ATU Research Showcase

Meet ATU's Bioeconomy Innovators

Interdisciplinarity Research at ATU Powering Ireland's Bioeconomy

Ollscoil Teicneolaíochta an Atlantaigh

Atlantic Technological University

October 2025

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BIOECONOMY IRELAND WEEK OCTOBER 13-19 2025

Rialtas na hÉireann
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This booklet was compiled and designed by the ATU Research Coordinator Team, Dr Shane Conway & Dr James Britton, and funded through TU RISE.

Dr Shane Conway

Dr James Britton

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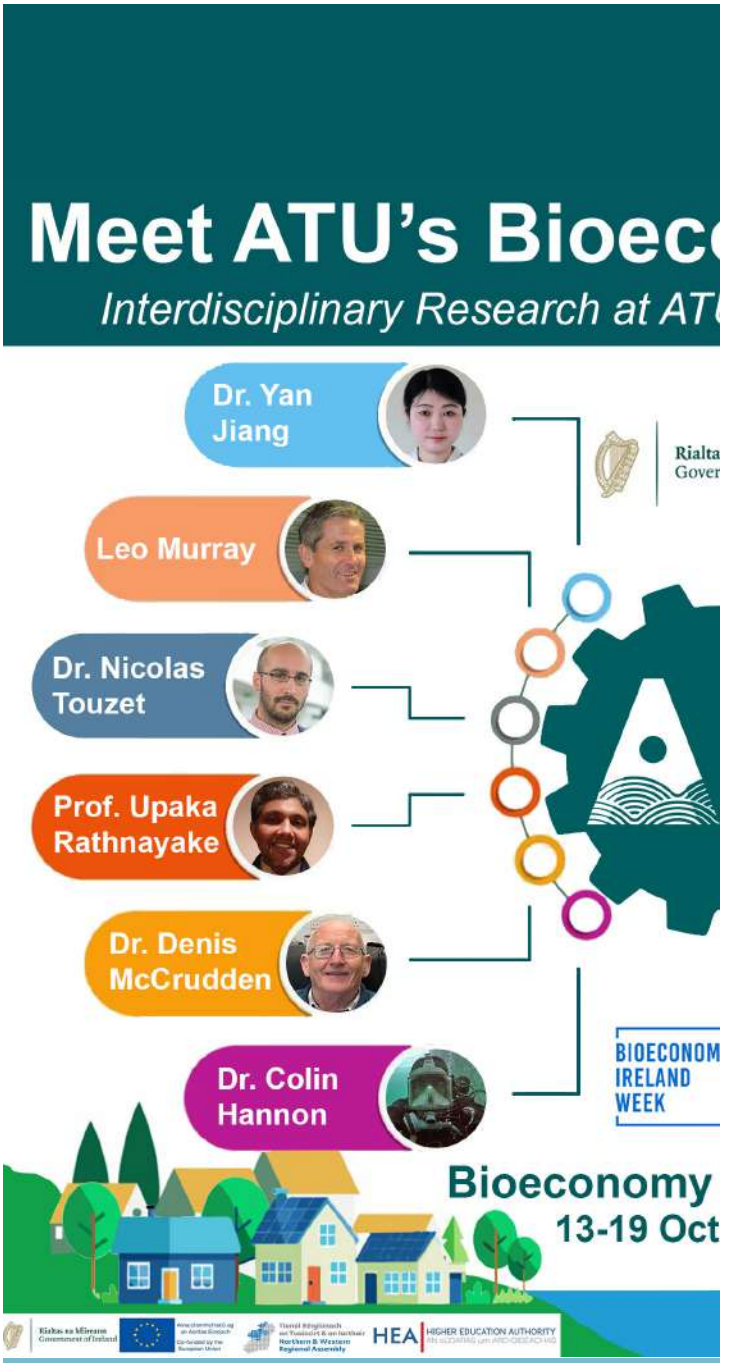
As Ireland marks Bioeconomy Ireland Week 2025, the new Research Coordinator team at Atlantic Technological University (ATU), funded through TU RISE, are proud to showcase the pioneering work of ATU's researchers and innovators who are helping shape a more sustainable, circular and resilient future. From valorising waste into new value chains to reimagining farming systems and advancing solutions in marine, energy, and engineering, ATU's research is driving bioeconomy innovation across our faculties and Research Centres.

As the technological university for the west and north-west of Ireland, ATU also grounds this innovation in regional and national priorities. Through alignment with the Northern & Western Regional Assembly's Smart Specialisation Strategy (S3), ATU contributes to regional strengths in Agri-Food & Agri-Tech, the Marine & Blue Economy, Renewable Energy & Climate Action, and the wider Circular Economy transition, while also connecting to emerging opportunities in biotechnology, nanotechnology and digital transformation.

In July 2022, ATU researchers became part of BiOrbic, a prestigious Science Foundation Ireland (SFI)-funded Bioeconomy Research Centre, dedicated to advancing Ireland's bioeconomy through interdisciplinary research collaborations that connect academic researchers with industry. At European level, ATU partners and leads work packages in major Horizon Europe Cluster 6 and ERA-NET BlueBio projects, positioning the university as a European bioeconomy hub on the Atlantic coast.

This booklet presents a sample of 12 researchers whose work illustrates the breadth of ATU's bioeconomy expertise. The selection spans multiple campuses and faculties, demonstrating the diversity of ATU's contribution to this field. Many other colleagues across the university are also making significant impacts in this area, and their work is equally valued. The profiles featured here are intended to highlight a cross-section of ATU's strengths in the bioeconomy, rather than provide an exhaustive list.


Meet ATU's Bioec
Interdisciplinary Research at AT
Dr. Yan Jiang
Leo Murray
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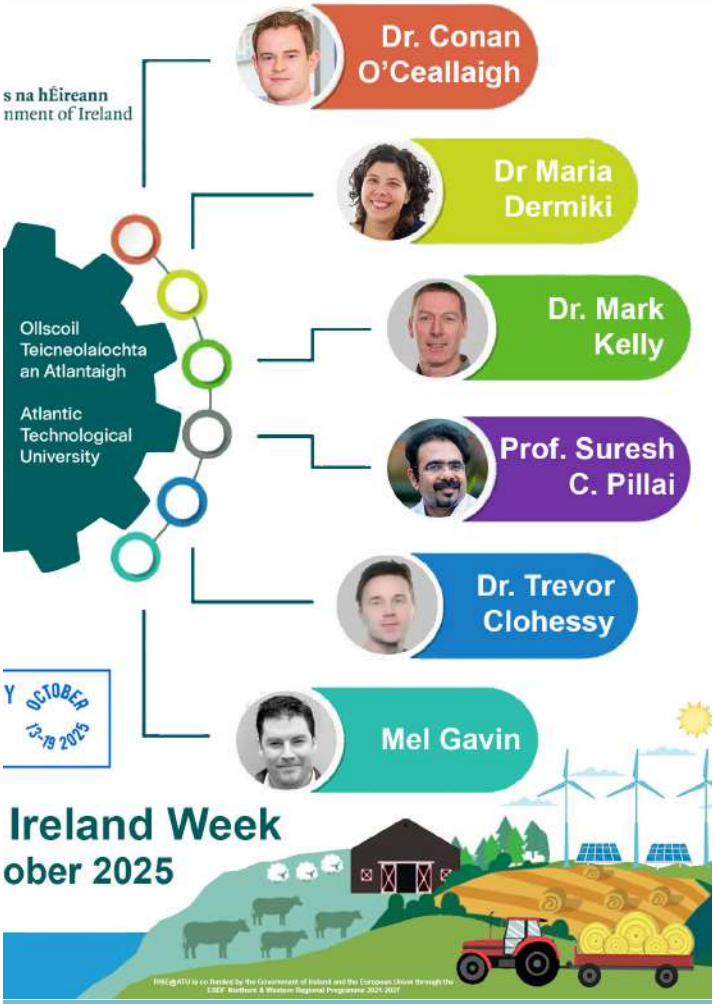

Showcase

ATU

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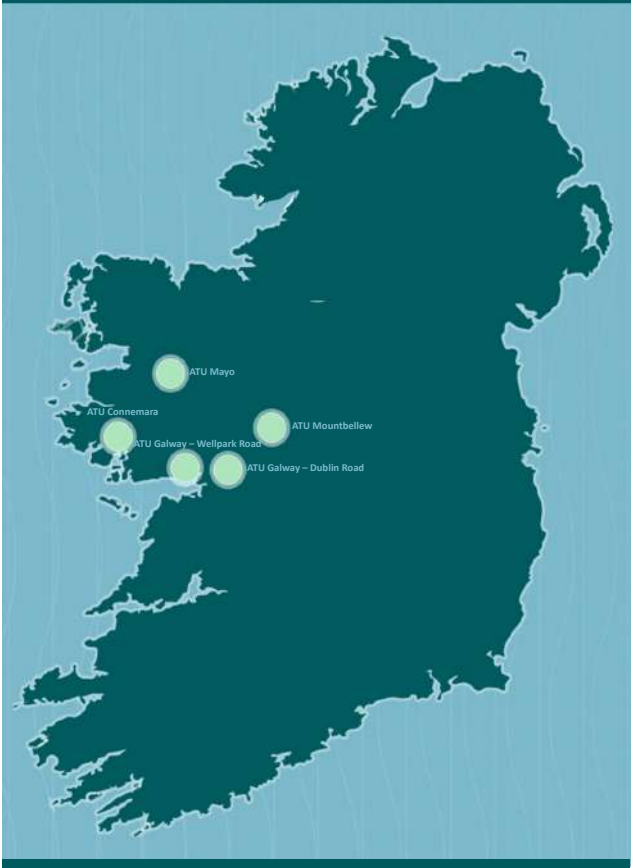

Dr. Conan O'Ceallaigh

Building the Bioeconomy with Timber Innovation

Department of Building and Civil Engineering, ATU Galway

Dr. Conan O'Ceallaigh, Lecturer and Principal Investigator in the Department of Building and Civil Engineering at ATU Galway, is a chartered engineer specialising in sustainable construction and circular economy design. His research focuses on the structural design and implementation of timber-based solutions, including Cross Laminated Timber (CLT) and mass timber systems for multi-storey and modular construction.

By leading national and European projects on bio-based construction materials, Conan is helping to establish timber as a low-carbon alternative to steel and concrete, reducing embodied carbon in buildings. His work on life cycle assessment (LCA) and reference databases for Irish-grown timber provides the evidence base for climate-smart construction, supporting Ireland's housing and sustainability goals.

Through this research, Dr. O'Ceallaigh demonstrates how the bioeconomy extends into the built environment, where renewable materials and circular principles can reshape the future of housing and infrastructure.

Dr. Trevor Clohessy

Bringing Blockchain to the Bioeconomy

Department of Mechanical and Industrial Engineering, ATU Galway

Dr. Trevor Clohessy is a Lecturer and Researcher in Business Information Systems and Transformative Technologies at ATU Galway's Department of Mechanical and Industrial Engineering. As an academic collaborator with BiOrbic, Ireland's SFI-funded Bioeconomy Research Centre, he investigates how blockchain and Industry 4.0 tools can enhance transparency, resilience and circularity in bioeconomy supply chains. His research explores applications ranging from agri-food traceability to marine and aquaculture innovation, showing how digital tools can improve provenance authentication, product recalls and supply chain efficiency.

Dr. Clohessy is also an active member of the Blockchain Ireland working groups for education, innovation & skills and start-ups, contributing to national strategies on blockchain education and adoption.

By integrating digital transformation with sustainability goals, Trevor's work highlights how the bioeconomy depends not only on natural resources but also on smart, transparent and future-proof digital infrastructures.

Dr. Colin Hannon

Expanding the Blue Bioeconomy

Department of Natural Resources and the Environment, ATU Galway

Dr. Colin Hannon, is Senior Research Fellow in the Department of Natural Resources & the Environment at ATU Galway and Principal Investigator at the Marine and Freshwater Research Centre (MFRC). Colin has over 20 years' experience in commercial aquaculture research and production, specialising in the development of low-trophic species across the value chain. His work focuses on unlocking the potential of underutilised marine resources to create high-value products, sustainable feeds and ecosystem services.

As ATU's lead in major European projects such as AquaVitae (H2020), SeaSoil (ERA-NET BlueBio), InEVal (ERA-NET BlueBio) and PalmariaPlus (SBEP), Colin collaborates with international partners to develop innovative aquaculture systems and solutions, valorise seaweed, and repurpose echinoderm species like sea stars, sea urchins, and sea cucumbers into food, feed and site remediation solutions. Through his applied research and strong industry engagement, Dr. Hannon is driving ATU's leadership in the blue bioeconomy, demonstrating how marine science and innovation can deliver sustainable growth for Ireland and the wider Atlantic region.

Dr. Mark Kelly

Circular Economy Leadership in Construction & Education

Department of Building and Civil Engineering, ATU Galway

Dr. Mark Kelly is a Senior Lecturer in the Department of Building and Civil Engineering at ATU Galway and Head of the ATU Galway-Mayo Centre for Sustainability. He also leads the Build360 research group and has over 20 years' experience directing national projects on construction and demolition waste management, resource efficiency, education for sustainability, and the circular economy.

In addition to his academic leadership, Dr. Kelly has been seconded by the Higher Education Authority's National Forum for the Enhancement of Teaching and Learning in Higher Education to serve as a Policy Advisor for Education for Sustainable Development (ESD). In this role, he is helping to shape the national approach to embedding sustainability within teaching and learning curricula across Ireland's higher education system. Through both research and policy, Mark connects practice, education, and governance, ensuring that sustainability and circular economy principles are embedded in Ireland's construction sector and its higher education programmes, in line with the UN Sustainable Development Goals (SDGs) and the national Climate Action Plan.

ATU

Sligo

Leo Murray

Driving Circular Bioeconomy Innovation

Contract Research Unit (CRU), ATU Sligo

Co-Founder of ATU Sligo's Contract Research Unit (CRU), Leo Murray specialises in delivering ATU's knowledge transfer and Industry engagement support services that upscale awareness and dissemination of the value of sustainability and circular economy solutions in enterprise operations that meet the 'triple bottom line' of social (people), environmental (planet), and economic (profit) enterprise.

Leo's work involves connecting existing, new and emerging sectors of the Agri/Blue economy with research expertise to explore new valorisation pathways that will transform bio-based waste and residual materials into value-added products that support the goals of the EU Bioeconomy Strategy and Climate Economy Action Plan.

Leo coordinates industry–academic collaborations across multiple sectors, ensuring ATU research delivers practical solutions and sustainable impact for the region.

Dr. Nicolas Touzet

Unlocking the Potential of Microalgae Biotechnology

Department of Environmental Science, ATU Sligo

Dr. Nicolas Touzet, Senior Lecturer at ATU Sligo, is a leading researcher in microalgal biotechnology and its applications for the circular and blue bioeconomy. His work explores how microalgae can produce high-value bioactive compounds with applications in nutraceuticals, aquaculture, cosmetics, and pharmaceuticals, while also contributing to carbon capture and climate neutrality.

As ATU's lead in the EU-funded VES4US and BOW projects on Sustainable Circular Bio-Based Products (H2020 FET and FET Proactive, Grants Nº 801338 and 952183), consortia of partners from 8 European countries (Italy, Spain, Germany, Ireland, Switzerland, Estonia, Slovenia and the Czech Republic), and previously METALGAE (funded by Science Foundation Ireland), Dr. Touzet has focused on harnessing extracellular vesicles (EVs) and bioactive metabolites from microalgae like the chlorophyte Tetraselmis. His research advances innovations in drug delivery, biomedicine and sustainable aquaculture, placing ATU at the forefront of next-generation biomanufacturing and bridging marine resources, biotechnology and global sustainability goals.

Prof. Upaka Rathnayake

Engineering Sustainable Agricultural Systems

Department of Civil Engineering and Construction, ATU Sligo

Lecturing in ATU Sligo's Department of Civil Engineering and Construction, Professor Upaka Rathnayake is a Lead Author to the United Nations Intergovernmental Panel on Climate Change (IPCC) 7th Assessment Report. His expertise lies in multi-objective optimisation strategies for water systems, climate resilience, artificial intelligence and agricultural sustainability.

As co-author of a 2023 study in AgriEngineering on energy balance in agricultural systems, he applied life cycle assessment (LCA) to crops and livestock, identifying pathways to improve net energy efficiency, water use efficiency and carbon footprint reduction.

Prof. Rathnayake's work demonstrates how advanced modelling and systems thinking can support the circular bioeconomy, making farming more resilient and resource-smart in the face of climate change.

Dr. Maria Dermiki

Development of Sustainable Foods

Department of Health and Nutritional Sciences, ATU Sligo

Dr. Maria Dermiki, Lecturer in Food Product Development in the Department of Health and Nutritional Sciences at ATU Sligo and Principal Investigator (P.I.) at the Health and Biomedical Research Centre (HEAL), is an expert in sustainable food production. Maria is a P.I. of several projects that focus on sustainable food production. Her work focuses on developing food products from alternative sustainable sources such as plant-based proteins, insect proteins, and ingredients derived from food processing side-streams like fruit and vegetable trimmings. Dr. Dermiki is a collaborator on the European Regional Development Fund (ERDF) funded Healthy Oats project which explores the potential for Extraction of bioactive compounds from locally produced oat husk using novel technologies to produce targeted nutraceuticals. Alongside product development, Maria also investigates the cultural acceptance of foods made with novel ingredients. Dr. Dermiki is also a collaborator on project FungiTech in the SFI Future Food Systems Challenge with Prof. Fiona Doohan (UCD). FungiTech uses crop residues as substrates for producing filamentous fungi, here Marias work in FungiTech explores consumer acceptability of foods containing filamentous fungi. By understanding consumer attitudes towards insect-based foods and upcycled ingredients, her research informs strategies to support the adoption of reduced carbon-emission diets, helping to create a more sustainable and resilient food system.

Mel Gavin

Powering the Bioeconomy with Renewable Energy

Contract Research Unit (CRU), ATU Sligo

Chartered Engineer and Certified Energy Manager, Mel Gavin, is Research and Development (R&D) Coordinator at ATU Sligo's Contract Research Unit (CRU), where he provides research and innovation support to enterprises, communities and individuals. With over 15 years' experience in sustainable buildings, renewable energy, and resource efficiency, Mel's work demonstrates how applied engineering can drive the bioeconomy's clean energy transition.

As coordinator of the AgroRES Interreg Europe project, Mel works with farmers, policymakers and regional authorities to accelerate the uptake of renewable energy in agriculture and rural areas. From solar installations on poultry farms to strategies for overcoming financial and regulatory barriers, his research shows how renewable energy can cut costs, reduce emissions, and strengthen rural resilience. By connecting ATU's expertise with real-world challenges, Mel plays a key role in ensuring that the bioeconomy is powered by sustainable energy systems, delivering benefits for both the environment and the rural economy.

Dr. Yan Jiang

Turning Agricultural and Food Waste into Bioenergy

Department of Environmental Science, ATU Sligo

Dr. Yan Jiang, who joined the Department of Environmental Science at ATU Sligo in 2024, is an expert in optimising anaerobic digestion (AD) processes to transform animal manure and food waste into renewable bioenergy.

Yan's work focuses on improving the productivity of biogas for energy generation while reducing the environmental impacts associated with agricultural and food waste streams by Life Cycle Assessment (LCA). Her previous research has also explored how anaerobic digestion conditions can be managed to reduce the presence of potentially harmful bacteria such as Salmonella species and carbapenem-resistant Enterobacterales (CRE).

By advancing waste-to-energy solutions, Dr. Jiang's research contributes to a more sustainable and circular bioeconomy, where organic waste is reimagined as a valuable energy resource.

Prof. Suresh C. Pillai

Harnessing Nanotechnology for the Circular Bioeconomy

Department of Environmental Science, ATU Sligo

Prof. Suresh C. Pillai is Senior Lecturer in Nanotechnology at ATU Sligo and Associate Director of ATU's Health and Biomedical Research Centre (HEAL). He leads pioneering research at the interface of nanotechnology, materials for energy and sustainability, waste management and renewable energy. As ATU's lead in the Nano2H2 project, co-funded by Science Foundation Ireland (SFI) and the Sustainable Energy Authority of Ireland (SEAI) and co-led with Trinity College Dublin, Prof. Pillai is developing low-cost nanomaterials to enable commercial-scale hydrogen production from renewable sources, including agricultural waste. This work addresses three critical challenges simultaneously: clean energy generation, waste reduction, and environmental protection.

By transforming waste into a resource and advancing hydrogen as the fuel of the future, Suresh's research embodies the principles of the circular bioeconomy. His leadership positions ATU at the forefront of next-generation energy solutions, advancing Ireland's path to net-zero while contributing to global efforts to tackle the waste and climate crises.

ATU

Donegal

Dr. Denis McCrudden

Optimising the Bioeconomy with Novel Sensor Technology

Department of Life and Physical Sciences, ATU Donegal

Dr. Denis McCrudden, Lecturer in Analytical Science at ATU Donegal's Department of Life & Physical Sciences, is an experienced researcher who develops low-cost, portable sensor technologies to support innovation in the bioeconomy and beyond. Some of his earlier work focussed on collaborative studies with Teagasc on the development of chemical sensing platforms for the portable detection of trace levels of heavy metals in soils. He is currently collaborating with Queens University Belfast (QUB) and the Manchester based Supergen bioenergy hub developing in-situ electrochemical sensors to monitor the production of value-added compounds and fine chemicals from waste biomass during photocatalytic reactions.

Denis has also designed portable soil sensors to measure pH and nutrient content, enabling more efficient fertiliser use, reducing run-off, and lowering environmental impacts and costs for farmers. At ATU, Dr McCrudden serves as the lead researcher for the €19.2 million PEAT+ project, a PEACEPLUS cross-border initiative led by Ulster Wildlife and funded by the Special EU Programmes Body (SEUPB). This transformative programme aims to restore vital peatlands, enhance biodiversity, and combat climate change across Northern Ireland and the border counties of Ireland, positioning peatland restoration as a cornerstone of both climate action and the circular bioeconomy.

ATU and the Future of the Bioeconomy

Together, these researchers and innovators represent the breadth of ATU's bioeconomy leadership, spanning circular economy practices, sustainable agriculture, climate-smart engineering, marine biotechnology, bio-based construction, aquaculture innovation, renewable energy and nanotechnology for clean fuels. Together, their work embodies ATU's mission to deliver research with real-world impact for communities, industries and ecosystems across Ireland's Atlantic region and beyond.

This commitment is further strengthened through ATU's involvement in BiOrbic, Ireland's SFI-funded Bioeconomy Research Centre, a national collaboration of more than 100 researchers focused on building a sustainable circular bioeconomy. ATU members contribute expertise across supply chain innovation, agricultural systems, ecosystem services and digital transformation. Among those leading ATU's contribution to BiOrbic are:

- *Professor Graham Heaslip, Dean, Faculty of Engineering and Computing, ATU.*

- *Dr. Edna Curley, Head of Centre, ATU Mountbellew (Mountbellew Agricultural College).*

- *Dr. James Moran, Senior Lecturer in Ecology and Biology, Department of Natural Resources & the Environment, ATU Galway-Mayo.*

- *Dr. Trevor Clohessy, Lecturer in Business Information Systems and Transformative Technologies, School of Engineering, ATU Galway-Mayo.*

Through BiOrbic, ATU researchers connect their regional expertise to a thriving national research community, addressing global challenges while delivering solutions tailored to Ireland's west and north-west.

ATU and the EU GREEN European Alliance

ATU's commitment to sustainability is reinforced through its role in the EU GREEN European University Alliance, a network of nine European universities dedicated to advancing sustainability, innovation and societal responsibility. In January 2025, ATU hosted a lecture entitled 'Blue Bioeconomy and Sustainability' as part of the EU GREEN engagement series, bringing together academics, policymakers, industry and NGOs to explore innovation strategies for a sustainable marine bioeconomy. The pan-European EU GREEN alliance brings together:

-Atlantic Technological University (ATU), Ireland
-University of Extremadura, Spain
-University of Évora, Portugal
-University of Oradea, Romania
-University of Angers, France
-University of Gävle, Sweden
-University of Parma, Italy
-Otto von Guericke University Magdeburg, Germany
-Wrocław University of Environmental and Life Sciences, Poland

Events like the January lecture demonstrate how ATU connects its regional expertise to a broader European mission: empowering communities, fostering collaboration, and preparing future leaders to shape a greener and more inclusive society.

EU GREEN
EUROPEAN ALLIANCE

This 'Meet ATU's Bioeconomy Innovators' campaign, part of Bioeconomy Ireland Week 2025, not only connects researchers and innovators across ATU's nine campuses, but also strengthens links with colleagues across this EU GREEN alliance and the wider European and international bioeconomy community, fostering collaboration, visibility and impact in one of the most strategically important fields for our shared future.

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