



# Belfast School of Architecture and the Built Environment

Research and Innovation Annual Report  
1 August 2023 - 31 July 2024

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# 1. FOREWORD

**Research Director**  
**Prof. Jayanta Mondol**



In presenting the Annual Report for Architecture, Built Environment, and Planning for the academic year 2023-2024, I am delighted to share the success achieved across various areas of activity. The year has marked significant accomplishments in terms of grant income, research outputs, active participation in collaborative projects, the establishment of research networks at both local and international levels, and extensive engagement with broader communities through outreach activities. This foreword offers a brief overview of the activities undertaken by our research centres within the unit.

The Hydrogen Safety Engineering and Research Centre (**HySAFER**) is continuing global hydrogen safety research and education. HySAFER's research activities are organised into three core sub-teams: multiphase non-reacting and reacting flows, hydrogen blending in gas networks and associated safety concerns, and hydrogen safety in maritime environments. Research findings are actively disseminated through Regulations, Codes, and Standards (RCS). In 2023-2024, HySAFER coordinated and contributed to thirteen hydrogen safety projects. Of these, eight are national initiatives (four funded by the EPSRC, two by Invest NI, one by Innovate UK, and one by the Gas Innovation Fund), while five are European projects (one under Horizon 2020 and four under Horizon Europe). Notably, two Horizon Europe projects—**ELVHYS** and **HyLICA** are focusing on the safety of liquid hydrogen (LH2).

In early 2024, HySAFER began work on two additional Horizon Europe projects. The **DelHyVEHR** project explores liquid hydrogen delivery in high-rate environments, and **HyAcademy.EU** aimed to strengthen Ulster University's leadership in hydrogen safety education across Europe. The latter complements the UK EPSRC CDT "Sustainable Hydrogen" programme, where Ulster plays a key role in doctoral training on hydrogen safety. The UK National Clean Maritime Research Hub also supports HySAFER's work on hydrogen and ammonia safety in maritime applications, including the IGF Code for hydrogen use in shipping.

Professor Vladimir Molkov was invited to present groundbreaking technology at the USA Hydrogen Safety Panel, showcasing explosion-free self-venting tanks in fire conditions. This technology is now under consideration for inclusion in the UN GTR#13 regulations. Dr Kashkarov received the 2023 Young Scientist Award. In the summer of 2024, HySAFER hosted four visiting researchers from Japan and Mexico, further strengthening its international network.

The Architecture Research Group (ARG) staff actively engaged in discipline-specific and interdisciplinary research, contributing to a wide range of activities, including writing, editing, curating exhibitions, consultancy, professional practice, innovation, and community/public engagement. In response to staffing changes and emerging research directions, the ARG underwent a restructuring in 2024/25, introducing three new research clusters: **Practice Collective**, **Interlocutory Percept**, and **Critical Futures Lab**. These new clusters complement the ongoing



work of the inaugural research clusters: **Drawing: Methodology, Making, and Media**, and **Hidden Barriers**. During this reporting period, several notable achievements emerged across these clusters. Two PhD scholarships were funded by the Arts and Humanities Research Council (AHRC) Northernbridge Consortium, and a prestigious Collaborative Doctoral Award was awarded in partnership with the Northern Ireland Department of Justice. Dr David Coyle was appointed to the Northern Ireland Ministerial Advisory Group for Architecture and the Built Environment. The paper, “*Hidden Barriers and Divisive Architecture: The Role of ‘Everyday’ Architecture in Conflict and Peacebuilding in Belfast*” published by Coyles, Grant, and Hamber, 2023 earned the *2023 Best Paper Award* from the highly regarded *Journal of Urban Affairs*. Paul Clarke has been appointed to the steering group of the All-Ireland Architectural Research Group (AIARG) and serves as an Expert Advisor to the National Trust for Scotland on the restoration and development of Charles Rennie Mackintosh's iconic *The Hill House*.

This year has seen a further expansion in Research on Property and Planning (RPP)’s research activities, driven by the urgent economic, environmental, and societal challenges facing the housing sector. The centre continues to be a leader in UK housing research, with a focus on improving housing affordability, eliminating barriers to new housing provision, and advancing the decarbonisation of existing housing stock. RPP has been at the forefront of research commissioned by the Northern Ireland Housing Executive (NIHE) in the social housing sector. Over the past year, this has led to several impactful outcomes, including revaluating public sector housing stock, profiling the energy efficiency of

Northern Ireland’s housing, and conducting a feasibility assessment to introduce an intermediate rent product. RPP remains the lead research partner for the Forum for Better Housing Northern Ireland and continues to contribute actively to CACHE, the UK Collaborative Centre for Housing Evidence. Internationally, RPP has strengthened its global presence and continues to build new networks in the field of property taxation research. A notable recent output is the UN-Habitat publication ‘Land and Property Taxation in the *Fragile States*’, which has been recognised by the World Bank as ‘foundational work’ in using technology to enhance property tax revenue collection. RPP members have also been appointed to prestigious international committees, including the International Association of Assessing Officers (IAAO) Artificial Intelligence in Appraisal Task Force and the IAAO Education Committee, which oversees global research and quantitative analysis education.

**“The year has marked significant accomplishments in terms of grant income, research outputs, active participation in collaborative projects, the establishment of research networks [...] and extensive engagement with broader communities through outreach activities.”**

The four core areas of activity at the Fire Safety Engineering Research Centre (FireSERT)—fire dynamics and materials, structural fire engineering, fire protection, and human behaviour in fire—were significantly advanced over the past year. The current ongoing FireSERT projects include the Facades Assessment & Hazard Identification Exercise in collaboration with the Northern Ireland Housing Executive and MHCLG (2022–2024) and the *Ecosurety Project*, aimed at developing novel processing technology to address hard-to-recycle plastic food waste packaging. The *Development of Emergency Response Training Facilities* for the Korean National Fire Agency is another significant project, alongside the *Finite Element Analysis of Precast Concrete Sandwich Panels Façade Systems* subjected to elevated temperatures (ISO) and *Advanced Thermo-Mechanical Analyses* of external and internal wall systems in fire situations. FireSERT researchers were invited as keynote speakers at major international conferences across Brazil, the USA, China, Ireland, and

Ghana. FireSERT also participated in key conferences such as SIF 24 and IAFSS 23 and is set to organise the International Fire Safety Symposium (IFireSS) in June 2025.

In this reporting period, research income at the Centre for Sustainable Technologies (CST) research centre has increasingly diversified, with significant grants secured from Interreg PeacePlus, US-Ireland, and the Royal Academy of Engineering. In addition, proposals are actively being developed for funding from UK Research Councils, European bodies, and all-Ireland funding programmes. This expands upon an already strong portfolio that includes support from UK Research Councils, European funding agencies, and national funding schemes, all of which sustain both post-doctoral researchers and postgraduate scholars. Furthermore, the recent merger with civil and highways engineering academic staff has strengthened the Centre for Sustainable Technologies, enabling it to broaden its focus. The centre is now tackling critical issues related to infrastructure materials and their procurement. Looking to the future, the CST is also integrating advanced technologies, including machine learning tools, to enhance all areas of energy and infrastructure research, ensuring that it remains at the cutting edge of innovation and scientific advancement.

**In closing, I would like to honour the memory of the late Professor Stanley McGreal, who served as Director of the Built Environment Research Institute from 2006 to 2017.”**

In closing, I would like to honour the memory of the late Professor Stanley McGreal, who served as Director of the Built Environment Research Institute from 2006 to 2017. Throughout his distinguished career, he made profound contributions to housing research, urban renewal strategies, regeneration, and the property investment market, leaving a lasting impact on both academia and practice.

Further details of our research, facilities, staff profiles and research expertise can be found at [Architecture, Built Environment and Planning Research](#) or by contacting **Ms Marcella McCann** (Academic Excellence Executive Assistant) at **Email:** [m.mccann1@ulster.ac.uk](mailto:m.mccann1@ulster.ac.uk); **Tel:** +44 28 9536 7356.



**Professor Jayanta Deb Mondol**

Research Director, Belfast School of Architecture and the Built Environment

## 2. RESEARCH STUDENTS

NAME	PROJECT TITLE
<b>Abdulai, Yahaya</b>	Fire Safety for Vulnerable Groups (FSVG)
<b>Affoh, Peter</b>	Fire Defence/Factors contributing to rate of death and loss of properties in high rise buildings fire outbreak in UK
<b>Amponsah, Richmond</b>	An investigation of risk perception and behaviour in communicable disease control
<b>Bradley, Briegin</b>	Healthy Urban Environments. Assessing the needs and expectations of Young People across European Cities
<b>Bray, Robert</b>	An experimental and computational study of flame ignition and extinction of polymeric materials in under-ventilated environments
<b>Carlin, Kieran</b>	Urban universities as catalysts for public-private regeneration strategies to benefit more liveable and healthy inner-city communities
<b>Cassidy, Peter</b>	Design and evaluation of community fire safety educational programmes
<b>Chang, Roma</b>	Multifunctional Building Integrated Solar Technologies
<b>Cooke, Helen</b>	Spatial planning on the island of Ireland: developing the Dublin-Belfast Economic Corridor (DBEC) concept
<b>Corbett, Hayley</b>	Sustainable means for the removal of emerging pathogens in the tertiary treatment of wastewaters in western and emerging economies
<b>Cui, Shiqi</b>	Safety of hydrogen and natural gas blends
<b>Darvishvand, Leila</b>	Implementation Digital twins technology to building energy management with Heat Pump
<b>Davidson, Sean-Luc</b>	What's happening in your marine backyard? The role of Marine Spatial Planning in Marine Renewables on the island of Ireland
<b>Ebne Abbasi, Hazhir</b>	CFD model of fuelling through the entire equipment of a hydrogen refuelling station
<b>Farmer, Michelle</b>	Net-zero vertical farming

<b>Fitzmaurice, Laura</b>	Next Generation 'circular' net zero carbon concrete for the UK's offshore wind energy sector
<b>Gawale, Atish</b>	Safety strategies and engineering solutions for hydrogen heavy-duty vehicles
<b>Gibson, Zoe</b>	SuperStudio Pedagogy: Innovation through a Responsive Studio Learning Ecology
<b>Hasnain, Syed Ali</b>	Experimental and Numerical Investigation of Fire in Li Ion Battery Energy Storage System
<b>Hermans, Lucas</b>	Model-to-Model Validation: An Extended Framework for Quality Assessment and Comparison of Automated Valuation Models for Residential Real Estate
<b>Itanola, Moses</b>	Digital Construction and the Circular Economy in Building Services
<b>James, Ben</b>	Climate Resilient, Net and Autonomous Zero Emission Buildings and Communities (NZEB) – Definitions and Prototypes for the UK/Northern
<b>Johnston, Ryan</b>	Visualisation and Immersive technology to improve stakeholder participation in net Zero Emission Buildings and Neighbourhoods (ZEN) in Smart Cities
<b>Kamboj, Mayank</b>	Modelling heat and mass transfer during liquid hydrogen refuelling
<b>Kazemi, Mina</b>	Stability of hydrogen flames
<b>Kennedy, Robert</b>	Legibility in Urban Design and Conservation Area Practice
<b>Kishel, Katlin</b>	Influence of racetrack surface attributes on braking patterns, overall racing performance
<b>Kumar, Rabinder</b>	Computational studies on the response of structural elements in travelling fires.
<b>Liang, Hongyuan</b>	The Development of a Strategic Performance Measurement Framework for Assessing Xiongan New Area in China
<b>Lynch, Frances</b>	Healthy place-making and youth wellbeing: Role of neighbourhood heritage
<b>MacIntyre, Sean</b>	Solar PV in NI. An examination of the user profile and experience together with an assessment of its future potential for household generation and use via behavioural and technological changes
<b>Mackel, Aedan</b>	Architecture, Planning and Desegregation: An evaluation of current practice
<b>Magennis, Lawrence</b>	Saving Earth from Humans: Earth-focussed Sustainable Development

<b>McGuinness, Siobhan</b>	Co-Designing Child Friendly Places: Growing the Resilience of Children through Inclusive Planning
<b>Obasi, Gerard</b>	Renewable Energy Technologies and Storage Systems for Building Applications
<b>Parke, Daniel</b>	Renewable Energy and Storage for Outdoor Events Sector (RESOES)
<b>Pillai, Rahul Sajith</b>	New electricity market participants. Integration of the distributed energy resources into the Single Electricity Market (SEM)
<b>Reynolds, Kevin</b>	Architectures of Gentrification: Property Development, Heritage, and Community Identity
<b>Shahzadi, Iram</b>	Energy system model for Northern Ireland
<b>Sivaraman, Srinivas</b>	Safety of Using Ammonia in for the Hydrogen Economy
<b>Son, Kwangho</b>	Development of Emergency Response Training Facilities for Alternative Vehicles under Fire
<b>Tosh, Calum</b>	Next generation 'circular' net zero carbon concretes for the UK's offshore wind energy sector
<b>Umer, Muhammad</b>	Biohydrogen from waste through biomass electrolysis: challenges and opportunities
<b>Wasson, Jonathan</b>	Architectures of Gentrification: Urban Regeneration and Community Identity
<b>Wilson, Bailie</b>	Energy positive Multifunctional Building Facades Incorporating Energy Storage for nearly Zero Energy Building standards
<b>Zehra, Bintul</b>	3D printed cementitious architectures to deliver sustainable infrastructure assets with enhanced structural and durability resilience



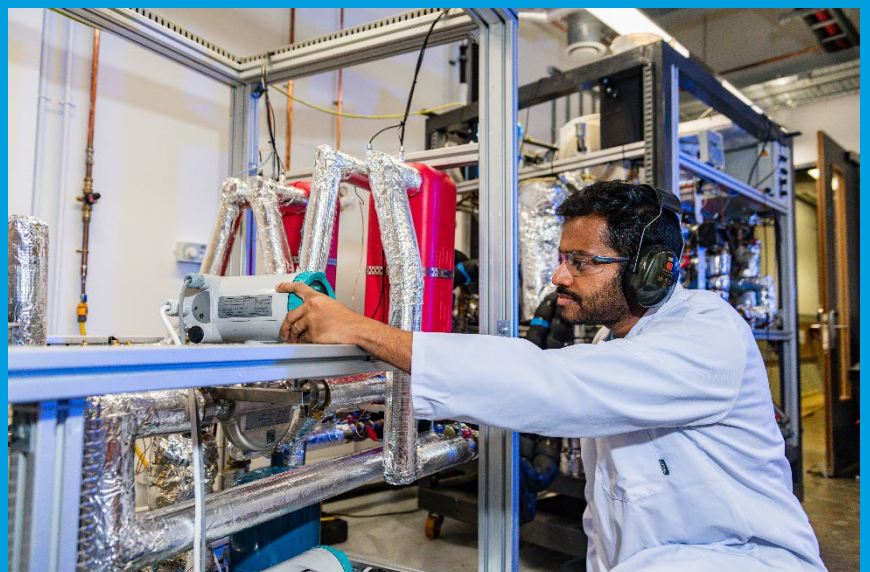
## GRADUATED DEC 2023

NAME	PROJECT TITLE
Ghoraishi, Mohammad	Advanced multifunctional energy efficient building facades: Experimental and computational characterisation of Concentrating Photovoltaic Thermal Evacuated Glazing
Oakes, Luke	The development of fibre reinforced geopolymer cladding systems with integral foamed insulation
Ramirez, Miguel	Design and development of a High Temperature Heat Pump (HTHP) for industrial applications
Rolfe, Angela	Advanced simulation and modelling to ensure techno-economic and environmental sustainability of new process development

## GRADUATED JULY 2024

NAME	PROJECT TITLE
Alkadi, Sanaa	An Investigation of the Adaptation of the Southern Syrian Vernacular Dwelling
Baby, Aloshy	Synergistic Effect of Phosphorus and Nitrogen-Containing Groups in Fire Retardancy of Polystyrene
Donkoh, Emmanuel	Development of a Comparative Preconstruction Performance Management Models for Traditional Lump Sum And PPP-DBFOM Transport and Health Projects
Kearney, Matthew	Rationalising Institutional Change: An Investigation into the Governance of Developer Contributions in Northern Irish Planning
Quigley, Mura	Enabling a Resilient Future: Exploring the Governance and Leadership of Urban Design in the UK
Sreekumar, Sreehari	Performance Enhancement of Photovoltaic/Thermal System Using Hybrid Nanofluid

<b>Sulaiman, Adam</b>	Numerical And Experimental Study of Subcritical and Transcritical High-Temperature Heat Pump Systems for Industrial Applications with Low-GWP Refrigerants
<b>Tavanarezaei, Hossein</b>	Investigating Biomechanical and Spatial Dynamics of Pedestrian Movement in the Context of Microscopic Crowd Flow Modelling
<b>Velanparambil Ravindran, Rahul</b>	Reversible High-Temperature Heat Pump - Organic Rankine Cycle System for Industrial Waste Heat Recovery



### 3. RESEARCH OUTPUTS

This section reports those outputs published and/or delivered over the period of this report and classified as either: journal articles, books/chapters in books, research reports, published conference papers, or live conference contributions. <https://pure.ulster.ac.uk/>.

#### 3.1. JOURNAL ARTICLES

**Ali, U, Bano, S, Shamsi, MH, Sood, D, Hoare, C, Zuo, W, Hewitt, N & O'Donnell, J** 2024, 'Urban residential building stock synthetic datasets for building energy performance analysis', Data in Brief, Elsevier, vol. 53, 110241, pp. 1-10.  
<https://doi.org/10.1016/j.dib.2024.110241>

**Ali, U, Hewitt, N, Bano, S, Shamsi, M, Sood, D, Hoare, C, Zuo, W & O'Donnell, J** 2024, 'Urban building energy performance prediction and retrofit analysis using data-driven machine learning approach', Energy and Buildings, vol. 303, 113768, pp. 1-16.  
<https://doi.org/10.1016/j.enbuild.2023.113768>

**Baby, A, Tretsiakova-McNally, S, Joseph, P, Zhang, J & Arun, M** 2024, 'The Effects of Nitrogen-Containing Monomers on the Thermal Degradation and Combustion Attributes of Polystyrenes Chemically Modified with Phosphonate Groups', Macromolecular Materials and Engineering, vol. 309, no. 6, 2300432, pp. 1-12.  
<https://doi.org/10.1002/mame.202300432>

**Balsas, C** 2024, 'Coastal Waterfront Transformations, Fishing Structures, and Sustainable Tourism', Sustainability (Switzerland), vol. 16, no. 15, 6313, pp. 1-13. <https://doi.org/10.3390/su16156313>

**Balsas, C** 2023, 'Enthralling Urban and Regional Planning forward', Land, vol. 12, no. 11, 1973, pp. 1-22.  
<https://doi.org/10.3390/land12111973>

**Balsas, CJL** 2024, 'From Granary to Arts Incubator: An Evolutionary Perspective on the Concept of Food for Thought', World, vol. 5, no. 1, pp. 1-21.  
<https://doi.org/10.3390/world5010001>

**Balsas, CJL** 2023, 'Global (Sustainable) Commercial Urbanism and Culture', Global Journal of Cultural Studies, vol. 2, pp. 196-204.  
<https://doi.org/10.6000/2817-2310.2023.02.15>

**Balsas, CJL** 2023, 'Improving land-use-based urbanism through award-winning planning practice and scholarship: a North American case study', Socio-Ecological Practice Research, vol. 5, no. 3, pp. 275-291.  
<https://doi.org/10.1007/s42532-023-00161-x>

**Balsas, C** 2024, 'Resiliência Urbana: Boas práticas e consumo sustentável', Portuguese Studies Review, vol. 31, no. 2, pp. 355-373.

**Balsas, C** 2023, 'Spatializing Culture: The Ethnography of Space and Place: BY SETHA LOW', Environment, Space, Place, vol. 15, no. 1, pp. 151-156.  
<https://doi.org/10.1353/spc.2023.a903433>

**Balsas, CJL** 2024, 'Urban Revitalization in Small Cities across the Atlantic Ocean', Sustainability, vol. 16, no. 2, 639. <https://doi.org/10.3390/su16020639>

**Black, B, Rafferty, J, Santos, J, Ennis, A, Perry, P & McKee, M** 2023, 'Bluetooth 5.0 Suitability Assessment for Emergency Response within Fire Environments', Electronics, vol. 12, no. 22, 4599, pp. 1-16.  
<https://doi.org/10.3390/electronics12224599>

**Bray, R, Åström, J, Madsen, D, Tretsiakova-McNally, S, Zhang, J, Malmberg, V & van Hees, P** 2023, 'A comparison of carbon monoxide yields and particle formation at various global equivalence ratios in vitiated and under-ventilated conditions', Fire Safety Journal, vol. 141, 103915, pp. 1-18.  
<https://doi.org/10.1016/j.firesaf.2023.103915>

**Bray, R, Fernandez-Anez, N, Maluk, C, Merci, B, Wang, Y & Woodrow, M** 2024, 'IAFSS workshop on education 2023 – Perspectives on the need for competence in fire safety engineering', Fire Safety Journal, vol. 144, 104105.  
<https://doi.org/10.1016/j.firesaf.2024.104105>

**Buonomano, A, Forzano, C, Pugsley, A & Smyth, M** 2023, 'An advanced Photovoltaic Thermal Collector Storage Solar Water Heating based on planar liquid vapour thermal diode: Model-based design approach for the optimal energy performance assessment', Energy Reports, vol. 10, pp. 4616-4628.  
<https://doi.org/10.1016/j.egyr.2023.09.078>

**Chang, R, Mondol, J, Smyth, M, Zacharopoulos, A & Pugsley, A** 2024, 'A comparison of the use of traditional glazing and a novel concentrated photovoltaic glazing (CoPVG) for building solar gain analysis using IESVE', Architectural Intelligence, vol. 3, no. 2, pp. 1-23. <https://doi.org/10.1007/s44223-023-00044-x>

**Cirrone, D, Makarov, D, Kashkarov, S, Friedrich, A & Molkov, V** 2023, 'Physical model of non-adiabatic blowdown of cryo-compressed hydrogen storage tanks', International Journal of Hydrogen Energy, vol. 48, no. 90, pp. 35387-35406.  
<https://doi.org/10.1016/j.ijhydene.2023.05.182>

**Cirrone, D, Makarov, D & Molkov, V** 2023, 'Safety of Liquid and Cryo-Compressed Hydrogen: Overview of Physical and CFD Models Developed at Ulster University', Chemical Engineering Transactions, vol. 105, no. 2023, pp. 55-60.  
<https://doi.org/10.3303/CET23105010>

**Coyles, D** 2024, 'Ambiguities of Segregation and Spatial Reconciliation: Reflections from Belfast', Io Squaderno, no. 67, pp. 23.  
<https://www.losquaderno.net/?p=2365>



**Dai, X, Alam, N, Liu, C, Nadjai, A, Rush, D & Welsh, S** 2024, "Scaling-up" fire spread on wood cribs to predict a large-scale travelling fire test using CFD', *Advances in Engineering Software*, vol. 189, no. 2024, 103589, pp. 1-22.  
<https://doi.org/10.1016/j.advengsoft.2023.103589>

**Dawson, H, Davis, G, Ross, K, Vaganay, M & Tomlinson, A** 2024, 'Using staged teaching and assessment approaches to facilitate inter-university collaboration and problem-based learning', *Frontiers in public health*, vol. 12, 1334729, pp. 1-10.  
<https://doi.org/10.3389/fpubh.2024.1334729>

**Ebne-Abbasi, H, Makarov, D & Molkov, V** 2024, 'CFD model of refuelling through the entire equipment of a hydrogen refuelling station', *International Journal of Hydrogen Energy*, vol. 53, pp. 200-207.  
<https://doi.org/10.1016/j.ijhydene.2023.12.056>

**Elsheikh, A, Motawa, I & Diab, E** 2023, 'Multi-objective Genetic Algorithm Optimization Model for Energy Efficiency of Residential Building Envelope under Different Climatic Conditions in Egypt.', *International Journal of Construction Management*, vol. 23, no. 7, pp. 1244-1253.  
<https://doi.org/10.1080/15623599.2021.1966709>

**Forde, D, McElduff, L & Rafferty, G** 2023, 'Alley Greening: A Tool for Enhancing Community Resilience?', *Local Environment*, vol. 29, no. 9, pp. 1150-1169.  
<https://doi.org/10.1080/13549839.2023.284944>

**Gibb, D, Rosenow, J, Lowes, R & Hewitt, N** 2023, 'Coming in from the cold: Heat pump efficiency at low temperatures', *Joule*, vol. 7, no. 9, pp. 1939-1942.  
<https://doi.org/10.1016/j.joule.2023.08.005>

**Greco-Coppi, M, Seufert, P, Hofmann, C, Rolfe, A, Huang, Y, Rezvani, S, Ströhle, J & Eppler, B** 2023, 'Efficient CO2 Capture from Lime Plants: Techno-economic Assessment of Integrated Concepts using Indirectly Heated Carbonate Looping Technology', *Carbon Capture Science & Technology*, vol. 11, 100187.  
<https://doi.org/10.1016/j.ccst.2023.100187>

**Gupta, A, Das, B, Biswas, A & Mondol, J** 2023, 'Assessment of performance and quality parameters for drying neem leaves in photovoltaic-thermal solar dryer', *Thermal Science and Engineering Progress*, vol. 43, 101989.  
<https://doi.org/10.1016/j.tsep.2023.101989>

**Gupta, A, Borah, PP, Das, B & Mondol, J** 2024, 'Energy and Exergy based performance evaluation of an innovative PV-assisted solar dryer with and without modified absorber', *Solar Energy*, vol. 272, 112464, pp. 1-22.  
<https://doi.org/10.1016/j.solener.2024.112464>

**Hall-Smith, S, Wang, Y, Huang, Y & Zhou, B (ed.)** 2023, 'Techno-Economic Study of a Distributed Renewable Power System for a British Winery', *Sustainability*, vol. 15, no. 19, 14410, pp. 1-19.  
<https://doi.org/10.3390/su151914410>

**Harrigan, S, Bi, Y, Huang, M, O'Neill, C, Zhai, W, Sun, J & Zhang, X** 2024, 'Detection of Electromagnetic Seismic Precursors from Swarm Data by Enhanced Martingale Analytics', *Sensors*, vol. 24, no. 11, 3654, pp. 1-27. <https://doi.org/10.3390/s24113654>

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**Islam, AKMK, Dunlop, PSM, Bhattacharya, G, Mokim, M, Hewitt, N, Huang, Y, Gogulancea, V, Zhang, K & Brandoni, C** 2023, 'Comparative performance of sustainable anode materials in microbial fuel cells (MFCs) for electricity generation from wastewater', *Results in Engineering*, vol. 20, no. 101385, 101385, pp. 1-12. <https://doi.org/10.1016/j.rineng.2023.101385>

**Jaffar, M, Brandoni, C, Martinez, J, Snape, C, Kaldis, S, Rolfe, A, Santos, A, Lysiak, B, Lappas, A & Hewitt, N et al.** 2023, 'Comparative techno-economic analysis of the integration of MEA-based scrubbing and silica PEI adsorbent-based CO<sub>2</sub> capture processes into cement plants', *Journal of Cleaner Production*, vol. 414, no. 137666, 137666, pp. 1-11. <https://doi.org/10.1016/j.jclepro.2023.137666>

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**James, B, Mondol, J, Hyde, T & Houlihan Wiberg, A** 2024, 'How far can low emission retrofit of terraced housing in Northern Ireland go?', *Environmental Research: Infrastructure and Sustainability*, vol. 4, no. 1, 015010, pp. 1-19. <https://doi.org/10.1088/2634-4505/ad2c97>

**Kang, R, Jia, C, Zhao, J, Zhao, L & Zhang, J** 2024, 'Effects of capacity on the thermal runaway and gas venting behaviors of large-format lithium iron phosphate batteries induced by overcharge', *Journal of Energy Storage*, vol. 87, 111523. <https://doi.org/10.1016/j.est.2024.111523>

**Kazemi, M, Brennan, S & Molkov, V** 2024, 'Hydrogen Safety by Design: Exclusion of Flame Blow-Out from a TPRD', *Hydrogen*, vol. 5, no. 2, pp. 280-292. <https://doi.org/10.3390/hydrogen5020016>

**Kazemi, M, Brennan, S & Molkov, V** 2024, 'Numerical simulations of the critical diameter and flame stability for hydrogen flames', *International Journal of Hydrogen Energy*, vol. 59, pp. 591-603. <https://doi.org/10.1016/j.ijhydene.2024.02.039>

**Ling-Chin, J, Simpson, R, Cairns, A, Wu, D, Xie, Y, Song, D, Kashkarov, S, Molkov, V, Moutzouris, I & Wright, L et al.** 2024, 'Research and innovation identified to decarbonise the maritime sector', *Green Energy and Sustainability*, vol. 4, no. 1, 0001, pp. 1-14.  
<https://doi.org/10.47248/ges2404010001>

**Ma, H, Zhao, J, Huang, H, Zhang, J & Wang, Z** 2024, 'An experimental study on the spreading characteristics and burning behaviors of continuous spill fires under cross flow', *International Communications in Heat and Mass Transfer*, vol. 155, 107476, pp. 1-14.  
<https://doi.org/10.1016/j.icheatmasstransfer.2024.107476>

**McCord, M** 2023, 'A Review of Vertical Equity Measures in Property Assessments', *Journal of Property Tax Assessment and Administration*, vol. 20, no. 2.

**McCord, M, McCord, J, Davis, P, Haran, M & Squires, G** 2024, 'Do private rental tenants pay for energy efficiency?: The dynamics of green premiums and brown discounts', *Journal of Property Research*, vol. 41, no. 3, pp. 251-275.  
<https://doi.org/10.1080/09599916.2024.2349293>

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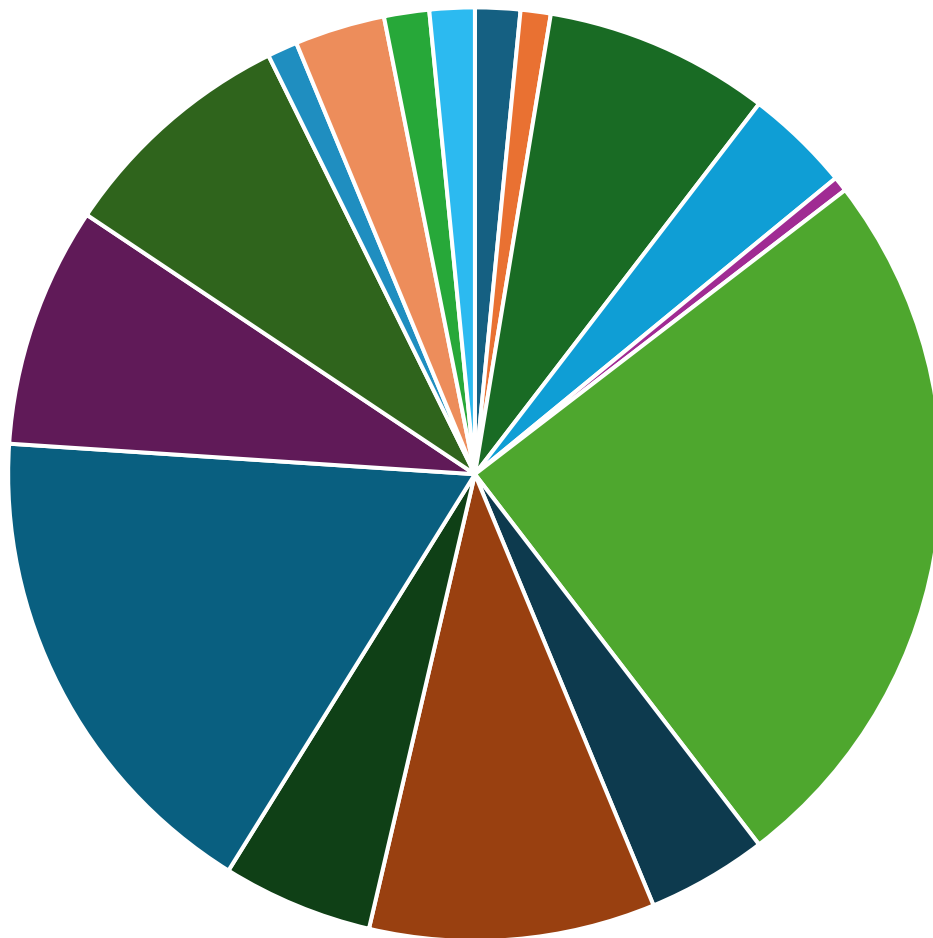
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# SUSTAINABLE DEVELOPMENT GOALS

Universities and knowledge institutions globally have a critical role to play in the achievement of the United Nations Sustainable Development Goals (SDGs). Here is a breakdown of the Research Outputs for the Belfast School of Architecture and the Built Environment, according to their SDGs.



- SDG 1 - No Poverty
- SDG 2 - Zero Hunger
- SDG 3 - Good Health and Well-being
- SDG 4 - Quality Education
- SDG 6 - Clean Water and Sanitation
- SDG 7 - Affordable and Clean Energy
- SDG 8 - Decent Work and Economic Growth
- SDG 9 - Industry, Innovation, and Infrastructure
- SDG 10 - Reduced Inequalities
- SDG 11 - Sustainable Cities and Communities
- SDG 12 - Responsible Consumption and Production
- SDG 13 - Climate Action
- SDG 14 - Life Below Water
- SDG 15 - Life on Land
- SDG 16 - Peace, Justice and Strong Institutions
- SDG 17 - Partnerships for the Goals



## 4. RESEARCH FUNDING

Portfolio of Research Grants awarded during period 1 August 2023 - 31 July 2024

UoA MEMBER(S)	PROJECT TITLE	FUNDER	VALUE	AWARD DATE
<b>Prof. Michaela Black</b> Prof. Neil Hewitt Prof. Jayanta Mondol	Artificial Intelligence Collaboration Centre (AICC)	Invest Northern Ireland	£13,830,161.00	24.08.2023
<b>Dr Sile Brennan</b> Prof. Vladimir Molkov	Safety of hydrogen blends in the NI gas network: Phase 1	NI Department for the Economy	£156,597.00	06.09.2023
<b>Prof. Justin Magee</b> Dr Saul Golden	AHRC Green Transition Ecosystem: Future Island-Island	Arts & Humanities Research Council	£4,112,377.00	12.09.2023
<b>Dr Svetlana Tretsiakova</b>	Toxins in Fire Suits	Ardmel Automation	£4,095.80	27.09.2023
<b>Prof. Vladimir Molkov</b> Prof. Dmitry Makarov	EPSRC Clean Maritime Research Partnership	Engineering & Physical Sciences Research Council	£486,223.81	19.10.2023
<b>Dr Saul Golden</b>	Collaborative Research & Teaching for Sustainable Urban Systems	British Council	£19,805.11	15.11.2023
<b>Dr Svetlana Tretsiakova</b>	Enhancing the fire safety of Li-ion batteries: a focus on the thermal degradation characteristics and combustion attributes of the electrolyte system	Royal Society of Chemistry	£5,000.00	13.12.2023
<b>Dr Heather Coleman</b> Dr Svetlana Tretsiakova	Low-cost sustainable water treatment for the removal of contaminants of concern in surface water and wastewater in Lagos, Nigeria	NI Department for the Economy	20,700.00	16.01.2024

<b>Prof. Phil Jordan</b> Prof. Neil Hewitt	Co-Centre for Climate + Biodiversity and Water	NI Department of Agriculture, Environment & Rural Affairs	£1,493,864.99	26.01.2024
<b>Dr Sile Brennan</b> Prof. Vladimir Molkov	The European Hydrogen Academy	Horizon Europe – Innovate UK Guarantee via IFS	£241,908.00	31.01.2024
<b>Prof. Gerard Leavey</b> Dr Saul Golden	Challenging Health Outcomes/Integrating Care Environments Ph3: A Community Consortium to Tackle Health Disparity for People Living with Mental Illness	Arts & Humanities Research Council	£1,594,028.00	23.02.2024
<b>Prof. Jayanta Mondol</b>	Participatory collaborative research to enhance climate change adaptation and mitigation in underserved communities in Asia and North- and South America	Social Sciences and Humanities Research Council	£29,243.57	29.02.2024
<b>Prof. Dmitry Makarov</b> Prof. Vladimir Molkov	DELHYVEHR	Horizon Europe – Innovate UK Guarantee via IFS	£525,823.00	13.03.2024
<b>Prof. Dmitry Makarov</b> Prof. Vladimir Molkov	LH2 refuelling (flexible funding of Network-H2)	Engineering & Physical Sciences Research Council	£39,997.32	28.03.2024
<b>Prof. Ye Huang</b> Dr Caterina Brandoni Professor Neil Hewitt Dr Angela Rolfe	Sustainable Production of 3-Hydroxypropionic acid and Biopolymers from Biomass	NI Department of Agriculture, Environment & Rural Affairs	£238,268.98	01.07.2024
<b>Prof. Neil Hewitt</b>	Peace Plus Geothermal	EU Programme for Peace and Reconciliation in Northern Ireland and the Border Region of Ireland	£472,880.09	25.07.2024

## 5. NOTE FROM THE ASSOCIATE DEAN

The 2023-24 Annual Research Report for the Belfast School of Architecture and the Built Environment reflects Ulster University's ongoing commitment to delivering impactful research excellence in areas that actively contribute to the economy of Northern Ireland and to society more generally.

The scope and scale of the research undertaken by the School is reflected in the high quality of the various outputs reported here and the direct positive impact that it is having on society through our various partnerships with industry and other national and international institutions.

The University Strategy: 'People, Place and Partnership' seeks to deliver 'Sustainable Futures for All' with research and innovation central to its success ([People, Place and Partnership - People, Place and Partnership](#)). The associated University Research Strategy (2023-2028) focuses on how our core values of Collaboration, Enhancing Potential, Inclusion, and Integrity underpin a sector-leading environment for the continued development of talent and opportunity across our designated research themes ([Ulster University Research Strategy 2023-2028](#)).

**“[W]e are focused on further increasing our world-leading and internationally excellent research that impacts both locally and globally[.]”**

As we to plan our submissions to relevant subject areas in the 2029 UK Research Excellence Framework exercise (REF2029), we are focused on further increasing our world-leading and internationally excellent research that impacts both locally and globally with Open Research as a central tenet of our ambitions.



**Professor Brian J. Meenan**

Associate Dean for Research and Innovation

### REF 2021



**ULSTER UNIVERSITY**  
(REF 2021)



**ARCHITECTURE,  
BUILT ENVIRONMENT  
AND PLANNING**  
(REF 2021)



**FOR RESEARCH CULTURE  
AND OVERALL SATISFACTION**

## Research Centres and Groups

Centre for Sustainable Technologies (**CST**)

Research on Property and Planning (**RPP**)

Fire Safety Engineering Research and Technology Centre (**FireSERT**)

Hydrogen Safety Engineering and Research (**HySAFER**)

Studies Allied to Built Environment Research (**SABER**)

Architecture Research Group (**ARG**)

