UNIVERSITY OF SURREY



SUSTAINABLE DEVELOPMENT GOALS

Annual Report 2024-2025

SUSTAINABLE DEVELOPMENT GOALS



INTRODUCTION FROM THE VICE-CHANCELLOR

The global challenges we face today require ambitious thinking, collaborative action and a determination to translate knowledge into meaningful change. From climate change and biodiversity loss to health inequalities and sustainable economic growth, universities have a vital role to play in developing solutions that improve lives and create a more sustainable future. It is therefore a pleasure to introduce this latest Sustainable Development Goals Report, which highlights how the University of Surrey is helping to address these global challenges through research, innovation, education and partnership.

At Surrey, sustainability remains central to our purpose and ambitions. Through our strategy, Vision 2041, we are committed to creating positive impact locally, nationally and internationally. We are proud to be recognised amongst the world's leading institutions for our contribution to sustainable development. Our continued performance in the Times Higher Education Impact Rankings reflects both the strength of our research and our commitment to delivering progress against the United Nations Sustainable Development Goals. Alongside this, we continue to equip our students with the skills, knowledge and opportunities to become future leaders in sustainable development, extending our impact far beyond our campus.

Across our institutes and research centres, colleagues are tackling some of society's most pressing challenges. Researchers in our Institute for Sustainability and the Advanced Technology Institute are developing breakthrough technologies including longer-lasting lithium-ion batteries, sustainable thermoelectric materials and innovative approaches to hydrogen production and carbon capture. Our Global Centre for Clean Air Research is helping communities adapt to rising temperatures and improve urban environments, while researchers across our health and veterinary sciences disciplines are improving understanding of cancer screening uptake, dementia care, health inequalities and the impact of climate change on disease transmission. Our newly established Surrey Space Institute is creating new opportunities to address global challenges through space-enabled research–from climate monitoring and environmental protection to resilient communications and disaster response.

We continue to strengthen our role as a catalyst for positive change beyond our campus. Through initiatives such as Together for Surrey, developed in partnership with Surrey County Council, we are helping residents, communities and businesses access practical sustainability advice and support. Our researchers are working alongside policymakers, healthcare providers, schools, businesses and community organisations to ensure that knowledge generated at Surrey delivers tangible benefits in the places where it is needed most. From supporting SMEs through innovation and leadership programmes to helping young people shape safer neighbourhoods and greener spaces, our work demonstrates the value of collaboration in achieving lasting impact.

We are equally committed to ensuring that sustainability is reflected in the way we operate as an institution. Over the past year, we have continued to make progress towards our Net Zero ambitions. We have expanded our sustainable laboratories programme, installed 1,500 solar panels at Surrey Sports Park, which generates more than a quarter of the Sports Park's energy, and strengthened our biodiversity across our campus, launching a new biodiversity trail showcasing the rich habitats within our estate. Recognition through awards such as Guildford in Bloom and the Green Apple Environment Award reflects the dedication of our teams in creating a campus that supports both people and nature. Meanwhile, our efforts to reduce waste, conserve water, increase recycling and improve resource efficiency demonstrate our determination to lead by example.

What stands out throughout this report is the power of partnership and interdisciplinary working. Whether developing technologies that could transform energy storage, exploring cleaner fuels and sustainable aviation technologies, advancing healthcare outcomes or working with communities to build climate resilience, Surrey's success comes from bringing together expertise across disciplines and sectors. This collaborative spirit is one of our greatest strengths and will be critical as we address the complex sustainability challenges of the decades ahead.

I would like to thank all those whose work is featured in this report, and the many colleagues, students, alumni and partners whose contributions are helping to deliver positive environmental, social and economic change. Together, they are ensuring that the University of Surrey continues to make a lasting difference locally, nationally and globally, while helping to create a fairer, healthier and more sustainable future for generations to come.

Professor Stephen Jarvis
President and Vice-Chancellor

CONTENTS

		PAGE
SDG 1	NO POVERTY	04
SDG 2	ZERO HUNGER	06
SDG 3	GOOD HEALTH AND WELLBEING	08
SDG 4	QUALITY EDUCATION	12
SDG 5	GENDER EQUALITY	14
SDG 6	CLEAN WATER AND SANITATION	16
SDG 7	AFFORDABLE AND CLEAN ENERGY	18
SDG 8	DECENT WORK AND ECONOMIC GROWTH	20
SDG 9	INDUSTRY, INNOVATION AND INFRASTRUCTURE	22
SDG 10	REDUCED INEQUALITIES	24
SDG 11	SUSTAINABLE CITIES AND COMMUNITIES	26
SDG 12	RESPONSIBLE CONSUMPTION AND PRODUCTION	28
SDG 13	CLIMATE ACTION	32
SDG 14	LIFE BELOW WATER	34
SDG 15	LIFE ON LAND	36
SDG 16	PEACE, JUSTICE AND STRONG INSTITUTIONS	38
SDG 17	PARTNERSHIPS FOR THE GOALS	40



NO POVERTY

LINKING POVERTY, HEALTHCARE ACCESS AND RABIES MORTALITY

Rabies is considered a disease of poverty yet the connections between economic development and rabies control and elimination have been poorly quantified.

Researchers at Surrey's School of Veterinary Medicine have used models to assess the relationship between healthcare access, poverty and death rate as a result of rabies. Additional indicators were used at country-level – total GDP, health expenditure as a percentage of the total GDP, and the extent and intensity of deprivation experienced at the individual level.

Although there was no detectable relationship between GDP or current health expenditure and death rate from rabies, there were significant relationships between per capita rabies deaths and the probability of receiving lifesaving post-exposure prophylaxis. Thus, those most at risk of not being treated – and dying as a result of rabies – live in communities experiencing healthcare inequalities, measured through poverty indicators.

In order to meet the 2030 goal to eliminate dog-mediated human rabies deaths, it may not be enough to tackle economic growth. Other strategies, such as targeting vulnerable populations and responsible pet ownership, are also needed.

THE UNIVERSITY SUPPORTS STUDENTS FACING FOOD POVERTY BY...

PROVIDING LOWER COST HEALTHY MEALS IN CAFES

FREE END OF DAY SALADS AND SANDWICHES

FOOD VOUCHERS FOR THOSE IN GREATEST NEED

TOGETHER FOR SURREY: A CENTRAL INFORMATION HUB ON SUSTAINABILITY

Together for Surrey is a collaborative initiative between Surrey County Council and the Institute for Sustainability, established as a central sustainability knowledge hub for residents, communities and businesses.

In May 2025, Surrey County Council and the Sustainability Innovation Hub launched this new platform, designed to inspire and empower individuals, communities, and businesses to make more sustainable choices. From saving energy at home to recycling electrical items, the platform offers practical guidance and insights for anyone looking to live or operate more sustainably.

Since its launch, the platform has attracted more than 16,000 visitors, with around 100 users each month actively accessing and benefiting from practical information and signposting to further support.



TACKLING RISING COSTS WITH THE COMMUNITY HUB

To support students struggling with the cost of living, Surrey has a Community Hub offering everyday items at low prices. From homewares and clothing to food and books, students can purchase these items at reduced prices. Items are £1 or 'whatever you can afford'. Unwanted items can also be donated.





2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
23	15	2	12	1.9	259	11.3



VERTICAL SALAD – GROWING FOOD WITH MINIMAL LAND USE

The challenge of feeding the world's population while also keeping a check on its impact on our environment is one that Surrey has been tackling in collaboration with the University of Aberdeen.

Researchers have studied a vertical lettuce farm in the UK, a cultivation technique that involves shelves of crops stacked on top of each other in a controlled environment. The lettuces can grow without soil and are drip-fed with nutrient-rich water.

It was discovered that the farm produces the equivalent of 740g of carbon dioxide per kilo of lettuce – comparable to growing in a field – but used 28 times less land than traditional methods. If all lettuce fields were replaced with vertical farms we could save over 8,000 hectares in the UK, freeing up land for other crops.



8,000

HECTARES OF LAND COULD BE SAVED WITH VERTICAL LETTUCE FARMS

ACHIEVING FOOD AND NUTRITION SECURITY IN MALAYSIA

An article, co-authored by Surrey's Abayomi Balogun, has been published focusing on sustainable solutions to end hunger by 2030 in Malaysia. The researchers investigated the escalation of electricity consumption and its potential effects on food productivity in Malaysia to see if the country has the capacity to achieve food and nutrition security by 2030.

The research concluded that electricity consumption did not support expansion of food production in the country, and therefore the authors recommended that policymakers and stakeholders in Malaysia should emphasise the importance of managing and utilising arable land effectively in order for the country to experience sustainable food production.

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
34	15	5	8	1.0	282	8.3



3 GOOD HEALTH AND WELLBEING

GOOD HEALTH AND WELLBEING

IMPROVING THE LIVES OF THOSE WITH DEMENTIA THROUGH CREATIVE EXPRESSION

Dr Stephen Fay from the School of Arts, Humanities and Creative Industries has been working with the Alzheimer's Society and the 3 Nations Dementia Working Group to establish digital creative expression (CE) tools for people with dementia.

Dr Fay has been investigating such tools since 2020 and has seen how these interventions can improve the lives of people living with the condition. Through the Digital Tools for Wellbeing with Dementia (DoWell) Study, he has shown that digital CE programmes are accessible, inclusive and enjoyable for those with dementia.

As an extension of this, the DoWell+ study worked with a care home group in Wales (Caron Group) to collect user-experience and customer-requirement data from long-term care residents and service managers.

With funding from the ARC Accelerate (ESRC) scheme, he is now working to co-design a dementia-friendly AI-enhanced CE tool for use in UK care homes, with the potential for expansion to other countries and settings.

LINKING DIARRHOEAL ILLNESS WITH CLIMATE CHANGE

How the climate influences the spread of disease has long been discussed, but what environmental factors drive this has not been fully understood. Dr Gianni Lo Iacono, from Surrey's School of Veterinary Medicine, has led a team investigating the impact of weather on the transmission of campylobacteriosis, a bacterial infection that can cause diarrhoea and stomach pains.

Our researchers analysed data from around a million cases in England and Wales over a 20-year period, developing a mathematical model to compare this data from the Met Office with weather parameters at the time. Results showed that incidences of infection were consistent below temperatures of 8°C. However, there was a sharp increase in infection for every five-degree rise in temperature, where temperatures were between 8°C and 15°C. They also established a link between humidity, with high incidents of infection noted when levels of water vapour in the air were between 75% and 80%.

The findings could help predict further outbreaks of the illness, potentially leading to better preparedness within health services.

2024 PUBLICATIONS	COLLABORATION			CITATION IMPACT		
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
412	269	38	91	1.4	4568	11.1

A FOCUS ON THE WELLBEING OF OUR FRONTLINE NHS STAFF

The NHS's nurses, midwives and paramedics are under immense pressure to deliver high-quality care to patients, often in challenging and emotionally taxing circumstances. Researchers at the School of Health Sciences focused on the psychological wellbeing of these frontline workers and how improvements could help revitalise the NHS.

Research found that issues like blame culture, upholding values and a 'serve and sacrifice' ethos can create tensions and impact on staff wellbeing and productivity.

The team launched a guide offering recommendations, aimed at helping these professions thrive at work, for example prioritising basic needs like access to food and rest areas, anticipating psychological health management, and encouraging a culture where staff can speak up without fear of blame.

> "Healthcare work is emotionally complex and takes its toll, with stress and burnout rife. Improving the psychological wellbeing of nurses, midwives and paramedics in the NHS is crucial to retaining staff and allowing them to give excellent care."
>
> *Professor Jill Maben, Professor of Health Services Research and Nursing*



DISCOVERING A GENETIC LINK BETWEEN TYPE 2 DIABETES AND MULTIPLE CANCERS

Why do some people with type 2 diabetes also get cancer? Is there a link at the genetic level? This was the problem researchers at the University of Surrey sought to uncover, led by Professor Inga Prokopenko.

The team looked at data from over 36,000 individuals from several European countries and pioneered a new approach that allowed them to study how genetic variants simultaneously affect all four different health conditions.

The research ascertained that specific genetic variants were key contributors to people developing both type 2 diabetes and some cancers. One variant was linked to the risk of developing both breast cancer and type 2 diabetes, while the other affected type 2 diabetes and breast, colorectal and pancreatic cancer risk. This explains why people carrying either of these genetic variants will have an increased susceptibility to developing both type 2 diabetes and these cancers.

This research could be critical in developing new and more personalised ways to predict, prevent and treat cancers in people with type 2 diabetes, potentially saving thousands of lives. It could also encourage healthcare professionals and people living with type 2 diabetes to be vigilant for the symptoms of cancers so that problems can be detected and treated early.

WHAT HAPPENS WHEN THE ANTIBIOTICS DON'T WORK ANYMORE?

A Pint of Science talk by PhD student Stella Christou explored the global challenge of antibiotic resistance, highlighting its impact on human, animal and environmental health.

The public audience were introduced to the basics of antibiotics while examining the mechanisms of antimicrobial resistance spread between microorganisms and subsequently to the environment. It also addressed the role of wastewater as a pathway for the spread and proliferation of antimicrobial resistant bacteria into water bodies.

By raising public awareness, the talk aimed to inspire more responsible antibiotic use with the aim to safeguard clean water.



MAKING BREAST CANCER SCREENINGS MORE ACCESSIBLE

Surrey researchers sought to understand why Black women are less likely to attend breast cancer screenings than their white female counterparts. Focus groups and interviews were conducted with 47 Black African and Caribbean women aged between 50–71, the age group routinely invited for NHS breast screening, to learn why only 45% of Black women take part in screening compared to 63% of white women.

The study found a need to increase awareness of breast cancer screening. Some women, particularly those born outside the UK, had limited knowledge of breast screening before receiving their first invitation. Others questioned why screening was needed when they had no symptoms. Researchers found that some Black women expected their GPs to talk to them about breast screening, particularly before they reached screening age. Researchers also found that faith and religious beliefs influenced the decision-making of some of the women.

Researchers emphasised that user-friendly, culturally relevant resources developed in partnership with communities, healthcare professionals and screening services could help improve understanding, reduce fear and make breast screening feel more accessible and reassuring.

> “There is no question that breast screening can be life-saving, but we need to make it easier for women to understand, access and feel reassured by the programme. This means improving communication, addressing practical barriers and making sure healthcare professionals and community partners are supported to provide clear and trusted information.”

Dr Robert Kerrison, Associate Professor of Cancer Care at the University of Surrey



4 QUALITY EDUCATION

QUALITY EDUCATION

2023 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
79	38	4	17	1.3	605	7.7

SUPPORTING RESEARCHERS WITH OPEN RESEARCH PRACTICE RESOURCES

The idea of open research may be new to some researchers and it can be difficult to know how to apply open research practices to one's own work.

Professor Emily Farran from the School of Psychology is leading on the creation of a resource document that details open research practice across all disciplines. This has been translated into a series of easily accessible webpages by the UK Reproducibility Network (UKRN).

This resource offers research techniques and resources that are relevant across all disciplines and include case studies, open methods and open data.

PRESERVING AND PROMOTING INDIGENOUS LANGUAGES THROUGH EDUCATIONAL RESOURCES

With half the world's 7,000 languages predicted to be extinct by the end of the century, UNESCO declared 2022–2023 the decade of indigenous languages.

Vanuatu, the most linguistically dense country in the world, has over 130 languages and a population of just 300,000. New Caledonia, its neighbour, has a similar population and 28 languages. This immense linguistic diversity makes vernacular language education a huge challenge.

By focusing on a particular system of linguistic categorisation, researchers from the School of Psychology have helped us understand how we codify human experience through language. As a result, they have combined aspects of psychology and linguistics to create a range of evidence-based educational materials that reflect the unique way these languages function. These materials support the teaching and preservation of vernacular languages in Vanuatu and New Caledonia.

STUDYING TRANSPORT POLICY THROUGH A LIVING LAB APPROACH

Surrey students taking the International Travel and Transport Policy module were offered hands-on experience in implementing sustainable transport policies.

Students evaluated their own travel, then studied existing transport policies in the southeast. They focused on multi-modal and international travel to illustrate their learnings and recommendations, which were presented in a workshop with the Director of Transport for the South East along with other university students in the region.

IMPROVING PRODUCTIVITY AND ADDRESSING BARRIERS TO INNOVATION

Improving productivity has long been a key challenge for the economy in the United Kingdom and is a driver for economic growth. Since the Great Recession in 2008, productivity growth has slowed from 2% per annum to approximately 0.7% as measured by output per hour. If we look at the drivers of productivity, they relate to a long-term decline in investment and training, inadequate diffusion of practice and an absence of joined-up policymaking. For small companies, this is a particularly acute problem because they lack the means of larger companies to invest in innovation yet must adapt to the fast-changing digital economy.

Collaboration through programmes such as Help to Grow: Management is a great way that small businesses can support innovation. The programme launched in 2014 supports growth for small and medium-size enterprises (SMEs) and is 90% government funded.

Surrey Business School are offering this 12-week programme for ambitious SME leaders looking to grow their business, drive innovation, strengthen resilience, and build confidence in their leadership.







ACKNOWLEDGING AND SUPPORTING WOMEN'S ACHIEVEMENTS

Surrey Research Park has been actively supporting women across all sectors. As well as hosting a celebration on International Women's Day, they have recognised the importance of women-only networks. These powerful networks offer tailored support and a safe space for discussion, as well as increasing visibility for its members.

Established in 2023, the Surrey Women's Entrepreneurship Network (SWEN) is an initiative dedicated to curating and creating opportunities for women to foster growth in their ventures and networks. With more than 350 members – and growing every day – from across Surrey and neighbouring counties in the UK, the network is for women entrepreneurs from all sectors and industries. As well as championing women-led businesses, the network also helps women access funding for their own businesses.

OVER

350

MEMBERS OF SURREY WOMEN'S ENTREPRENEURSHIP NETWORK (SWEN)

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
47	23	5	17	1.6	441	9.4

BETTER SUPPORT FOR FEMALE-LED BUSINESSES

Research has revealed that female-led businesses found it harder to bounce back from the pandemic than those run by men. TThis was attributed to women having, on average, less access to external financial resources, weaker positions in professional networks and generally being more exposed to personal constraints, such as school closures.

Data from over 11,000 firms across 34 countries was used and the resilience of these firms was measured by looking at changes in their sales compared to the previous year.

Sorin Krammer, Professor of Strategy and International Business and author of the study from the University of Surrey, said: "Our research underscores the critical need to bolster support for women in leadership, particularly in times of crisis. By providing better access to financial, network and governmental resources, we can fortify the resilience of female-led businesses, empowering them to thrive in testing times."

The study has been published in *The Journal of Business Research*.

REVEALING THE EXTENT OF SEXUAL MISCONDUCT BY SURGICAL COLLEAGUES

A study has revealed that sexual misconduct is rife among colleagues in the UK surgical workforce, with women disproportionately impacted and staff believing organisations are not doing enough to protect them.

Surrey researchers, in collaboration with colleagues from the University of Exeter and the Working Party on Sexual Misconduct in Surgery, analysed anonymous online survey responses from 1,434 participants from the surgical workforce. Most participants – men and women – reported witnessing some form of sexual misconduct. They also found that there is a widespread lack of faith in accountable organisations' adequacy to deal with the issue.

The study's senior author Professor Carrie Newlands from the University of Surrey's School of Medicine said: "Cultural change in healthcare and particularly in surgery is long overdue. It is vital that regulators, colleges, employers and training authorities come together to take a zero-tolerance approach to sexual misconduct and create adequate mechanisms with consequences to deal with perpetrators."

The study was published in the *British Journal of Surgery*.

ATHENA SWAN SUCCESS FOR THE SCHOOL OF COMPUTER SCIENCE AND ELECTRONIC ENGINEERING

The School of Computer Science and Electronic Engineering has successfully achieved an Athena SWAN Bronze Award, recognising solid foundations for eliminating gender bias and developing an inclusive culture that values all staff.

This is the School's first successful submission following the merger of two award-holding departments into one school.

> "Our unified plan ensures our core activities reflect the importance of supporting all colleagues and students. We also look forward to working collectively to achieve our goals."

Professor Helen Treharne, Head of the School of Computer Science and Electronic Engineering

HELPING KEEP FEMALE GPS IN PRACTISE

The conditions that could help female GPs build long and rewarding careers already exist, but they are routinely undermined in everyday practice, according to a new review led by the University of Surrey.

GP appointments have risen by 14% since 2019, and around a third of GPs say they plan to leave the profession within five years. Women make up more than half of the GP workforce, which makes keeping and supporting them a priority for patient care.

Published in the British Journal of General Practise, the review found that female GPs value spending longer with patients and find this kind of care meaningful. However, female GPs also attract more complex appointments as patients expect them to be more empathetic and understanding. That extra time is rarely recognised or rewarded, which lengthens their working hours and raises the risk of burnout.

Researchers identified the conditions that help women thrive, including social support, flexible scheduling, mentoring, positive role models and time for high-quality interactions with patients and colleagues.

The authors recommend that a committee be set up to push for the policy changes needed to support female GPs.

6 CLEAN WATER AND SANITATION

CLEAN WATER AND SANITATION

2024 PUBLICATIONS	COLLABORATION			CITATION IMPACT		
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
35	29	5	2	2.1	847	24.2

HOW SHAMPOO ROUTINES AFFECT HOUSEHOLD WATER WASTE

Published in the Journal of Environmental Management, researchers found that showers account for between 25% and 45% of indoor household water use, making them the single largest contributor to domestic water consumption.

Interestingly, the findings show that in-shower routines and product use play a far greater role in determining shower length than originally thought. The analysis showed that showers involving two or more shampoo applications were around 27% longer than those with a single application. Similarly, showers with three or more pauses in water flow were around 20% longer than those with no pauses. Younger and middle-aged adults also tended to shower longer than people over 50.

> If we want to reduce household water consumption, we need to design solutions that work with people's habits rather than against them. Behavioural nudges, smarter feedback devices and better product design could all play a role in helping people use less water without sacrificing comfort.

Dr Pablo Pereira Doel, Human Insight Lab co-director; Fellow at the Institute for Sustainability; Visiting Fellow, Center for Tourism Research at Wakayama University (Japan)

HIGHLIGHTING THE ENVIRONMENTAL ISSUES OF FRACKING IN INDIA

The drive to produce energy has led to 56 fracking projects being announced across six states in India. Fracking involves injecting high-pressure fluid into shale rock to release natural gas, but has significant environmental impacts, particularly on water resources.

Surrey's Shashi Yadav, from the School of Law, has said that India's plans to scale up its fracking operations without robust regulations could spell disaster for the country's finely balanced water security. His research shows that the country's regulatory framework for fracking is currently based on rules designed for conventional drilling processes, ignoring the specific challenges fracking presents.

Four key issues were highlighted: water contamination by fracking fluids, depletion of local water supplies, handling and disposing of contaminated water that returns to the surface, and fracking-induced earthquakes.

The research warns that India must reassess its commercial scaling of fracking operations and conduct a thorough scientific inquiry into the potential impacts on water resources. Both federal and state-level regulations also need to be examined to ensure comprehensive coverage of all potential fracking issues.



> The potential for a significant environmental crisis is real and imminent if proactive steps are not taken. As India marches towards its energy goals, the balance between energy security and water security must not be overlooked.

Shashi Yadav, School of Law

MAKING THE CASE FOR NATIONAL GUIDELINES FOR RADON IN DRINKING WATER

Radon is a radioactive gas that, when inhaled or ingested in excessive amounts, can cause serious health issues to humans. A study co-authored by Surrey's Professor David Bradley investigated radon levels in commercial bottled water available in Dhaka city, Bangladesh. Although the levels tested in this study were within the recommended limits, the results highlighted the need for setting up national guidelines for radon in drinking water, alongside the monitoring of radon for public health purposes.



TRANSFORMING WASTEWATER TREATMENT

Living bacteria embedded in coatings could clean wastewater, capture carbon and generate biofuels – but only if they survive the manufacturing process. Researchers at the University of Surrey and the University of Warwick have developed a method that keeps bacteria submerged throughout coating formation, increasing the number of surviving cells by around 500 times compared to conventional approaches.

Most sewage treatment already depends on bacteria to break down organic matter and process nitrates and ammonia, but those bacteria are grown in large open tanks that are expensive, space-hungry and slow to respond to changes in load. Applying a metabolically active bacterial coating onto carriers inside a treatment plant could concentrate far more bacterial activity into far less space. The problem has always been keeping the bacteria alive while the coating is being made.

The team adapted a process used in latex glove manufacturing. The bacteria in the new coatings do not merely survive – they remain metabolically active. When supplied with glucose, bacteria in wet-sintered coatings produced ethanol through fermentation, a result the researchers describe as proof of concept for future biofuel applications.



7 AFFORDABLE AND CLEAN ENERGY

AFFORDABLE AND CLEAN ENERGY

SOLAR FARMS IN SPACE

It's viable to produce low-cost, lightweight solar panels that can generate energy in space, according to new research from the Universities of Surrey and Swansea.

The first study of its kind followed a satellite over six years, observing how the panels generated power and weathered solar radiation over 30,000 orbits. Although the cells' power output became less efficient over time, researchers believe that their findings could pave the way for commercially viable solar farms in space.

> "This ultra-low mass solar cell technology could lead to large, low-cost solar power stations deployed in space, bringing clean energy back to Earth – and now we have the first evidence that the technology works reliably in orbit."
>
> *Professor Craig Underwood, Surrey Space Centre*

2024 PUBLICATIONS	COLLABORATION			CITATION IMPACT		
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
238	181	21	17	1.7	5619	23.6

IMAGING SYSTEM FOR MORE EFFICIENT BATTERIES

Working with the UK SME Ionoptika and the University of Manchester, Surrey is delighted to be in receipt of a £3 million grant from the Engineering and Physical Sciences Research Council. The grant will allow researchers and businesses to understand materials at an unprecedented microscopic level using the world's first imaging system – a new Multimodal Ion Beam Imaging Facility.

The imaging system is like a powerful microscope, able to see the tiniest details of materials and molecules. Its use could help develop better medicine and more efficient batteries and solar cells. It may also help us understand pollutants better and develop new ways to reduce climate change.

The facility is expected to benefit more than 25 UK universities and companies in health, energy, technology and engineering.

NEW LITHIUM-ION BATTERY DESIGN COULD PROVIDE LONGER-LASTING POWER

A new battery design that could significantly extend the range of electric vehicles and the lifespan of portable electronics has been developed by researchers at the University of Surrey's Advanced Technology Institute.

The research team developed a new 'Vertically Integrated Silicon–Carbon Nanotube' (VISiCNT) structure. The design grows dense forests of carbon nanotubes directly onto copper foil and coats them with a thin layer of silicon, creating a flexible, conductive scaffold that can absorb expansion while maintaining performance. The resulting anode can store a very large amount of energy for its weight. In laboratory tests, it stored more than 3,500 milliampere-hours per gram – close to the maximum possible for silicon and far higher than the graphite used in today's batteries. It also demonstrated improved stability and performance over repeated charge cycles.

As demand for energy storage grows, batteries will need to store more energy, charge faster and last longer to support the UK's transition to Net Zero. The VISiCNT design offers a promising route to meeting these challenges and could be key to powering next-generation electric vehicles and phones.

HOW WIND TURBINES COULD HAVE PREVENTED NUCLEAR DISASTER

New wind farms can produce energy much more cheaply than new nuclear stations. Now, Surrey researchers have also found that offshore turbines could have averted the 2011 nuclear disaster in Japan by keeping the cooling systems running and avoiding meltdown. It was also discovered that wind farms are not as vulnerable to earthquakes.

Professor Suby Bhattacharya, Chair in Geomechanics at Surrey, said: "Wind power gives us plentiful clean energy – now we know that it could also make other facilities safer and more reliable. The global review finds that greener really is cheaper – thanks to falling construction costs and new ways to reduce wind turbines' ecological impact."

The research was published in the *National Institute Economic Review.*

CAMPUS CARBON DIOXIDE EMISSIONS

19% ↓

EQUIVALENT TO 500 UK HOMES

SUSTAINABLE FLEET MANAGEMENT

Our Estates and Facilities team now operate 45 vehicles, including 12 electric vans, 3 hybrids and 100% electric Citroën Amis.

The aim is for 40% electric fleet conversion and a 40% reduction in greenhouse gas emissions by 2028. Upgrades like vehicle tracking and switching from diesel to more efficient petrol engines are already reducing emissions.

8 DECENT WORK AND ECONOMIC GROWTH

DECENT WORK AND ECONOMIC GROWTH



2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
115	82	6	55	2.0	2084	18.1

INVESTIGATING PAY VARIATIONS IN ADULT SOCIAL CARE

Why do pay differences exist within adult social care? And what are the consequences? These are the questions posed by Surrey's Professor Carol Woodhams and Dr Cécile Guillaume who lead the project funded by a grant from the National Institute for Health Research (NIHR).

The project investigates how pay for adult social workers is impacted by local conditions, such as deprivation and procurement processes led by local authorities. They also looked at the consequences of pay variations on care workers, including their job satisfaction and skill development. Examining these issues is essential if we are to reduce the burden on the NHS, the Surrey team say.

A project steering group, consisting of the Department of Health and Social Care, local authorities, care managers and Patient and Public Involvement representatives, work together to ensure the research findings are widely adopted by policymakers and those working in the sector.

> "Our study is focused on understanding why these pay differences exist. By addressing this, we can work towards better pay, working conditions, and, ultimately, a higher standard of care."
>
> *Professor Carol Woodhams, Professor of Human Resource Management*

REGIONAL SPACE BOOST

The Surrey Space Centre's SpaceCraft programme offered SMEs access to its specialist facilities, making it easier for them to build and test spacecrafts. This reduced barriers to entry for startups and other companies wanting to break into the thriving space sector.

SpaceCraft, which was supported by the UK Space Agency, also sought to help tackle skill shortages in the space industry. The team worked with Alton College to develop the SpaceCraft course, which introduced sixth formers to the basics of space engineering and mission design, aiming to inspire and upskill them.

The course was also adapted to help more experienced engineers to pivot into space

A NEW SUSTAINABLE APPROACH TO ENERGY HARVESTING

A recent study outlines a new way of designing thermoelectric materials using metal–polymer superlattices – ultra-thin layered structures that boost performance while avoiding the cost and environmental impact of conventional materials.

Researchers combined thin metal layers with a widely used organic polymer called PEDOT:PSS – improving performance by up to 100 times compared to the base material.

The research offers a scalable and more sustainable alternative to traditional thermoelectric materials, opening new possibilities for powering everyday devices and even future space missions. The findings also highlight the potential of combining advanced nanostructures with sustainable materials to help tackle global energy challenges – especially the urgent need to recover waste heat, given that roughly 80% of global energy input is lost as low-grade waste heat.

TACKLING STAFF BULLYING AND INCIVILITY IN THE NHS

There are endemic levels of bullying and unprofessional behaviours within the NHS, costing £2.8 billion a year, according to an investigation led by the University of Surrey and funded by the National Institute for Health and Care Research.

Researchers conducted a comprehensive literature review of interventions that aim to address unprofessional behaviours among staff in acute care settings. The study examined 3,000 global sources and found no evaluated solutions to address unprofessional behaviours in the UK.

The study highlights that current approaches largely overlook the unique challenges faced by women, staff from minority backgrounds and those with disabilities. Despite these statistics, the research found that only one existing intervention specifically aims to tackle racism in acute care settings.

The study calls for a more targeted and inclusive approach, warning that without specific focus the experiences of women and minority staff will continue to be overlooked, perpetuating systemic issues in healthcare environments both in the UK and globally.

The research team have developed and presented guidelines to help leaders in the health service tackle unprofessional staff behaviours at work.



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

INDUSTRY, INNOVATION AND INFRASTRUCTURE

ROBOT AID IN NUCLEAR, BUILDING AND DEFENCE SECTORS

Robots that can see beyond human vision, build live 3D maps of unknown environments and identify what objects are made of are being developed by researchers at the University of Surrey, opening new possibilities for application in nuclear inspection, rail and building safety or search and rescue in combat zones.

Unlike conventional cameras, which mimic human vision, the robots are equipped with hyperspectral vision, meaning they can capture information across many more wavelengths, including parts of the infrared and ultraviolet spectra. These cameras record the unique spectral fingerprint of materials, helping robots distinguish rust from dirt, identify suspicious objects or freshly disturbed ground, and even tell visually identical pills apart.

> “The exciting thing about this technology is that we’re effectively giving robots access to information humans can’t naturally see. That could be incredibly valuable in places where people may not be able to safely investigate themselves, such as nuclear sites, damaged infrastructure or hazardous environments.”

Nathalie Hinds, the Institute for Sustainability’s Director of Operations, Innovation and Partnerships

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
156	99	11	29	2.0	3861	24.8

SURREY H2: EMISSION-FREE HYDROGEN

Sustainable production of hydrogen at an affordable cost and scale for heating, cooling and power generation is a fundamental challenge. Industry experts from the University of Surrey have invented, developed and patented an innovative yet simple looping system to produce green hydrogen at unbeatable overall system efficiency.

Combining the reliable aspects of chemical reaction engineering with modern electrochemical science, Surrey H2 offers a patented hybrid water-splitting technology for producing emission-free hydrogen with high efficiency and a reduction in the very high temperature requirements.

INSTITUTE FOR SUSTAINABILITY ANNOUNCES WINNERS OF INNOVATION CONTEST

Surrey’s Institute for Sustainability has announced the winners of its Innovation Contest.

Launched during the Institute’s inaugural Annual Showcase, the contest saw Fellows engage with critical innovation challenges posed by external organisations.

The winning projects included combatting carbon emissions in a hospital trust setting, developing a wood fibre bottle that is recyclable in the paper waste stream, and a project to bring a participatory exhibition to Winchester Science Centre to encourage children’s connection with nature.

The Institute for Sustainability’s Innovation Hub is now working with the winning teams to get the projects underway, facilitating collaboration between scientific experts and partner organisations.

> “The Institute’s Sustainability Innovation Hub [...] an ecosystem that encourages collaborative innovation, with a commitment to turn research into actionable solutions. The Hub is here to support organisation transition to sustainable practices and monitors the impact generated from its innovative approaches.”

Nathalie Hinds, the Institute for Sustainability’s Director of Operations, Innovation and Partnerships

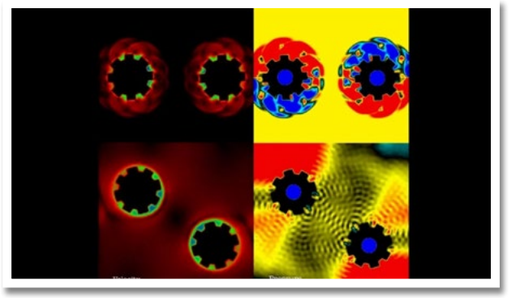
OXYGEN-PRODUCING PAINT THAT CAPTURES CARBON

With the challenges of greenhouse gases in the atmosphere and rising global temperatures, there is an increasing need for sustainable materials. Researchers at Surrey have created an innovative paint that contains oxygen-producing bacteria capable of capturing carbon dioxide.

Researchers suggest this paint, known as ‘biocoating’, could be used in extreme environments, such as space stations. Biocoatings are a type of water-based paint that encase live bacteria within layers. Besides capturing carbon, they can also serve as bioreactors or as biosensors.

Named ‘Green Living Paint’, it features *Chroococcidiopsis cubana*, a bacterium that undergoes photosynthesis to produce oxygen while capturing CO2. This species is usually found in the desert and requires little water for survival.

Dr Suzie Hingley-Wilson, a senior lecturer in bacteriology, said, “Mechanically robust, ready-to-use biocoatings, or ‘living paints’, could help meet these challenges by reducing water consumption in typically water-intensive bioreactor-based processes.”



FROM GALAXIES TO FLOOD DEFENCE: FUNDING RECEIVED TO INNOVATE FLUID MODELLING

Funding has been won from the UK Government’s ICURe programme for a Surrey spinout company that carries out research on computational fluid dynamics methods.

Morpheus Fluid Ltd, led by Surrey’s Professor Justin Read and Dr Linghan Li, can now use their technology to digitally model the flow of fluids like air and water and help businesses design and optimise products in industries as diverse as aerospace and automotive, through to flood defence design and modelling the flow of blood through the body.

Professor Justin Read said: “We’ve reduced the costs normally associated with fluid dynamics modelling by going meshless. Our new technology bypasses this time-consuming step yet still gives highly accurate results. It’s quicker and cheaper, offering our customers the detailed information they need to check if their designs work effectively.”



REDUCED INEQUALITIES

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
66	33	2	26	1.5	667	10.1

WOMEN ENTREPRENEURS – DETERMINING SUCCESS IN A TIME OF CRISIS

In resource-scarce destinations, where the potential for inequality is high, female entrepreneurship drives tourism development. But why do local women engage in business and what determines their success in a time of crisis, such as environmental disasters and the Covid pandemic?

Dr Viachaslau Filimonau from the School of Hospitality and Tourism Management sought to explore this further in a study that has been published in the Journal of Sustainable Tourism. He and his co-authors carried out their research in the Aral Sea region, known for its human-made environmental disasters. They carried out semi-structured interviews with women entrepreneurs in Uzbekistan, where almost 50% of tourism enterprises in the Aral Sea region are run by women.

They concluded that female entrepreneurship in the area is largely motivated by making money, with only a few setting up businesses with the priority of helping local communities. Their success is due to a number of factors, including family support, the role of policymakers and support from NGOs. The research also showed how the pandemic drove many women to self-education, including learning English and attending training events. Understanding these factors can be useful in supporting policies on regional regeneration and poverty alleviation.

CHALLENGING RISKY CEO PAY STRUCTURES

Researchers at the University of Surrey found that companies with more independent board members move faster to correct risky CEO compensation structures.

The study focused on 'inside debt', which includes pensions and deferred compensation awarded to chief executives. The study analysed 6,357 firm-year observations across 942 US companies between 2006 and 2019. Using executive compensation, accounting and governance data, they examined how quickly firms adjusted CEO inside debt towards an estimated optimum level and whether board independence influenced that process.

Researchers found that firms with a higher proportion of independent directors adjusted CEO compensation more quickly towards what they calculated to be the optimal level. The effect was strongest in companies with high growth opportunities, financially unconstrained firms and businesses led by overconfident chief executives where the risks of poor incentive structures are often greater. The findings also suggest board independence mattered more than pressure from institutional investors or major shareholders when it came to adjusting executive compensation structures.

UNDERSTANDING BRAIN HEALTH AND DIVERSITY

Studies have explored the discrepancies between brain age and chronological age to further understand brain health and disease. However, the impact of diversity – including geographical, socioeconomic, sex and neurodegeneration – on the brain-gap is unknown. Dr Daniel Abasolo, Head of the Centre for Biomedical Engineering Sciences, has co-published a paper looking into the disparities in ageing and dementia across geographically diverse populations.

It was discovered that there was an ascending brain-age gap from healthy controls to mild cognitive impairment to Alzheimer disease. In Latin American and Caribbean participants, they observed larger brain-age gaps in females in control and Alzheimer disease groups compared with the respective males. These results were not explained by variations in signal quality, demographics or acquisition methods. As a result of these findings, a quantitative framework capturing the diversity of accelerated brain ageing has been developed.



> "There is a common perception that boards are often powerless when it comes to executive pay, particularly when dealing with influential CEOs. What we found is much more nuanced. Independent directors appear willing to step in and adjust compensation structures when they believe shareholders could be exposed to unnecessary risk."

Bonnie Buchanan, co-author of the study, Associate Dean (International – FABSS) and Professor of Finance at the University of Surrey



11 SUSTAINABLE CITIES AND COMMUNITIES

SUSTAINABLE CITIES AND COMMUNITIES

CHILDREN HELP COOL OVERHEATING SCHOOLS

With heatwaves becoming more frequent across the UK, reaching highs of 36°C in parts of London in June, the 'Heat-Cool' programme designed by Professor Prashant Kumar has shown that children as young as nine can use thermal imaging technology to investigate how heat builds up around their schools, using evidence they gathered themselves to design greener, cooler spaces. In a study published in Environmental Research Communications, researchers led by Surrey's Global Centre for Clean Air Research (GCARE) rolled the programme out to more than 500 children at seven schools across the South East.

The research team analysed more than 1,700 thermal images captured by pupils, covering over 4,300 objects around school grounds. The findings consistently showed that natural, water-based and engineered green infrastructure were typically between one and three degrees cooler than surrounding areas without it, although students favoured infrastructure-integrated solutions such as green roofs.

> "It was a proud moment watching children discover that some of the coolest places around their school were also the greenest. They weren't just learning about climate change in a classroom – they were gathering real evidence, interpreting it and using it to design practical solutions for their own environment. I think this is such a special way to help young people understand both the challenges we face and the role they can play in tackling them."
>
> *Dr Jeetendra Sahani, Postgraduate Research Student*

TACKLING HIGH URBAN TEMPERATURES

The role of rural areas in reducing urban temperatures in Chinese cities has been investigated at Surrey's Global Centre for Clean Air Research (GCARE).

Scientists from GCARE have been looking at satellite data from around 30 Chinese cities that showed how warm the ground was between 2000 and 2020 and how the land was used. Along with a team from Southeast University (China), they could then show how the biggest cooling effects happen where the rural ring around a city extends for at least half the city's diameter.

As warm air rises in a city, it creates a layer of low pressure close to the ground. This sucks cooler air in from surrounding rural areas. This process is greatly shaped by the size of a city and the land cover of neighbouring rural areas.

SHIELDING CARE HOME RESIDENTS FROM AIR POLLUTION

Researchers at Surrey's Institute for Sustainability have studied the effect of air pollution on care homes in the Chinese city of Nanjing. They measured fine particle pollution at various locations in and around the care homes.

The study found that the amount of pollution inside the care home decreased exponentially the further it was from the road. They also found that trees planted between the homes and the road could significantly mitigate the impact of air pollution.

The study concluded that to shield older residents from dangerous air pollution, new care homes should be built as far from heavy traffic as possible and that bedrooms should be kept on the far side of the building where possible.

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
107	89	9	35	2.4	2085	19.3

MEASURING URBAN WELLBEING

Dr Eleanor Ratcliffe, Senior Lecturer in Environmental Psychology and Fellow of the Institute for Sustainability, has been awarded a British Academy Innovation Fellowship.

The Fellowship will enable Dr Ratcliffe to collaborate with Tranquil City, an SME that works with communities, campaigners and volunteers in London to show how city life can be healthy, mindful, slow and environmentally responsible. Together they will develop an Impact Assessment Toolkit (IAT) to measure urban wellbeing.

The IAT will demonstrate the benefits of active travel and green space interventions for wellbeing and sustainable behaviour, especially for communities at risk of health inequalities, and communicate those benefits to public, private and third sector stakeholders, driving the adoption of sustainable development and lifestyle practices at city levels.





RESPONSIBLE CONSUMPTION AND PRODUCTION

CUTTING WATER USE IN SHOWERS WITH LIVE ECO-FEEDBACK

How long do you spend in the shower? How much water do you use? When on holiday, do you know that people tend to use up to 250 more litres of water per day than they would in their own homes?

To tackle water use in the tourism industry, researchers at the University of Surrey have trialled technology in over 17,500 showering events from hotels in the UK, Denmark and Spain. A smart water saving technology known as Aguardio was installed in tourist accommodation shower cubicles and provided continuous, real-time eco-feedback to the user (the length of their shower) through a timer. The technology was used in combination with persuasive messages on a sticker such as 'will you beat the clock?', 'water conservation starts with you,' and 'make a difference!' with a view to test their effectiveness.

Use of this technology reduced shower lengths by up to 25.79% – the equivalent to around 10 litres of (hot) water per event.

> "Our innovative and robust approach emphasises the effectiveness of smart technology to foster resource conservation. This study's outputs, based on actual behaviour measurement, show that eco-feedback can have a dramatic effect on water use and that sustainability communications matter."

Professor Xavier Font, Professor of Sustainability Marketing

MAKE PLASTIC PACKAGING LESS CONFUSING

To study why some people recycle plastics appropriately while others do not, a team from the University of Surrey and Imperial College London surveyed communities at two universities on either side of the Atlantic.

They studied the recycling systems on campuses at Imperial College London and University of California, Davis, carrying out focus groups and surveys to identify the factors that could influence disposal practices. They then applied a method called network analysis, which maps the relations between factors and disposal practices to investigate which aspects might be most influential.

They found that the more knowledgeable about biodegradable plastics and recycling a person was, the more likely they were to dispose of biodegradable plastics alongside food waste. Misleading terminology around biodegradable plastics was a factor, so stricter labelling rules and stronger producer responsibility are needed.

PROMOTING SUSTAINABLE PRODUCTION PRACTICE WITHIN THE PERFORMING ARTS SECTOR

The Theatre Green Book is a collective initiative by theatre-makers in the UK to work more sustainably and has grown to involve the performing arts industry across the world. It is a free resource for anyone in the performing arts sector.

Katy Downton, from the Guildford School of Acting, has conducted research into how the Theatre Green Book has been adopted by UK drama schools, resulting in an academic article published in Theatre, Dance and Performance Training. The article explores the barriers and motivators that impact the implementation of the Theatre Green Book, concluding that pressures of time, leadership and storage were common themes.

She also hosted an online conference focusing on the Theatre Green Book, sharing the skills, knowledge and behaviours that theatre educators need to be instilling in the future workforce to ensure they are work-ready in regard to sustainable production practice.

CARBON CALCULATOR FOR SPA OPERATORS MEASURES EMISSIONS PER VISIT

In a study published in Nature's Communications Sustainability, researchers detail how the Dynamic Emissions Calculator for Spa and Wellness Centres (SPA-DEC) combines live metered data (such as energy and water use) with normalised figures for waste and staff travel, so that a facility's total emissions can be allocated to each individual visit across Scopes 1, 2 and 3 of the Greenhouse Gas Protocol.

The calculator was validated using data from two different and contrasting sites – Therme Bucharest and the University of Surrey Sports Park. A typical visit produced average emissions of around 5 kilograms of carbon dioxide equivalent (CO_2e) at the large facility and around 3.5 kilograms at the small facility. On-site renewable energy reduced these emissions by around 33% and 14% respectively during 2024.

Because SPA-DEC is designed to work with the metered and operational data facilities already collect, the researchers say it can be adopted directly by operators of any size without further development.



2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
124	96	8	39	1.8	2170	17.5

LIVING LAB SUPPORTS INNOVATIVE PROJECT

A social enterprise instigated at Hackathon17 has been awarded £500 seed funding from Surrey's Living Lab to further develop their idea.

Right Side aims to reduce plastic waste whilst tackling the cost-of-living crisis by creating low-cost blankets from single-use drink receptacles. The company is working with campus bubble tea shop, Zenchai, to create a minimum viable product by exploring the new materials that can successfully be made from bubble tea waste items.

The hackathon, organised by Student Enterprise and academics from each faculty, encourages collaborative working, an understanding of global issues, and incorporates a flavour of entrepreneurship as teams create products and services to tackle a variety of problem-statements relating to several of the 17 UN Sustainable Development Goals. Living Lab sponsored a special award for an initiative with strong sustainability credentials and were proud to award the funding to Right Side.

MAKING OUR CAMPUS MORE SUSTAINABLE

We continue to take action to make our campus activities as sustainable as possible.

Reducing waste and repurposing:

- Carpets being reused in low-traffic areas
- Mattresses recycled through external suppliers
- Unwanted furniture and materials are donated to Phyllis Tuckwell Hospice and local schools

Saving water:

- Installed passive infrared sensors to control urinal flushing, saving 60,000m3 of water
- Undertaken leak detection and fixed leaks, saving 28,000m^3
- Continued to draw fresh water from a borehole, saving carbon emissions and loss of water through leaky regional water networks

Diverting waste from landfill:

- Aiming to divert 100% of waste on campus from landfill
- Segregating 'all other waste' from bins for recycling and reuse
- Developed a waste reduction plan aiming for a zero-waste university



91%

OF CAMPUS WASTE IS REUSED OR RECYCLED

EQUIVALENT TO 1,500 UK HOMES PER YEAR.



13 CLIMATE ACTION

CLIMATE ACTION

MONITORING GREENHOUSE GAS EMISSIONS WITH KITE-FLYING ROBOTS

Taking action to achieve net zero in the UK water sector has been given a boost with a £620,000 grant to build new, lightweight gas sensors to monitor gas emissions. The sensors will be attached to helium kites and flown by an autonomous robot.

A major issue is that wastewater treatment systems produce methane and nitrous oxide, both of which have a much greater warming potential than carbon dioxide. Monitoring these emissions accurately and affordably is essential.

This complex project will combine a range of skills from across the University – from fluid dynamics to building robots, analysing data and sensing emissions. Researchers are also working with local businesses – University spin-out company Surrey Sensors Ltd will build the sensors, while Hampshire's Allsopp Helikites Ltd will provide the helium balloons.

TESTING THE NEW WEATHER-HEALTH ALERT SYSTEM

Extreme weather events are of increased concern to the globe, and keeping people informed and prepared is essential. The Sustainability Innovation Hub project team, led by Dr Tom Roberts, Senior Lecturer of Environmental Sociology, provided consultancy services to the UK Health Security Agency (UKHSA) with the primary aim of evaluating stakeholder experience of using the new Weather-Health Alert system.

The project team conducted a qualitative evaluation of user insights from individuals who received the new alerts and used them to guide their responses during heat events. These insights were used to map the alert journey – from issuance by UKHSA to on-the-ground action.

The findings demonstrated that the new Weather-Health Alert system meets stakeholder needs and improves upon the previous system. Stakeholders agreed it effectively supports planning and action during extreme weather events.

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
108	87	10	39	2.2	2976	27.6

TRANSFORMING SURREY INTO A THRIVING PLACE FOR PEOPLE AND NATURE

The University is in the heart of Surrey and is committed to supporting the county and its communities. A workshop hosted by the Institute for Sustainability and Surrey Climate Commission at the University, in partnership with Zero Carbon Guildford, explored collaborative solutions to overcome the barriers hindering transformative progress toward a Zero Carbon Surrey through participatory activities and discussions.

Ahead of the activities, the concepts of Doughnut Economics and the Four Lenses approach were introduced, and questions around increasing resilience in the face of climate change were asked to the participants to provoke thoughts ahead of the discussion.

To answer the question 'How can Surrey be a thriving place, which is home to thriving people, while respecting the wellbeing of all people and the health of the whole planet?', discussions included government initiatives, business opportunities, and community engagements to make Surrey a truly sustainable place. Participants also discussed how participatory democracy enables residents to be actively involved in shaping local policy decisions.

SPEEDING UP THE DEVELOPMENT OF CLEANER FUELS AND ENERGY TECHNOLOGIES

Tiny 'lab-on-a-chip' devices that recreate chemical reactions and allow scientists to observe these previously hidden processes are being developed at the University of Surrey, helping to speed up the development of cleaner fuels and energy technologies.

The miniature systems use renewable electricity to drive reactions, with early applications focused on converting carbon dioxide (CO_2) into useful fuels and chemicals, such as sustainable aviation fuels, ethanol and ethylene – a key building block in plastics and other industrial materials.

Although CO_2 is widely seen as a major contributor to climate change, researchers are increasingly exploring how to capture and reuse it as a valuable resource. However, the chemistry behind these processes is highly complex, making optimisation slow and heavily dependent on traditional trial-and-error methods. The Surrey-developed devices offer a more precise approach, recreating these processes inside miniature electrochemical systems and revealing how the chemistry unfolds in a highly controlled environment.

This level of insight could significantly accelerate the discovery of new materials – reducing both the cost and time needed to develop next-generation technologies for CO_2 conversion, hydrogen production, batteries and fuel cells. While Surrey researchers are initially focusing on CO_2 conversion, the technology has far wider potential. The same sensing platforms could be used to advance a range of sustainable technologies, including batteries, hydrogen systems, ammonia production and environmental monitoring.

> "We can co-design and co-create policies and decisions as citizens, and the trust we have in our political systems and institutions is vital for the democratic engagement we have with all those decision-making processes."
>
> *Professor Theofanis Exadaktylos, Professor in European Politics*

SURREY'S FIRST SUSTAINABILITY WEEK

OVER

500

STAFF AND STUDENTS

24

ACTIVITIES



LAUNCH OF UNIVERSITY'S NET ZERO CARBON BY 2030 PLAN

A SESSION TO NURTURE THE COMMUNITY GARDEN AND INSPECT BEEHIVES ON CAMPUS

BIODIVERSITY WALK

ENERGY-SAVING POP-UPS

GREEN APPLE ENVIRONMENT AWARD

Surrey's Horticulture Team has been invited to accept Green World Ambassador status and have its winning paper published in The Green Book after winning an International Green Apple Environment Award for its circular and close-loop recycling process at the University.

Landscaping waste across the University estate is collected and heaped, shredded and sieved to produce a fine compost, which is used to mulch tree bases and shrub beds across the 120 hectares of the University's campuses. Mulch protects soil from extreme temperature changes and provides plants and wildlife with the nutrients they need to thrive.

Iain Main, Sports and Landscape Manager, said: "Habitat creation and sustainability are having an impact on our campus in many ways, including fostering hedgehog habitats, conserving water, and enhancing the University's environmental impact ranking."

SUSTAINABLE LAB ROLL-OUT CONTINUES

The Laboratory Efficiency Assessment Framework (LEAF) is a sustainable labs accreditation scheme initially set up by 23 universities across the UK. LEAF provides lab users with a framework to address and improve their sustainability practices.

The scheme, launched at the University in November 2023, aims to support labs' sustainable journeys by tackling their high energy and resource rates. During 2023/24, nine labs across the University achieved LEAF bronze awards, with three more achieving silver.

A LEAF steering group, made up of academic and professional services staff across all three university faculties, has been created to continue to deliver sustainable change across all our labs. A key success from this group has been the agreement to launch UniGreenScheme at Surrey. This asset resale service allows universities to buy and sell lab equipment, encouraging reuse and reducing unnecessary waste from our labs.





BREAKING RECORDS AND UNDERSTANDING UNDERWATER NOISE POLLUTION

School of Veterinary Medicine lecturer Hannah Davies and her crew have collected data on microplastic pollution, underwater man-made sound, water temperature, salinity and biodiversity – and achieved a new Guinness World Record at the same time.

The team rowed over 2,000 miles in 50 days, the fastest time a mixed team has taken to row unsupported around Great Britain.

Data gathered from the journey will help to understand the impact of underwater man-made noise pollution. Sound travels much further in water and is used by many marine species to communicate, hunt, find a mate, navigate and avoid predators. Human activity from boats and machinery creates a lot of noise in the sea, which can impact marine animals, causing them to get lost or stranded, fail to find mates and become vulnerable to predators.

"This was not only a truly memorable experience, but we were able to collect vital data that will help support research on the state of our oceans and the conditions of our coastline," said Hannah.

LOOKING AFTER OUR AQUATIC ENVIRONMENTS

The University estate has seven ponds, a brook, cascade and other aquatic environments that it proactively manages. These habitats support a range of wildlife – moorhens, Egyptian and Canada geese, herons, frogs and toads, newts, fish and invertebrates. This is as a result of the maintenance of the marginal plants like reed mace, litter picking, monitoring water levels and condition both during the summer and winter, and health checks of the wildlife.

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
15	10	-	2	1.9	279	18.6



LIFE ON LAND

2024 PUBLICATIONS	COLLABORATION			CITATION IMPACT		
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
31	22	5	9	1.7	327	10.5

ORIGINAL TREE HABITATS ARE BEST FOR BIODIVERSITY

Older tree plantations can be more attractive to animals who are looking for a new home than younger plantations, according to a study from the University of Surrey. In the tropics, older plantations also welcome a greater variety of different plants and animals – though Christmas tree plantations do not become more biodiverse over time.

There are currently 223 million hectares of tree plantations globally. To study biodiversity within plantations, researchers took a recent global map of which year these were planted. They compared that map with a database measuring how many species and individuals lived where.

Dr Zoe Harris, Director of the Centre for Environment and Sustainability and Co-Director of the Institute for Sustainability, said, “Whilst plantations are important for providing products and services, there is a clear limit to the conservation value of plantations. Yet taking into account an area’s natural history and reducing the intensity of management can help encourage biodiversity. Therefore, we hope our findings can help achieve responsible planting that protects nature as far as possible.”

PLANTING ENERGY CROPS WISELY TO MINIMISE BIODIVERSITY LOSS

In a study, researchers from Surrey have shown that where you choose to plant energy crops makes a big difference to biodiversity.

Energy crops can be used for heat, electricity and even biofuels like bioethanol. They will become more important as the world transitions away from fossil fuels. Researchers studied which habitats contained the richest mix of species. They then compared that information with maps of land use and information about where energy crops could produce the biggest yields.

The analysis has shown that planting energy crops on existing agricultural land in places like China and Central Europe could minimise harm to biodiversity compared to planting them elsewhere. Planting in these locations could then allow agricultural land in other places to be restored to natural habitats, maximising the benefits to biodiversity.

However, other factors will also be important when choosing where to plant, including food security, incentives for farmers and surrounding energy infrastructure.

GUILDFORD IN BLOOM GOLD AWARD

The University of Surrey has been named a Guildford in Bloom Gold Award winner for its achievements in the category ‘Nature Champion’ in honour of its conservation work in the southern area of Manor Park campus.

The ‘Nature Champion’ category is open to areas with public access that have nature conservation at their core and focus on protecting and conserving wildlife habitats and species population, while also enhancing connectivity with similar areas.

TACKLING A GLOBAL SHORTAGE OF PHOSPHORUS – WITH HUMAN URINE

We rely on phosphorus for our fertilisers, but within 50 to 100 years we will run out of phosphate rock to mine. This could in turn threaten global food supplies.

A study at the University of Surrey is aiming to tackle a global shortage of phosphorus by extracting it from human urine. Scientists will collect 15 litres of urine from volunteers at toilets across the University’s Guildford campus. They will then extract phosphorus by passing the urine through a special membrane, allowing the water to pass through while leaving the phosphorus on the other side. This energy-efficient process is called forward osmosis. The efficiency of the method will be tested, alongside investigating how best to prevent the urine from clogging up the membrane’s pores.

Although urine is already used as a fertiliser in some rural communities, it is inefficient and costly to transport because it is made of 97% water. For that reason, concentrating the urine using this technique could be more effective.



LEAVING OUR HABITATS UNTOUCHED

The University has a range of habitats, from chalk grass downland and arable fields to ancient woodland and recreational parkland. Within these habitats areas are left to encourage wildlife corridors, particularly for invertebrates and pollinators, which are essential for the maintenance of habitats and the wider food chain of birds, reptiles and mammals.

Grassland remains unmown during the spring and summer and mown down in the autumn on a rotational method to minimise the impact to the wildlife that reside in them, with some machines being electric.

During 2023/24, biodiversity surveys within these areas showed an increase in the number of pollinators from bees to butterflies. More research is needed to see what the long-term underlying trend is and what gain there may be in the management change. In woodland and some urban areas, we have log piles that have been built by University community projects to provide locations for breeding and safety, resulting in stag beetles being found.

BIODIVERSITY TRAIL LAUNCHED ON CAMPUS

A new biodiversity trail has been unveiled across Stag Hill campus, inviting staff, students and visitors to slow down, explore and discover more about our wildlife and green spaces. The trail currently features 10 locations, each celebrating a different aspect of biodiversity, habitat creation, wildlife or natural landscape management.

Importantly, many of the areas highlighted along the trail demonstrate how campus grounds are being managed differently to better support biodiversity. In some places, this may mean allowing grass to grow longer, reducing mowing frequencies, or creating more natural habitats that provide food and shelter for wildlife throughout the year.

Sustainability and reuse have been at the heart of the project from the very beginning. The large timber installations used throughout the trail have been created by repurposing trees from our own campus estate that had to be removed for horticultural and safety reasons.

In the coming months, there are plans to expand the experience further through the introduction of additional walking routes around the estate, which are currently being developed in partnership with Team Surrey at Surrey Sports Park.



16 PEACE, JUSTICE AND STRONG INSTITUTIONS

PEACE, JUSTICE AND STRONG INSTITUTIONS

2024 PUBLICATIONS	COLLABORATION		CITATION IMPACT			
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
72	38	5	25	1.4	665	9.2

INTEGRATING SUSTAINABILITY IN HIGHER EDUCATION TEACHING

Two book chapters, authored by academics from the Surrey Institute of Education, take a deep look at sustainability in institution-wide curricula. They focus on how education for sustainable development can become a powerful mechanism for developing graduates and university staff to address interconnected global socio-environmental challenges.

Integrating sustainability in institution-wide curricula is widely championed to help address sustainability challenges such as climate change, biodiversity loss and growing inequalities. Empowering teaching staff to successfully integrate sustainability into learning, teaching and assessment is required to achieve this.

A whole-university commitment to sustainability integration in Higher Education is required, with a fair distribution of responsibility among all stakeholders, making the institutions accountable and inclusive at all levels.

CAREERS SERVICE'S ETHICAL CODE OF PRACTICE LAUNCHED

The University's Careers Service have released a code of practice for ethical careers activities. The document sets out the team's aim to partner specifically with companies and organisations actively reducing their carbon footprints and negative sustainability impacts.



YOUNG PEOPLE LEAD PRACTICAL COMMUNITY SAFETY IMPROVEMENTS

Supported by a project evaluated by the University of Surrey, young people across Surrey have been working with local police and community partners to improve safety and reduce low-level crime in their neighbourhoods.

Positive Futures involved young people aged 11 to 15 in Sunbury-on-Thames, Woking and Tadworth, where there were concerns about trust in the police or ongoing issues such as vandalism, drug use and littering. The project helped young people identify local problems and propose realistic solutions, working alongside neighbourhood officers, school staff and youth workers.

Participants suggested practical improvements, including better lighting and CCTV around underpasses, defensive planting to prevent access to closed areas, clearer signage in parks, and more bins to reduce littering.

A full evaluation report has been published open access. The project team is exploring next steps and the potential to expand Positive Futures to more areas.

BRINGING RESEARCH TO THE FOREFRONT OF POLICYMAKING

The University launched the Surrey Policy Network to strengthen academic policy engagement with local, national and international government bodies. The function provides direct support, upskilling academics and facilitating collaborations to ensure academic expertise contributes to the benefit of society and shapes stronger institutions and governance structures across the globe.

The Surrey Policy Network has supported a range of policy engagement workstreams, including working with the Institute for People-Centred AI and the Institute for Sustainability to advance policy work with governments in shaping the governance and regulation of AI and the embedding of sustainability across government policy through systems thinking.

The Surrey Policy Network has also supported undergraduate students in politics who experienced an informative Policy School, with four weeks of learning and interactive challenges led by the UK Government's Open Innovation Team. The students learnt policymaking processes and considerations when making decisions to shape fair, inclusive and effective national policy.

> "Being involved in Positive Futures gave young people a real say in what happens in their neighbourhoods. They saw that their voices matter. For police and community organisations, listening to and acting on what young people tell us helps build trust."
>
> *Professor Jon Garland, Professor of Criminology*



ENGAGING TALKS FOR A SUSTAINABLE FUTURE

The University has supported talks and webinars that aim to tackle the climate emergency.

A webinar titled 'Green Urban Legislation in the US and Digital Tool to Support Green Infrastructures' discussed Environmental Protection Agency recommendations for urban green infrastructures and air quality and digital tools that support science-driven green infrastructure designs and community actions. Surrey's Professor Prashant Kumar welcomed attendees and, following talks by Dr Richard Baldauf and Professor K. Max Zhang, the floor was open to questions.

The Institute for Sustainability joined forces with the Surrey Climate Commission to support a talk for community members called 'What's Stopping Us Stopping Climate Change'. Speakers included former Chair of the Climate Change Committee, Lord Deben, and Green Party peer, Natalie Bennett.

17 PARTNERSHIPS FOR THE GOALS

PARTNERSHIPS FOR THE GOALS



2024 PUBLICATIONS	COLLABORATION			CITATION IMPACT		
SCHOLARLY OUTPUT	INTERNATIONAL COLLABORATION	CO-AUTHORSHIP WITH LOW OR LOWER-MIDDLE INCOME COUNTRIES	POLICY CITATIONS	FIELD-WEIGHTED CITATION IMPACT (FWCI)	CITATION COUNT	CITATIONS PER PUBLICATION
1128	750	91	242	1.7	17530	15.5

COLLABORATING FOR ENVIRONMENTAL SUSTAINABILITY

Surrey Research Park's ESG Working Group enables representatives from businesses at the Park to collaborate and share expertise on matters relating to environmental sustainability within the community. It is also a way for the Park's strategic partners and third-party organisations to communicate and engage with community members on environmental matters.

For example, having discovered that the park stretch of the A3 suffers from high levels of air pollution, the group is collaborating with the Global Centre for Clean Air research at the University on a clean air project.

SURREY – CATALYST FOR A UK GREEN JOBS BOOM

Over 200 local firms, academics and sustainability professionals attended an event hosted by the Institute for Sustainability to learn how to improve the environmental impact of their businesses.



AN ENERGY PARTNERSHIP TO REDUCE CARBON EMISSIONS

The University has major plans to reduce its scope 1 and 2 carbon emission by 2030 and has developed an 8-point plan to set out how it will deliver this.

To help deliver parts of this plan, the University has entered into an energy partnership with Scottish and Southern Energy (SSE). This includes helping survey and identify carbon reduction opportunities and designing, funding and installing zero carbon facilities such as a 12 MW solar farm and energy centre to help decarbonise heating. The first project in the partnership will be a 700kw solar array at the Surrey Sports Park.



SURREY HILLS ENTERPRISES EDUCATION PARTNERSHIP

Businesses across the county of Surrey can now access world-class training courses, student placements, academic expertise, and UN-affiliated certification thanks to a new partnership between the University of Surrey and Surrey Hills Enterprises (SHE). The new partnership has also committed to engage in research collaborations during the year-long pilot that runs to March 2027.

The one-year pilot is designed to give Surrey-based firms practical access to a university on their doorstep, collaborative and research opportunities for staff and real-world commercial problems for students to work on. SHE members will be able to take up a range of funded or discounted places on university short courses, including sustainability training run by CIFAL Surrey, a United Nations Institute for Training and Research affiliated centre hosted by Surrey's Institute for Sustainability, offering both training and certification.

> "The University of Surrey is an anchor institution for the county of Surrey, and that should mean something concrete to the businesses around us. A student who spends a summer solving a supply chain problem for a local producer gains vital insights that bring to life their in-classroom learning and comes away with experience that employers actually value."

Professor Amelia Hadfield. Director, CIFAL Surrey. Co-Director of the Institute for Sustainability. Associate Vice-President for External Engagement. Founding Director, Centre for Britain and Europe.



UNIVERSITY OF SURREY
Guildford, Surrey GU2 7XH, UK

facebook.com/universityofsurrey
X: @uniofsurrey
youtube.com/universityofsurrey
instagram.com/uniofsurrey

surrey.ac.uk

UNIVERSITY OF SURREY

Published in November 2026