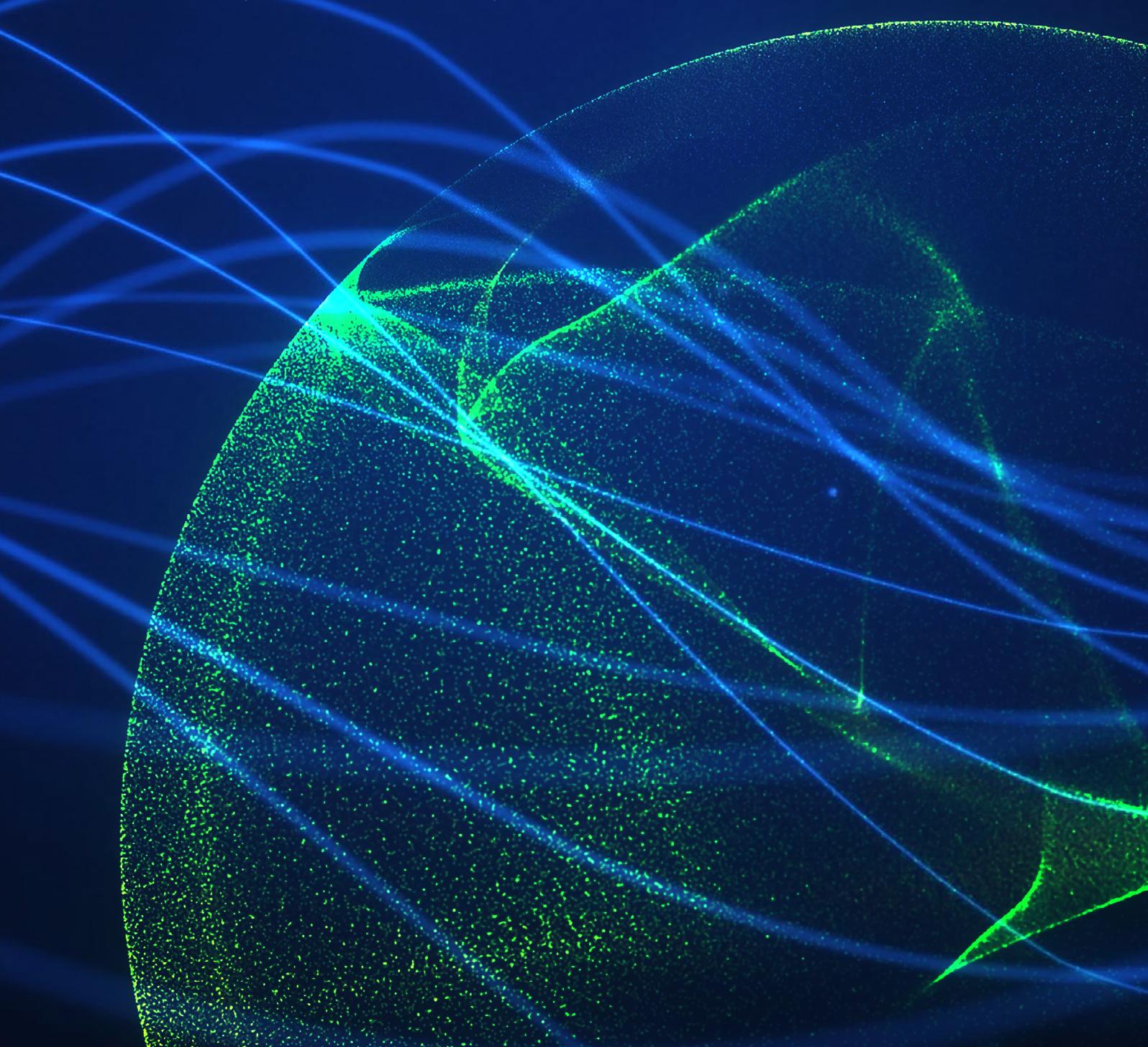


Building the energy systems of tomorrow

Clean tech research, innovation for
sustainability, and the journey to net zero



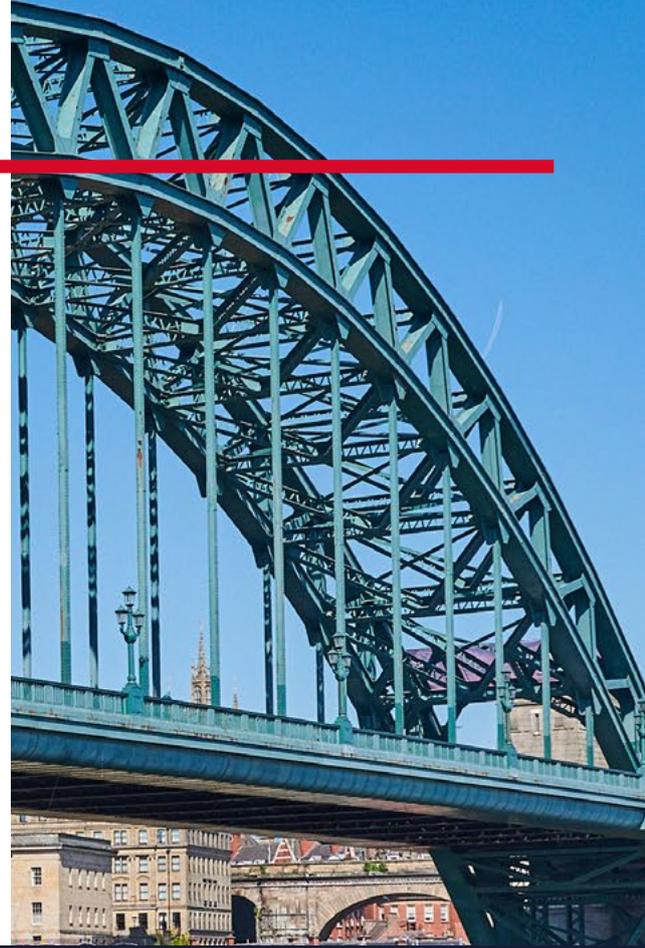


Pioneering solutions at Newcastle University

Our origins date back nearly 200 years to 1834, when we were founded to support the North East of England during the Industrial Revolution. That commitment to public good remains central to our mission today.

Now a global university, we work with communities, businesses, and partners across the world to co-create solutions that shape lives and change the world.

A key focus of our work is in clean tech, net zero, and sustainable technologies. As global energy demands grow and natural resources are stretched, it has never been more important to develop sustainable systems that protect the planet and support future generations.



As a global civic University, we are committed to delivering economic, social, and cultural benefit to society through our research, our education, and our operations, in Newcastle and the North East, nationally, and around the world.

Professor Chris Day CBE DL
Vice-Chancellor and President



A global strategic partnership to make clean hydrogen a reality

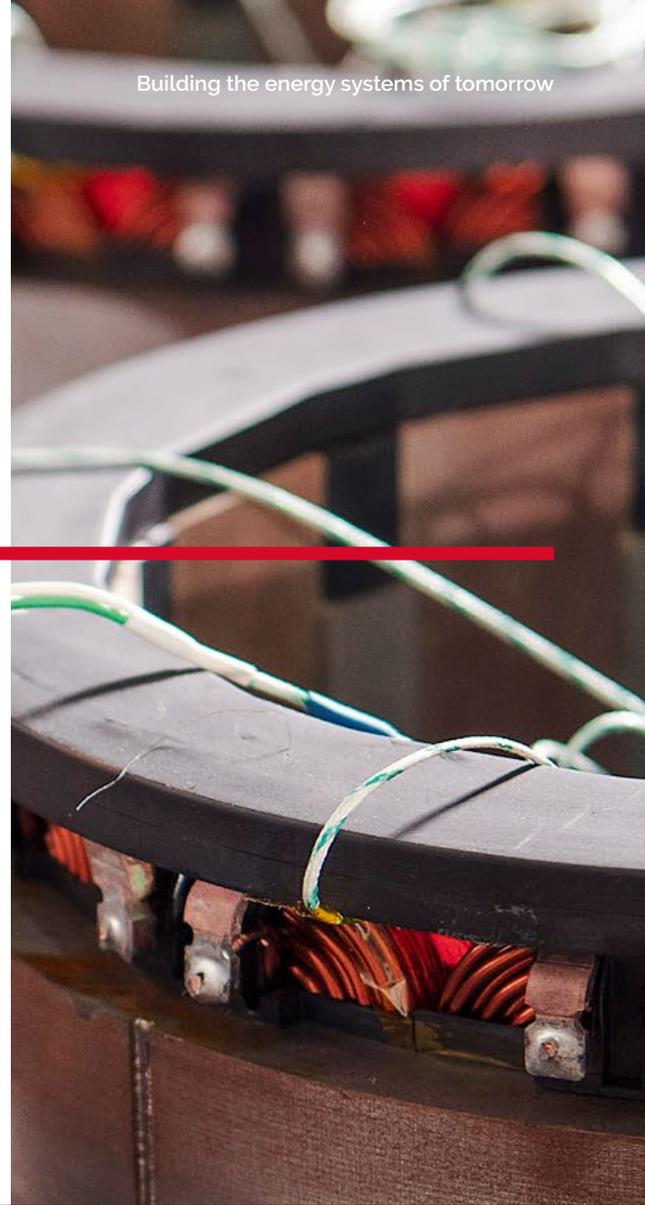
We are leading an international collaboration focused on translating hydrogen research into transformative, scalable practice. Building on shared expertise in the UK and the Kingdom of Saudi Arabia, we are actively inviting investors, new countries, institutions, and businesses from all backgrounds to join us.



Over 30

academic, industrial,
and governmental
partners

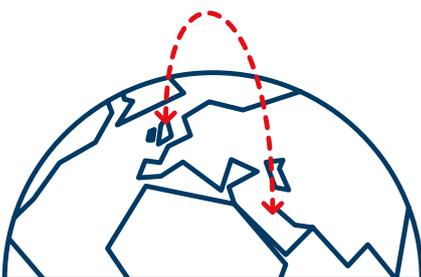




Together with academic, industrial, and governmental partners, we are working across:

- low-carbon hydrogen production
- efficient transport and storage infrastructure
- industrial applications and demand stimulation

This multi-year programme is a growing, international initiative aiming to accelerate the translation of hydrogen research into scalable, commercially-viable solutions – driving innovation, creating high-quality jobs, and supporting sustainable energy systems and long-term economic growth.



This partnership will accelerate the development and deployment of clean hydrogen technologies at scale. By combining academic, commercial, and policy expertise across production, infrastructure, and industrial application, we are not only advancing the science, but we are also building the foundations for a global hydrogen economy.

Professor Roberto Palacin
Academic Director for Electrification

Expanding expertise in chemicals, biosciences, process industries and renewables

The chemical sector is a major contributor to the UK economy, with an annual turnover of £65.5 billion. To support organisations in this area, we are educating the next generation of experts and promoting sustainable practices by sharing knowledge with stakeholders.

Centre for Doctoral Training in Process Industries: Net Zero

We are leading an £11 million programme to train 55 PhD researchers in process intensification and green chemistry. Delivered in partnership with the University of York and more than 25 industry partners, every research project is aligned with the leading edge of industry and practice. As part of the UK's largest investment in engineering and physical sciences doctoral skills, researchers will be equipped for careers that drive sustainable innovation across the process industries.

Great British Chemicals

Bringing together researchers from 10 universities, Great British (GB) Chemicals is helping replace fossil petrochemicals and recycling industrial waste using sustainable chemistry. The team collaborates with stakeholders to produce cleaner versions of the chemicals that we depend on in our modern lives, to reduce pollution, ensure resilience, and secure economic sustainability.

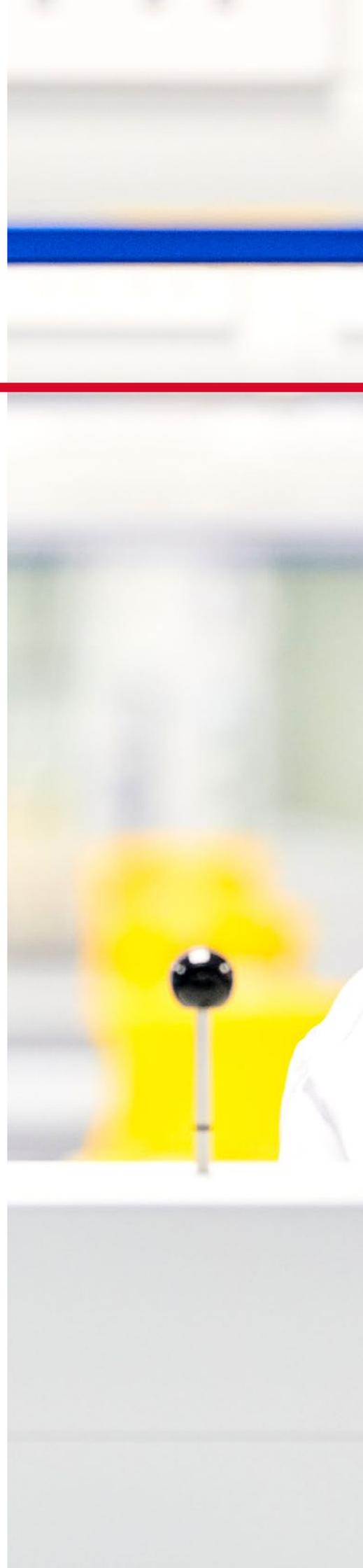
Read the full story:



'Based on their research and training, our graduates will become architects and leaders in the transition to net zero for process industries in the UK.'

Professor Adam Harvey

Co-Director of the Centre for Doctoral Training in Process Industries: Net Zero





Renewable Energy Northeast Universities

The EPSRC Centre for Doctoral Training in Renewable Energy Northeast Universities Plus (ReNU+) aims to train a new generation of Doctoral Carbon Champions. Characterised by scientific and engineering excellence, they are capable of interdisciplinary systemic thinking to accelerate net zero. The Centre runs across Northumbria, Durham and Newcastle Universities.

Bioscience for Sustainable Consumer Products (BISCOP)

The BISCOP Collaborative Training Partnership leverages partnerships that span industry and academia at the forefront of the field. It is an inclusive, collaborative environment for high-quality doctoral training. Started in 2022, the partnership aims to equip 47 PhD students with the knowledge and skills they need to lead the translation of research into sustainable consumer products that have economic and societal impact, both in the UK and globally. The partnership runs across Durham and Newcastle Universities.



Carbon is embedded in almost every manufactured product. If we want to cut pollution, improve health outcomes, become more resilient, grow the economy, provide jobs and keep products affordable, we need to urgently accelerate the deployment of smarter technology that keeps carbon in use rather than digging it up and then discarding it.

Professor Libby Gibson
Professor of Energy Materials

Research strengths and successes

Known for their interdisciplinary approach, our Centres of Research Excellence drive discovery and innovation across sectors. We work closely with global partners, industry, and communities to translate our discoveries into real-world impact and meaningful change.

CO₂ removal through Direct Air Capture

Our research on advanced gas separation technologies has developed the first synthetic membrane that uses natural humidity differences to extract CO₂ from the air, without relying on traditional energy inputs like heat or pressure. Direct Air Capture will be a key component of the energy system of the future, capturing emissions from mobile, distributed sources of carbon dioxide that cannot easily be decarbonised in other ways.





Energy conversion and storage

We are advancing knowledge of fuel cells, electrolyzers, and batteries to support clean energy conversion and storage. In parallel, our work on membrane technologies and electrocatalysis is transforming water purification, making it more energy-efficient and scalable. From green hydrogen production to wearable energy materials, we're developing scalable technologies that stabilise renewable energy and enable low-carbon solutions.

Decarbonised Adaptable and Resilient Transport Infrastructures

We lead the UK's National Hub for Decarbonised Adaptable and Resilient Transport Infrastructures. This major initiative brings together universities, industry, government, and civic partners to rethink how transport systems can support net zero. Our research is shaping future infrastructure that is low-carbon, climate-resilient, and responsive to changing societal needs.

Explore the work of our Centres of Research Excellence:



Insight and analysis for clean tech innovation

Our research facilities combine world-class equipment with deep technical expertise to support research and innovation in clean technologies. Through collaborative, expert-led services, we deliver high-impact analysis that drives progress in clean energy, advanced materials, and environmental solutions.

We have core strengths in material and surface analysis, both essential for developing next-generation energy systems. Using advanced techniques such as X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), and atomic force microscopy (AFM), we uncover insights for discovery and impact.

Invest in emerging technology

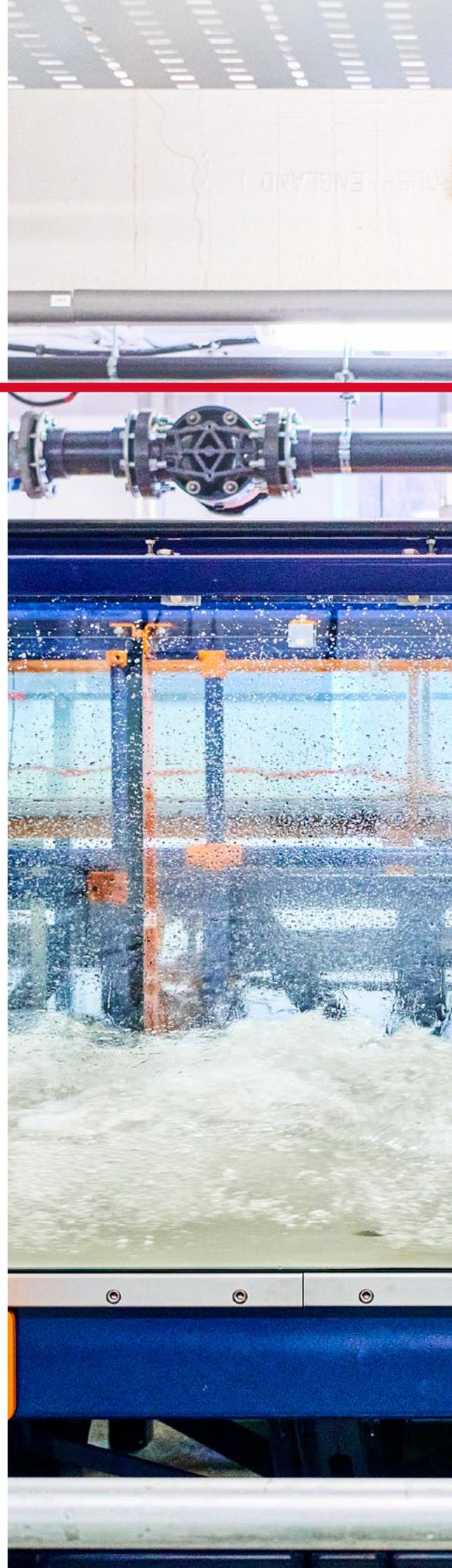
Sometimes the best way for us to have a positive impact is to license our intellectual property to others. By working together, we can make a difference to products, organisations, and lives around the world.

Key areas

You can develop or invest in emerging technologies that are supporting clean growth, electrification, and the transition to net zero, including:

- real-time water quality monitoring technology to improve environmental controls and outcomes
- enhanced capacity and efficiency of AC/DC/AC power converters to better manage power flows and reduce infrastructure costs
- water-based adhesive that can boost recycling potential and support a zero-waste economy
- a new method for cheap and efficient hydrogen production that supports the water-gas shift process
- cost efficient and scalable membrane-less water electrolyser for hydrogen production
- reduced levels of combustion particles using cost-effective non-thermal plasma agglomerator technology
- temperature sensitive smart coating for detecting thermal runaway in lithium-ion batteries

Explore intellectual property licensing:





Led by Newcastle University, the Accelerator drives innovation in low-carbon energy, storage, and end-use integration to decarbonise the North East of England.

It connects academic excellence with industry insight, supporting early-stage technologies, translational research, and commercialisation.

By fostering collaboration across sectors, the programme is accelerating the deployment of scalable solutions for a net zero future.

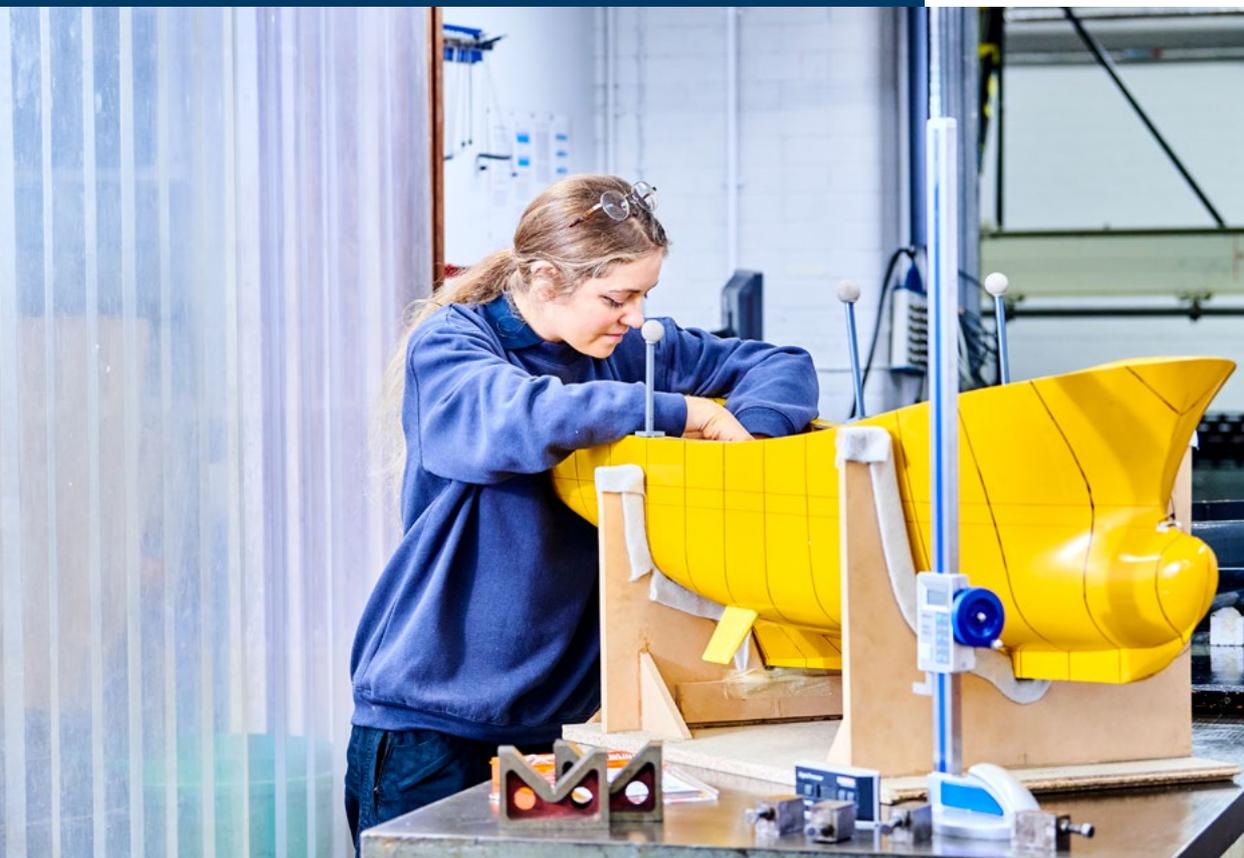
Spin-outs and start-up companies

When a discovery shows commercial potential, we create a spin-out company to bring it to market. These ventures transform Newcastle University's intellectual property into real-world impact. Our students also create start-up companies each year to bring new products and services to market.

Among our spin-out and start-up companies are several working in clean technology and sustainability, including:

Clean transport and circular economy

- **Advanced Electric Machines** – spun-out in 2017, AEM's electric motors are used in commercial vehicles across the UK, Europe, North America, and APAC. AEM's technology reduces environmental impact, improves recyclability, and supports the global shift to sustainable transport
- **Recovolt** – developed from PhD research, Recovolt's novel battery discharge system uses intelligent power electronics to discharge multiple lithium-ion batteries simultaneously, reducing fire risk and enabling energy recovery





Advanced materials for net zero

- **Dragonfly Insulation** – developed by scientists at Newcastle University, Dragonfly's advanced materials offer exceptional thermal insulation and are used in sectors ranging from aerospace to construction. As the UK's sole manufacturer of ultra-lightweight, fire-resistant silica aerogels, the team is scaling production to meet growing demand

Water and resource recovery

- **METZero** – developed from expertise in our School of Engineering, METZero helps water companies decarbonise by recovering energy and resources from wastewater using naturally occurring microbes instead of energy-intensive aeration. MetZero is now scaling its technology through commercial pilots with major UK water utilities

Renewable energy systems

- **Kinewell Energy** – emerging from PhD research, Kinewell's software optimises offshore wind cable layouts, reducing costs and improving efficiency. Their KLOC tool – Kinewell Layout Optimisation of Cable – is being used in projects worldwide to accelerate the deployment of clean energy infrastructure

From campus to company: how and why we create new businesses:



Developing professional skills and nurturing talent

Our mission is to provide all our students with an education for life – one that engages, challenges, and supports them to fulfil their potential throughout their career.

From undergraduate degrees to professional training and degree apprenticeships, our programmes are shaped by research excellence and industry insight. We work with partners to ensure learners are exposed to cutting-edge research and the leading edge of industrial practice.





Institute of Electrification and Sustainable Advanced Manufacturing (IESAM)

We provide flexible, high-quality training designed to meet industry needs and accelerate innovation in electrification and advanced manufacturing.

Our programmes align with key sectors – renewables, transportation, and advanced manufacturing – and focus on enabling technologies such as Power Electronics, Machines and Drives (PEMD) and battery systems.

What we offer:

- **Degree Apprenticeship:** level 6 BEng Product Design & Development Engineer with specialist electrification streams
- **Continuing Professional Development (CPD):** short courses and bespoke modules to support upskilling and reskilling
- **industry guidance:** signposting training opportunities at all technical levels, from beginner to expert
- **career resources:** information for advisors in schools, colleges, and job centres to inspire future talent

By connecting education with industry insight, IESAM ensures organisations and individuals have the skills to drive sustainable innovation and meet the demands of electrification

Building skills for solar innovation

We are a key partner in the Network+ for Sustainable Solar Energy Systems, an interdisciplinary initiative developing the skills and knowledge needed to support widespread solar deployment.



To truly future-proof the global workforce, we must create flexible, inclusive pathways that empower individuals at every stage of life to upskill, retrain, and thrive in a rapidly evolving world.

Professor René Koglbauer
Dean of Lifelong Learning and Professional Practice

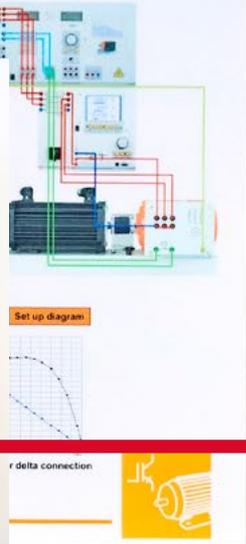
Working in partnership

We are committed to addressing pressing problems through collaboration. By working in partnership with organisations locally, nationally, and globally, we can combine expertise, drive innovation, and find sustainable solutions faster.

Reducing water consumption and lowering energy demand

The FairWater project brings together a powerful consortium. Led by Northumbrian Water, with partners including Newcastle University, National Energy Action, Procter & Gamble, and Northern Gas Networks, the shared goal is to help UK households reduce water consumption, lower energy emissions, and cut utility bills.





Routes to net zero through energy system integration

Newcastle University is a top-tier global partner for Siemens and its Research and Innovation Ecosystem (RIE). This strategic collaboration works across areas including energy systems integration, offshore wind, electrification, and data science.

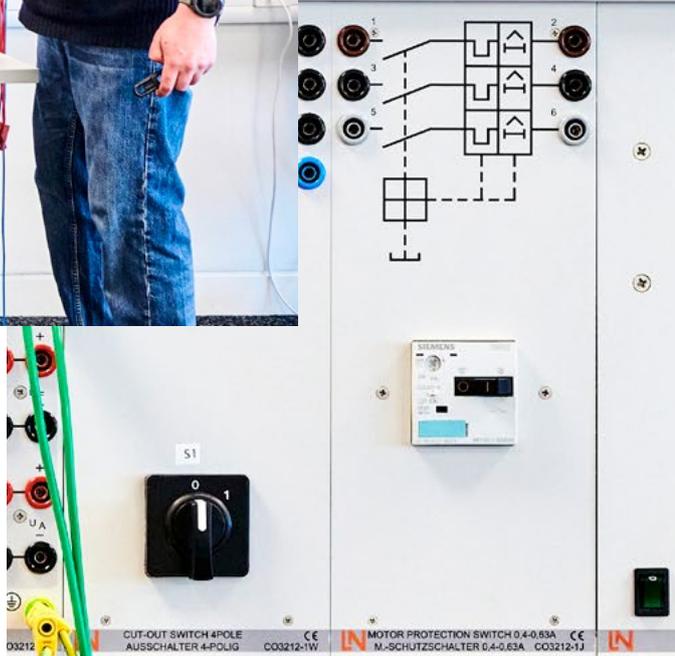
<p>Siemens Research and Innovation Ecosystem</p> <p>Northern Arc</p>	<p>Newcastle University</p> <p>Collaboration with</p> <p>SIEMENS</p>
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Building the future workforce

Our learning partnership with the Sofia Offshore Wind Farm supports skills development, innovation, and career pathways in the offshore wind sector. The collaboration enhances the student experience through workshops, research projects, and industry engagement, while promoting diversity and sustainability in the workforce.

A new partnership for decarbonisation

Newcastle University and the Port of Tyne have agreed a strategic partnership to collaborate on research, innovation, and skills development. Our shared priorities include smart grids, automation, and green corridors, with a focus on real-world impact. Together, we will drive sustainable growth and tackle global challenges through joint expertise and agile collaboration.



Innovation, demonstration, and delivery



VITAL living lab:
decarbonising defence

Catalysing an integrated energy system which grows a productive, clean economy for communities across the globe.



Sofia Offshore Wind Farm

Dogger Bank
World's largest offshore wind farm 3.6GW

Teesside
Freeport with hydrogen and CCUS projects



Building the energy systems of tomorrow

Clean tech research, innovation for sustainability, and the journey to net zero

Newcastle University

Newcastle University exists for the public benefit to advance education, learning and research. Our objective is to build on this core purpose and, in doing so, provide new knowledge and creative solutions that make a positive impact. We aim to work collaboratively with our many external partners to shape brighter futures, grow the economy, and champion social justice.

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**Business and partnerships
with Newcastle University**