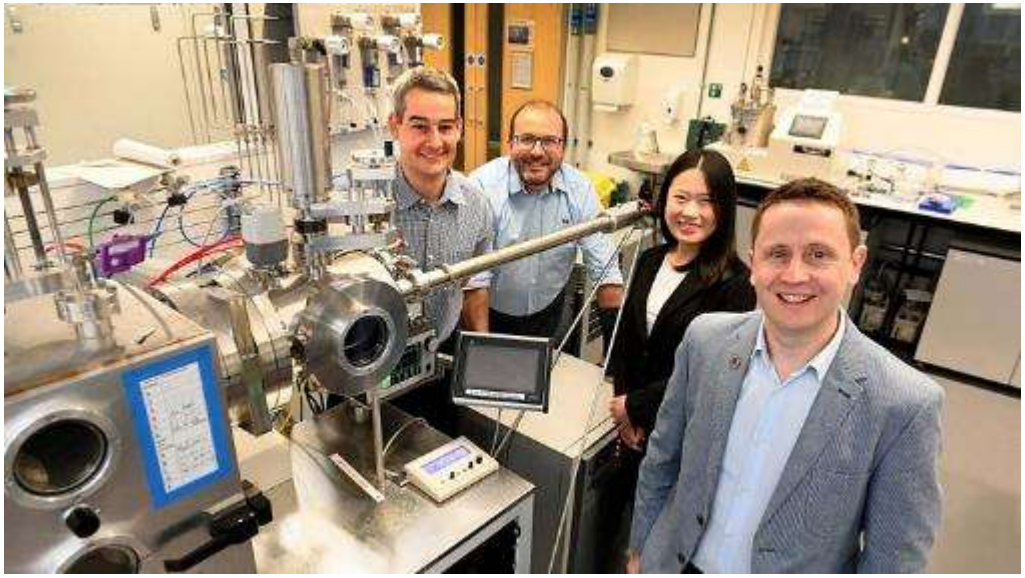
Through the partnership – the first of its kind in the region - Northumbria will provide supported work placements across different business areas of the University as well as its Sodexo-managed student accommodation, as part of the students' full time study programme, facilitated by City Learning.

Northumbria University has been a member of the Disability Confident Scheme for a number of years and was awarded Disability Confident Leader status in June 2023. The Disability Confident Scheme provides a framework to support organisations to develop a disability inclusive culture that realises the talent of disabled people.

£11m Funding To Expand Access To Renewable Energy Research In North East

World-leading research from three North East universities to advance renewable energy technologies has received a welcome boost, with the announcement of almost £11.5 million to expand their work and include people from under-represented groups and non-traditional educational backgrounds to drive the transition to Net Zero.

An award of £5.3 million from the Engineering and Physical Sciences Research Council will enable Northumbria, Newcastle and Durham Universities to further develop ReNU, their successful Centre for Doctoral Training in renewable energies, which was formed in 2019. This award is complemented by contributions from partner universities and companies resulting in a total value of nearly £11.5 million.



The funding will create ReNU+ – the ESPRC Centre for Doctoral Training in Renewable Energy Northeast Universities Plus – which will help the UK government progress towards its Net Zero aims for a low carbon economy.

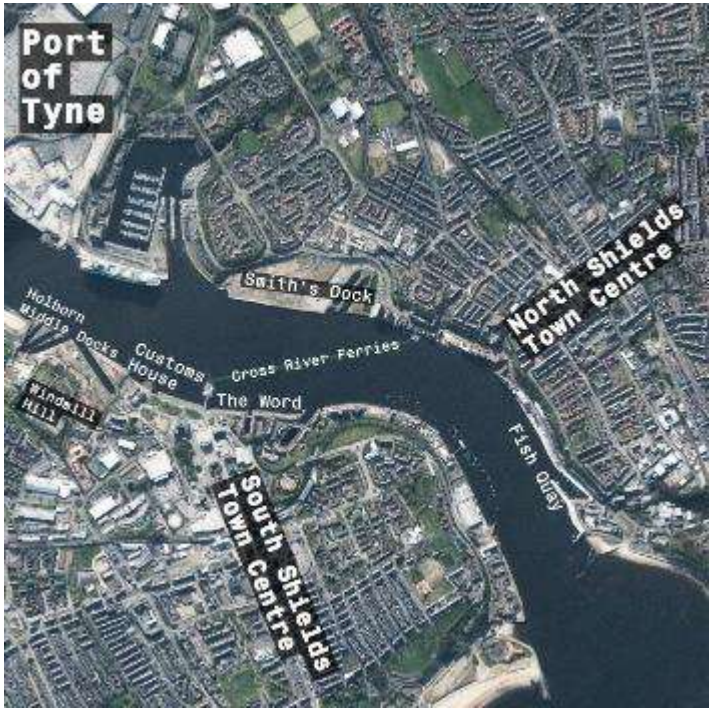
ReNU+will be distinctive from other areas of renewable energy research due to its emphasis on equality, diversity and inclusion, and its partnerships with local government, industry and charities.

The centre will widen access to doctoral level training to those with non-traditional educational backgrounds, encouraging those in under-represented groups such as people who are unemployed or disabled, carers and military veterans to train as doctoral carbon champions.

This will bring new perspectives and lived experiences that are essential for an urgent and equitable transition to Net Zero, from looking at new forms of investment and regulation through to encouraging end users to engage with new innovations.

SDG 11 - Sustainable Cities and Communities

As an urban university we are working to reduce the environmental footprint of our campus, but our staff and students are also helping to create thriving and culturally rich communities both locally and around the world.



Collaborating With Coastal Communities on Regeneration Is Key

Northumbria Researchers have undertaken a project exploring sustainable planning with the coastal communities in North and South Tyneside. The team developed and championed methods to enable communities to co-design how urban redevelopment might best serve their neighbourhoods.

Part of the research focused on co-developing and implementing a smartphone app. The app is capable of capturing information, opinions and local knowledge directly from residents who find themselves at the centre of the environmental and social impacts of community redevelopment.

Funding for the project was secured from the Design Exchange Partnerships (DEP) Coastal Communities 2023 programme, supported by the Arts and Humanities Research Council (AHRC) in partnership with the Future Observatory, the London Design Museum's national research programme for the green transition.

Along with developing new methods of citizen participation in the planning process in the form of the app, the project was focused on several research objectives, including understanding the major environmental issues facing coastal towns; the reuse of brownfield land; the effects of climate change and flooding; and, supporting social inclusion to empower community involvement in the planning and change of local coastal neighbourhoods.

The app has been trialled by over 50 participants to date, as part of the research which looks at devising a participatory planning service that benefits the people, the river, and the region. The project has also explored wider ideas of co-design with local

stakeholders to identify interventions that can best satisfy future needs in the context of the “brown to green” transition – meaning the best way of restoring the landscape while mitigating the negative ecological impacts associated with previous industrial land use.

Initial findings from the project were presented and discussed with fellow research teams during a Future Observatory workshop, hosted at the Design Museum in London.

Cultural-Led Regeneration To Help Gateshead Flourish

A Northumbria academic has received levelling up funding to help creative and cultural practitioners bring jobs and greater economic and community activity to Gateshead town centre. Dr Rebecca Prescott, from Northumbria’s Newcastle Business School and Dr Alexander Wilson, Lecturer in Urban Planning at Newcastle University, will use the £165,000 from Gateshead Council’s levelling up fund on a research project called Flourish. The project will build on a 10-year collaboration between Northumbria and Newcastle universities, the National Trust, Tyne & Wear Building Preservation Trust and Gateshead Council. It will also feed into a wider regeneration and revitalisation initiative, the Tyne Derwent Way a 9-mile outdoor trail connecting the centre of Gateshead with the Derwent Valley.

As a multi-disciplinary and collaborative project, Flourish aims to promote a more dynamic and inclusive creative and cultural environment in Gateshead. The research will include a broad range of subjects and methods from, ecosystem-mapping to urban participatory planning. Researchers will work with a stakeholder group of artists, local businesses and other cultural sector entrepreneurs to understand the challenges, opportunities and infrastructures they need to help create a flourishing and prosperous town centre. These stakeholders will also receive bursaries to maximise participation rates and the impact of the research.

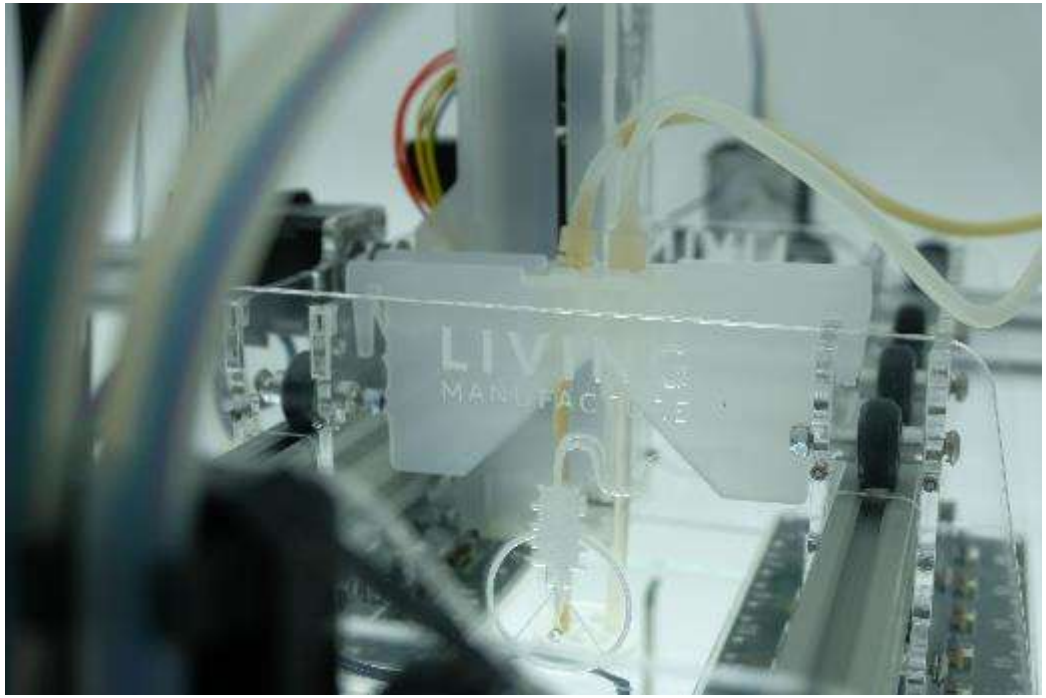
SDG 12 - Responsible Consumption and Production

We are building staff and student awareness of responsible consumption, not only to impact their day-to-day behaviours, but to develop graduates who are the responsible innovators of the future. This is echoed in the work we do with partners beyond the University.

Living Construction - When we think about responsible consumption and production, we can turn to nature for inspiration and, perhaps, directly for new technologies.

The Living Construction group has emerged over the past five years as part of the Research England-funded Hub for Biotechnology in the Built Environment (HBBE) and the Bio future Interdisciplinary Research Theme (IDRT). Led by Prof. Meng Zhang and Prof. Martyn Dade-Robertson, the group consists of bio scientists, engineers, architects, and designers with the grand vision of "Growing Everything."

Consider the construction of a tree. A tree grows using only the resources local to it, absorbed through its roots. With relatively simple building blocks, it self-assembles (without the need for construction workers or blueprints) materials and composites of extraordinary complexity across multiple scales. These materials provide structural support for the tree and enable a range of living functions, such as water transportation and photosynthesis. When the tree reaches the end of its life, these building blocks can be returned to the environment, where biological agents (including plants, animals, and insects) can reuse them as part of their own material assembly.



The Living Construction group is taking this model of production and consumption, engineering new materials and fabrication methods that are not only inspired by nature but also harness nature's extraordinary capabilities for material production. This approach is exemplified by our EPSRC-funded Living Manufacture project (a Northumbria-led collaboration, where we are developing microbial cellulose fabrication. We combine cutting-edge technology—such as a new type of fabrication device we call the Engineered Living Fabricator (ELF)—with biological engineering to modify cellulose as it is grown by microbes. This process enables us to create single materials that function like complex composites. This approach could also lead to new forms of textile production. We are exploring developing the development of sustainable manufacturing methods for a cellulose based textile which utilises raw material effectively, self-pigments and are durable until they need to be decomposed at the end of life. This research will continue with the collaboration with academics from Imperial collage and startup companies such as Modern Synthesis and Colorifix through the BBSRC funded Sustainable Style for Clean Growth project.

While this work points to a nature-driven future of manufacturing, we are also working on applications with more immediate potential developing, for example, new coatings which give the material water resistant and fire retardance without the use of environmentally harmful chemicals. For example, in an EPSRC project led by Dr. Paul James, we are exploring ways to break down textile waste to use as food stock for the development of mycelium-based, leather-like products. Projects like this reframe material manufacturing as part of a 'food chain' rather than a production chain, ultimately creating a circular economy.

Banana Waste To Be Converted To Green Textiles And Energy

Off-grid communities in parts of rural Pakistan could soon have access to a reliable source of electricity for the first time thanks to a new project which aims to convert waste from the banana-growing industry into energy.

Millions of tonnes of agricultural waste is generated in Pakistan every year from growing bananas and other foods. Academics from Northumbria University have now teamed up with partners in the UK and Pakistan to create a new solution which will make use of this waste product and provide benefits for local people at the same time.

The project will be led by Dr Jibran Khaliq, of Northumbria University's Department of Mechanical and Construction Engineering, a material scientist who researches converting waste energy, working in partnership with waste-to-energy company Eco Research Ltd, based in Dudley; and the National Textile University, and biogas specialists Prime Eurotech, both situated in Pakistan Together the project partners are developing an innovative two-part system – the first part of which will use new technology to convert the banana waste into textile fibres, with the second part taking the waste generated from that process and using it to produce renewable energy.

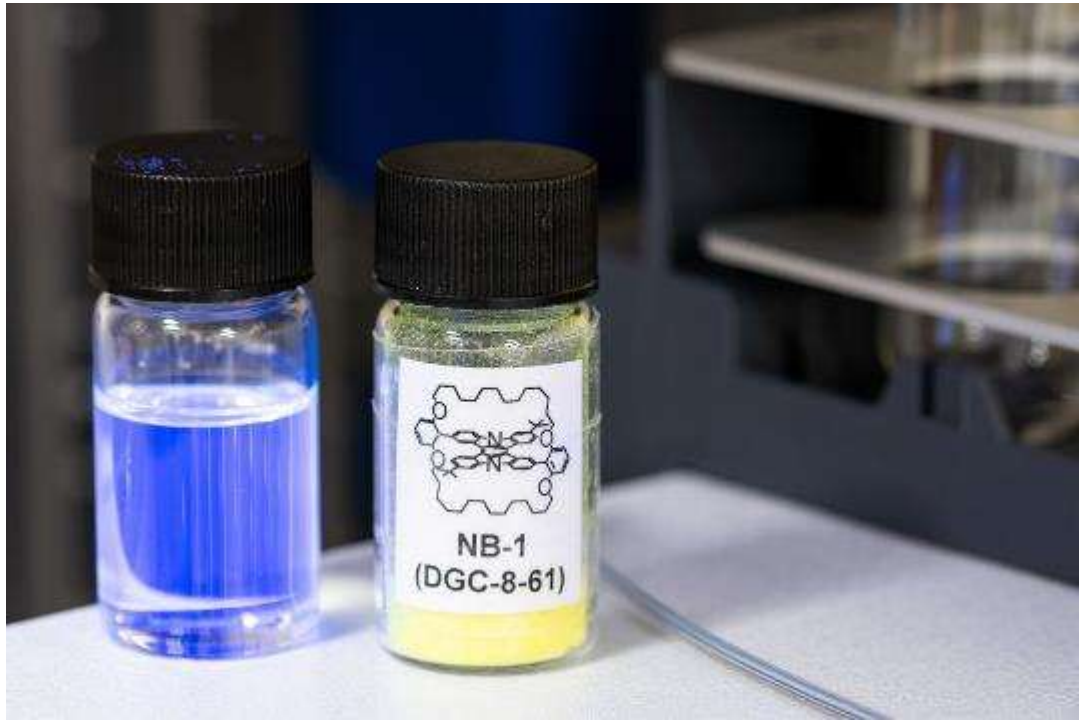
This will not only reduce the environmental impact of Pakistan's textile industry, but also bring clean electricity to the 50% of people living in rural areas of the country who live off-grid and currently rely on fossil fuels for energy.

The process has the potential to be applied to almost any form of agricultural waste, meaning it could be used all over the world, benefitting communities and the environment through the supply of renewable textiles and energy. Entitled, *Improving access to sustainable energy inrural Pakistan using food and fibre agro-waste as a renewable fuel (SAFER)*, the project has been awarded £300,000 though Innovate UK, the UK's national innovation agency, through its Energy Catalyst scheme.

It is estimated that the banana-growing industry in Pakistan produces around 80 million tonnes of agricultural waste every year. This could result in the production of over 57,488 million cubic meters of syngas, or synthesis gas as it is otherwise known, as well as 30 million tonnes of nitrogen-enriched biofertilizers. Syngas is a man-made gas which is created through chemical processes using waste products. It has a wide range of uses and is recognised as a greener way to generate electricity.

Brighter, cheaper blue light could revolutionise screen technology

Northumbria University researchers are specialising in developing new energy materials and systems to help deliver a cleaner, greener future. Using fundamental physics, chemistry and engineering, they are creating new ways of generating and storing renewable energy to help reach net zero targets.



Our researchers have found a new way to simplify the structure of high-efficiency blue organic light-emitting diodes (OLEDs), which could lead to longer-lasting and higher definition television screens. OLEDs are a class of organic electronics that are already found commercially in smartphones and displays and can be more efficient than competing technologies. Although OLED television screens have vivid picture quality, they also have drawbacks such as high cost and comparatively short lifespans.

In OLED displays, screen pixels are composed of three different coloured subpixels – red, green and blue – that light up at different intensities to create different colours. However, the subpixels that emit blue light are the least stable and can be susceptible to screen 'burn-in', which can discolour the screen and ruin viewing quality.

In a paper published in Nature Materials, the team of researchers from Northumbria, Cambridge, Imperial and Loughborough universities describe a new design that overcomes these

issues and may lead to simpler, less expensive systems with purer and more stable blue light. Their findings could lead to TV and smartphone screens using less energy in future, making them more efficient and sustainable.

An OLED is built like a sandwich, with organic semiconductor layers between two electrodes. In the middle of the stack is the emissive layer, which lights up when powered with electricity. Electrical energy goes into the molecules, which then release this extra energy as light.

An ideal OLED turns most of the electrical energy into light, but sometimes the energy gets diverted and degrades the structure of the OLED. This is especially a problem with blue light and reduces both the OLED efficiency and lifetime.

The research team designed a new light-emitting molecule that has shields added to block the destructive energy pathways and control how the molecules interact. With this new molecule, the team have created a channel to develop more efficient OLEDs that will drive down the energy consumption of our devices in the information era. Working towards net zero targets, this could have a significant impact for both manufacturers and consumers, and will contribute to the next generation of blue OLEDs that achieve high efficiency, brightness, stability, and colour purity simultaneously.

SDG 13 - Climate Action

We are committed to delivering education for sustainable development and ensure that all our programmes explore world challenges and seek sustainable solutions - from sustainability in fashion, to tackling global pandemics.

West Antarctic Ice Sheet Has Not Reached Its Tipping Point Towards Irreversible Collapse – Yet, New Research Finds

Northumbria researchers have examined the current state of the Antarctic ice sheet, which reveals no evidence that a tipping point towards large-scale, irreversible collapse has been crossed – yet. The researchers examined whether the Antarctic ice sheet has already reached a tipping point towards permanent unstoppable retreat, and have now systematically analysed this question and found there is no evidence that it has already reached its tipping point. The modelling study – carried out by Northumbria University and several research institutions across Europe – used three different computer models to run a series of simulations to conduct a thorough inspection looking for signs of irreversible retreat of the Antarctic ice sheet in its present form.

Authors of the study say whilst ice loss in Antarctica will continue in the future, these results give slight hope that it might still be possible to avoid or delay crossing the tipping point, if urgent action is taken. The implications are profound. We used three different numerical models which all showed that we have not yet crossed a tipping point that leads to irreversible ice loss in Antarctica. However, the researchers also ran hypothetical simulations to investigate how the ice sheet might evolve if current climate conditions stay as they are. They found that even with no additional global warming, an irreversible collapse of some marine regions of West Antarctica's ice sheet is possible in the future. One of their models shows the earliest that this could happen is within 300-500 years under current conditions, warning that accelerating climate change is likely to shorten this timescale further.

Antarctica's ice masses store enough water to raise sea levels by several metres around the globe and remain one of the greatest uncertainties in future projections of the effects of climate change.

Dr Ronja Reese, Vice-Chancellor's Fellow at Northumbria and report co-author, said: "Accelerated ice loss at the margins of the ice sheet could signal a collapse of larger marine regions. Our experiments show that an irreversible collapse in some marine regions in West Antarctica is possible for the current climate conditions. Importantly, this collapse is not happening yet, as our first study shows, and it evolves over thousands of years. But we would expect that further climate warming in the future will speed this up substantially."

The research forms part of a major £4 million EU-funded study on Tipping Points in Antarctic Climate Components (TiPACCs) bringing together experts from the UK, Norway, Germany and France to investigate the likelihood of abrupt changes in the movement of ice in the Antarctic region.

Northumbria University is home to one of the world's leading groups in the studies of the interactions between ice sheets and oceans. The team of researchers are working to explore the future of ice sheets and glaciers worldwide in a warming world. This involves understanding the causes of ongoing changes in Antarctica, Greenland and alpine areas, as well as assessing future changes and resulting impacts on human environments globally. The studies were conducted with partners including l'Institut des Géosciences de l'Environnement (IGE) at the Univ. Grenoble Alpes, Potsdam Institute for Climate Impact Research (PIK) and Norwegian Research Centre (NORCE).

Cutting-Edge Technology Will Boost Real-Time Monitoring Of Remote Peatlands

Northumbria researchers are developing new ways to monitor carbon emissions from vast swathes of peatland after winning almost half a million pounds to develop new sensors that can be used in remote areas. Peatlands store around one-third of the world's soil carbon, playing a vital role in reducing carbon emissions and combatting climate change. They also provide a unique habitat for rare species and help to minimise flood risks, but when they are cultivated or drained they dry out, releasing their stores of carbon dioxide and other greenhouse gases.

With more than one-tenth of land area in the UK being covered by peatland – in areas such as the Peak District, the North York Moors National Park and Dartmoor – the government is keen to support projects, such as rewetting, to manage and restore them to help the UK achieve net zero by 2050 and tackle climate change. However, it is extremely challenging to measure the effectiveness of efforts to recover peatland. Capturing readings on an hourly or daily basis requires sophisticated and expensive infrastructure which limits the size of the area that can be monitored.

Dr Paul Mann, an Associate Professor in Environmental Sciences, who specialises in carbon cycling and his team will work across the UK to develop low-cost sensor systems that can monitor carbon dioxide and methane emissions from peatlands.

The work will lead to improvements in carbon release estimates in the UK and support the transition to net zero. The team will also test if these solutions are capable of monitoring greenhouse gas changes occurring in extreme locations such as Arctic Canada and Finland.

Sensors will be developed with the ability to work remotely on low power meaning they can be left unsupervised for months, regularly sending back readings to a shared hub. This will allow networks of monitors to be deployed across much larger areas of the UK. The study – known as *GEMINI* – is one of 13 to have received a share of £12 million funding to harness the potential of new sensing and monitoring technologies.

It is hoped that the new services, systems and technologies developed thanks to this funding will be made more widely available for research, government and business use, helping to drive growth and commercial opportunity in the UK.

SDG 14 - Life Below Water

We are taking steps and working with partners to help reduce negative impacts on the world's oceans and waterways.

Seagrass Meadows Are Rapidly Expanding Near Inhabited Islands In Maldives – Here's Why

Northumbria's PhD candidate in Marine Ecology, Matthew Floyd has spent more than three years studying the drivers of seagrass habitat expansion in the Maldives.

These delicate ecosystems stand on the frontline of climate change and seagrass habitats are in crisis globally. As part of the research Mathew uncovered something unexpected: Maldivian seagrasses have expanded three-fold over the last two decades – and island populations could be playing a part. He discovered that seagrass is surprisingly three times more likely to be found next to inhabited islands, rather than uninhabited. So this flowering plant seems to benefit from living in seas close to humans.

Seagrasses grow along coasts all around the world. They can help guard against climate change yet they are frequently underappreciated. In the Maldives, seagrass meadows are dug up to maintain the iconic white beaches that are a frequent feature of honeymoon photos.

Important marine habitats have declined in the Maldives. Amid this backdrop of environmental uncertainty, the research found that seagrasses are faring remarkably well and one of the most plausible drivers could be the supply of nutrients from densely populated areas, such as tourist resorts.

Every day, human activities could provide valuable nutrients for seagrass habitats in an otherwise nutrient limited environment. Food waste is traditionally discarded into the sea from the beach and rain can wash excess fertilisers from farmland into the ocean. As human populations and fertiliser use have both increased, we suspect that seagrass meadows have started to thrive and expand as a result of this increased nutrient supply.

Currently, nutrient inputs seem to be creating just the right conditions for seagrasses. But if nutrients continue to increase, there is a risk that the seagrasses will be outcompeted by seaweeds and smothered. Continued land reclamation works that disregard seagrass may also remove this important habitat. So the future of this Maldivian success story may therefore largely lie in our hands.

Although seagrass removal has done little to curb habitat expansion, it highlights a troubled relationship with the tourism industry upon which so many jobs in the Maldives depend. Because it can ultimately make water depths shallower, seagrass can limit boat access and mooring, and therefore interfere with daily life. The proliferation of seagrass in areas of domestic refuse has

understandably damaged its image in the eyes of the public. But, by making coastal waters shallower, seagrasses reinforce coastal protection. And by growing close to refuse sites, they absorb excess nutrients and clean the water of pathogens. Despite being a vital tool in the fight against climate change, seagrass clearly has an image problem on the islands.

SDG 15 - Life on Land

We are supporting biodiversity and life on land not only through management of our own campus and work with local partners, but we are also making significant impacts though our research expertise and engagement.

Study Reveals Winners And Losers From Climate And Land-Use Change

Northumbria's Dr Andrew Suggitt, Assistant Professor in Ecology, working with the Swedish University of Agricultural Sciences, have determined that as warm-loving species expand their ranges under climate change, Britain's landscapes are losing their biological uniqueness.

The researchers took advantage of the long tradition of biological recording in Britain, combining long-term observations of birds, butterflies and plants with a new map of land-use change and climate data from the Met Office. Like much of the world, Britain has become warmer (and wetter) over the last 100 years. At the same time, the land has been increasingly converted for agriculture and built on for towns and cities.

The new study shows that the average number of species has increased in landscapes across Britain, with the largest gains occurring in the areas where the environment has changed the most.

The researchers maintain that it is not the case that environmental change is good for biodiversity, but rather that as different human activities modify the landscape, it is the same cohort of 'winner' species that are best able to capitalise – and they do so very successfully. This widespread phenomenon has resulted in ecological communities around Britain becoming more similar over time. Chickweed wintergreen (Trientalis europeaea) is a forest species that is declining in Britain despite an increase in forest cover.

The research showed that a retention of semi-natural habitat, particularly grasslands, was important for maintaining biodiversity in our landscapes. We found that the importance of this positive effect of grasslands more than doubled over our period of study.

Humanity For Habitat – Saving Nature At Home

The important role of managing residential gardens and yards to promote biodiversity is the focus of a study led by the U.S. Department of Agriculture Forest Service and co-authored by Northumbria's Dr Mark Goddard, Assistant Professor and urban ecologist.

Published in the journal *BioScience*, "Humanity for Habitat: Residential Yards as an Opportunity for Biodiversity Conservation" the research analysed data on the value of residential outdoor spaces as habitats, and details practical management activities to promote biodiversity. Residential gardens and yards support regional biodiversity, and features within gardens and across neighbourhoods interact and can provide critical habitat for at risk species, including birds, pollinators, and mammals.

Despite the majority of the world's population living in urban and suburban areas, conservation efforts often focus on protected areas, parks, and other non-residential greenspaces, limiting opportunities for the vast majority of residents to participate in biodiversity conservation. Researchers tallied land area in residential gardens and yards, and estimated 30 per cent of all land in the continental United States is classified as residential – four times more area than lands classified as protected.

The importance of gardens for protecting wildlife and connecting people to nature is too often overlooked. In a city like Newcastle, gardens make up around one quarter of the land area. This means that how we design and manage our backyards has a major impact on the plants and animals that live there. Small actions that many of us can make, like reducing the frequency of lawn mowing,

planting a tree, or creating a pond, can scale up to greatly increase wildlife habitat across our towns and cities. Wildlife-friendly gardening can also increase climate resilience and enhance human well-being – it's a win-win-win for people and nature.

SDG 16 - Peace Justice and Strong Institutions

We have significant expertise relating to justice, peace and strong, cohesive communities. These not only form the basis of multiple research strengths but are also key components of our degrees and outreach in areas including law and policing.

Major Funding For Flagship Research Project On AI In Law Enforcement

A Northumbria led research team has received major funding from Responsible AI UK (RAI UK) to investigate the future use of probabilistic AI in law enforcement. Entitled *PROBabLE Futures* – *Probabilistic AI Systems in Law Enforcement Futures*, the 4-year interdisciplinary research project is one of only three RAI UK Keystone projects and has secured funding of £3.4 million (80% FEC).

It will be led by Northumbria Law School's Professor Marion Oswald MBE, in collaboration with a team of multi-disciplinary co-investigators from Northumbria, Glasgow (Michele Sevegnani and Muffy Calder), Northampton (Claire Paterson-Young and Michael Maher), Leicester (Carole McCartney), Cambridge (Adrian Weller) and Aberdeen (Lizzie Tiarks) universities, and a number of law enforcement, commercial technology, third-sector and academic partners.

The launch of PROBabLE Futures was announced at the CogX Festival in Los Angeles – a flagship event bringing together tech industry global leaders, changemakers and policy makers to address the question `how do we get the next 10 years right'.

AI based technologies can deliver measurable benefits for police, courts and law enforcement bodies, helping to tackle digital data overload, identify previously unknown risks, and increase operational efficiencies. But a key problem for responsible AI is that the uncertain or *probable* nature of outputs is often obscured or misinterpreted. AI tools take inputs from one part of the law enforcement system, and their outputs have real-world, possibly life changing, effects in another part. The research will aim to improve data quality and help ensure that we avoid miscarriages of justice.

SDG 17 – Partnerships for the Goals

Showcased throughout this report is our work in partnership with organisations and businesses locally, nationally and globally. Through these Partnerships we can maximise our contribution to the SDGs and best deliver outstanding and impactful teaching and research.

Northumbria's North East Cultural Partnerships ed

Northumbria has joined forces with both Tyne and Wear Archives and Museums (TWAM) – the regional museum, art gallery and archives service which manages spaces such as the Discovery Museum and Laing Art Gallery; and Live Theatre – one of the few UK theatre venues outside of London dedicated exclusively to new work.

The partnerships will support new research addressing some of the key challenges of our times; linking culture and creativity to health and wellbeing, and exploring the benefits of participation in the arts by young people from more diverse backgrounds. They also open up new real-world learning opportunities for students in subjects ranging from creative writing and theatre, through to occupational therapy and early years education.

Northumbria already has successful partnerships with New Writing North, Baltic Centre for Contemporary Art and the British Film Institute (BFI), and the addition of TWAM and Live Theatre will further strengthen the region's cultural prominence.

These partnerships bring particular opportunities to explore the ways in which culture and heritage play a part in supporting health, wellbeing and social care; and to understand how young people from all backgrounds can be drawn into creative activity, such as theatre and performance, to boost their aspirations and broaden their choices.

The partnership with Live Theatre will involve engagement with students on Northumbria's Theatre and Performance and Creative Writing degree programmes, including workshops, modules, and work experience, as well as the unique opportunity for students to observe rehearsals for Live Theatre productions. Collaborative research bids are already being developed focusing especially on the opportunities and benefits provided for young people from all backgrounds by Live's highly regarded Youth Theatre.

The University has also worked with the Baltic Centre for Contemporary Art for over a decade, through the BxNU Institute, which aims to develop new academic opportunities, create applied postgraduate training programmes, contribute to the cultural sector, evidence the value and impact of contemporary art, and support research bidding and collaboration.

Northumbria has also recently joined forces with the UK's biggest screen body, the BFI (British Film Institute) in a partnership which involves projects such as live briefs, masterclasses and curriculum development for arts and humanities students. As part of the collaboration, all Northumbria students and staff are also able to access critically acclaimed classic, cult and archive films online, including specialist collections curated by the BFI.

Environmental Performance Review

Our Environmental Performance Review assesses progress towards our environmental and sustainable development objectives, and in meeting our environmental commitments.

Appendix 1 - Environmental Performance Review

	Target	Deadline	Result for 2023/24	Notes
Environmental Management System	Maintain ISO14001:2015 certification.	2023/24	Ongoing	Successful external audit February 2024.
Energy and Carbon	5% year-on-year reduction in Scope 1 & 2 emissions from 2022/23	2023/24	1.85% reduction	Reduction in Scope 1 gas emissions following commissioning of CCE ASHPs (10% gas reduction).
	Minimum DEC rating of D	2025	Ongoing	For 2023, all campus buildings DEC rating D or above, except Ellison which is rated E.
	80% reduction in scope 1, 2 and 3 carbon emissions from 2015/16	2030	57% reduction	Significant gas reduction following installation of ASHPs to CCE1 & 2.
Waste and Resource Management	15% reduction in total waste produced (tonnes) from 2015/16 (1235 tonnes 15/16)	2030	18% reduction	Total waste 1003 Tonnes 23/24
	2% reduction in total waste produced (tonnes) from 2022/23 (1054 tonnes 22/23)	2023/24	4.8% reduction	
	65% of total waste sent for reuse, composting, anaerobic digestion or recycling	2030	On target	
	41% of total waste sent for reuse, composting, anaerobic digestion or recycling	2023/24	41.6%	49.1% Non-res, 21.4% Res Working with accommodation providers to increase recycling.
	0% of non-hazardous waste sent to landfill (excluding third party contractors)	2023/24	0%	Residual waste sent for energy recovery.

Target		Deadline	Result for 2023/24	Notes
Water Management	40% reduction in total mains water consumption from baseline year 2016/17 (230,592m^3).	2030	32% reduction	
	2% year-on-year reduction in total mains water consumption from 2022/23.	2023/24	5.31% decrease	
Travel	20% reduction in emissions from Business Travel (CO2e) from 2015/16 (4616t CO2 2015/16).	2030	46.4% reduction (2472T CO2)	
Biodiversity	2% increase in metres of space considered medium or high value for biodiversity (m^2) from 2022/23.	2023/24	Baseline Audit completed September 2023.	Biodiversity Net Gain Assessment also completed to support CHASE Planning Application.
	Hedgehog Friendly Campus Gold certification.	2023/24	Complete	Gold Status.
Sustainable Buildings	Average DEC rating of C.	2023/24	**C**	
	All projects to achieve a SKA rating.	2023/24	Ongoing	
	Achieve BREEAM Excellent standard for new build.	2023/24		Standard to be incorporated into CHASE project design process.
Discharges	0 significant spills.	2023/24	0	No major spills

Target		Deadline	Result 2023/24	Notes
Education for Sustainable Development	Determine baseline for number of programmes embedding learning about one or more SDGs.	2023/24	Complete. Repeat survey in 2024/5.	A cross campus working group has been created to investigate links between research, teaching and the SDGs.
	Maintain Sustainability Ambassadors Programme.	2023/24	Ongoing	
Research & Living Lab	Maintain United Nations Academic Impact membership.	2023/24	Ongoing	
	Develop reporting to capture the multiple ways through which our research supports the UN Sustainable Development Goals and to identify any scope for improvement.	2023/24	Ongoing	
Reputation for Sustainability	Top 20 in the People and Planet University League.	2023/24	15th in Dec 2023	Improvement from 17th in 2022
	Top 100 in the THE Impact League.	2023/24	48th in June 2024	Improvement from 79th in 2023