



**BUILT ENVIRONMENT
RESEARCH INSTITUTE
ANNUAL REPORT
1 AUGUST 2011 - 31 JULY 2012**

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I. FOREWORD BY THE RESEARCH INSTITUTE DIRECTOR



It is a great pleasure to present the Annual Report for the Built Environment Research Institute (BERI) for the academic year 2011-2012. In spite of the prevailing economic recession and cutbacks in funding, research in the Built Environment at the University of Ulster has enjoyed another highly successful year including the further development of our research infrastructure base, major success in research grant funding, publications by members in leading journals in the discipline areas and research student success. Significant external research funding through the Seventh Framework Programme (FP7) was achieved across the Institute with new awards in areas concerning renewable energy and alternative sources, urban security, infrastructure and safety considerations.

In this foreword, we briefly review the activities of the four research centres within the Built Environment Research Institute: the Centre for Sustainable Technologies (CST), the Fire Safety Engineering Research and Technology Centre (FireSERT), the Hydrogen Safety Engineering and Research Centre (HySAFER), and the Centre for Research on Property and Planning (RPP). The main report provides details of academic and research staff in the Research Institute, details of PhD projects and graduating PhDs, publications and conference papers delivered by staff in BERI and information on new research funding notified during the year.

In the Centre for Sustainable Technologies, there have been a significant number of external research awards which further the objective of developing new and renewable energy technologies and sustainable materials in relation to the built environment. Completion of new infrastructure projects funded by the Department for Employment and Learning for Northern Ireland and the University of Ulster under the Research Capital Investment Fund saw a range of new laboratory analysis equipment in bio-energy, the operation of which has furthered the aims of the Centre in developing innovative products and systems.



Launch of Terrace Street: School of Built Environment Secretary (Marianne Creaney) welcoming the Vice-Chancellor Professor Richard Barnett (left) and Dr Stephen Farry, MLA (right).

The major project arising from the infrastructure development funding was the completion of “Terrace Street” opened by Minister Dr Stephen Farry MLA on 25 January 2012. Consisting of two solid wall dwellings designed to the same specification as those originally built in Belfast the properties model pre-1919 solid wall houses that constitute circa 14% of Northern Ireland’s housing stock and which represent the greatest challenge in terms of retrofit. “Terrace Street” will verify the role of the digital economy in well-being monitoring as well as observing the indoor climate and air quality before and after energy interventions, and will be used to demonstrate the validity of retrofit strategies in terms of reduced environmental impacts and reduced energy consumption directly related to products (heat pumps, solar thermal and vacuum glazing) being developed in the Centre for Sustainable Technologies.

In the Fire Safety Engineering Research and Technology Centre current externally funded projects are examining building safety related to flashover and façade fires in collaboration with the State Fire Safety Laboratory, China and Tokyo University of Science, the assessment and evaluation of fire safe nano-particle materials through FP7 funding, the replacement of brominated fire retardants with environmentally compatible fire retardants, fire safety of aircraft composite materials (FP7 funded), the performance of structures (cellular beams) (EPSRC, FP7 funded), elliptic cross section columns in fire situations (EPSRC funded), merging flows during evacuation of high rise buildings and protection of gas lines from bonfires (with Phoenix gas). New European design rules were developed in a project on the fire resistance of long span cellular beams made of rolled profiles. Collaboration with Bombardier for aircraft fire safety and the assessment of composite material flammability is a major outcome of the research expertise within FireSERT. Key infrastructure development during the year included the upgrading of the Fire (Dynamics) and Materials Laboratory through the purchase and development of new equipment for material flammability assessment including a tube furnace, gas chromatography, infrared thermal degradation and rheological analysis.



FireSERT laboratory: testing of 7.5m span Cellular steel beams

FireSERT hosted two conferences over the past year both aligned to major on-going research projects. The September 2011 conference focused on the AIRCRAFT FIRE project and in March 2012 the ENFIRO project, the latter concerning environmentally friendly fire retardants was attended by engineers and scientists from UK, Ireland, Holland, Sweden, Germany, Italy and local industry representatives from Northern Ireland. Conclusions stemming from the seminar and the wider world leading ENFIRO project are influencing European regulations in restricting the use of brominated fire retardants.

The HySAFER Centre has been involved in five European funded research projects over the year. This research is addressing the key challenges for the rollout of hydrogen and fuel cell systems. In this respect, the HyIndoor project, on the safe indoor use of fuel cells and hydrogen systems, is focusing on closing knowledge

gaps in hydrogen releases and dispersion with different levels of natural ventilation, mitigation of deflagrations and limits for self-extinction of under-ventilated hydrogen fires.



Professor Vladimir Molkov and colleagues at a HyIndoor meeting in Athens, June 2012

HySAFER has long established and new collaborations with Japanese partners. This year Prof Vladimir Molkov visited Japan as an adviser to the University of Tokyo explosion programme. During the visit he discussed hydrogen safety issues with representatives of Toyota and Honda.



Professor Vladimir Molkov (centre photograph) at the University of Tokyo

The Centre for Research on Property and Planning, in February 2012, hosted the sixth International Annual Planning, Law and Property Rights Conference. The four-day conference attracted delegates from as far afield as Australia, South Africa, Canada, North America and Israel. Topics under discussion included: planning for climate change; coastal erosion and flooding; affordable housing and land values; regeneration and community engagement. The spotlight was cast on the economic and legal dimensions of land use and the ways in which property rights can ensure land is utilised in the wider public interest.

The Centre enjoyed considerable funding success over the year notably through FP7 including the BESECURE project designed to enhance best practice security policy in urban areas including factors which may encourage or discourage economic prosperity. Two further FP7 funded security proposals, HARMONISE and COBACORE, concern delivering solutions for enhancing resilience in large scale, urban built infrastructure and developing a post crisis needs assessment tool, for enhancing reconstruction and recovery.

Research within RPP has continued to inform policy strongly notably in relation to the housing market from the perspective of both the private sector, monitoring the performance of the sales (in conjunction with the NIHE and the Bank of Ireland) and rental markets (NIHE with PropertyNews.com) and the analysis of land bank information funded through the National Asset Management Agency and the NIHE. Staff members of RPP have been highly visible at international conferences with several staff members delivering keynote presentations.

Across the four research centres in BERI, doctoral students represent a major source of research innovation. Over the course of the year 80 students were registered for PhD study on either a part-time and full-time basis with 15 graduating.



Graduation July 2012: four graduating PhD research students from the Centre for Research on Property and Planning, Martin Hinch, Louise Brown, Joseph Odeleye and Hugh Kelly with Professor Alastair Adair and Professor Stanley McGreal

This annual report provides a snapshot of the activities within the Built Environment Research Institute during 2011-2012. My colleagues are always willing to discuss their research with interested parties in further detail. For further information and contact details please consult our website <http://www.beri.ulster.ac.uk/>.

Professor Stanley McGreal
Director Built Environment Research Institute

2. RESEARCH INSTITUTE: ACADEMIC STAFF MEMBERS STATUS AT 31 JULY 2012

Surname	Forename	Title	Position	Institute Status
Adair	Alastair	Prof	PVC (Communication & Development)	Core
Ali	Faris	Prof	Professor of Structural Engineering	Core
Anderson	Mark	Mr	Lecturer	Associate
Berry	James	Prof	Professor in Urban Planning & Property Development	Core
Blair	Neale	Dr	Senior Lecturer	Core
Boyce	Karen	Dr	Senior Lecturer	Core
Bragin	Maxim	Dr	Lecturer	Associate
Brennan	Sile	Dr	Lecturer	Associate
Brown	Louise	Dr	Lecturer	Associate
Choi	Seng-Kwan	Dr	Lecturer	Core
Dahoe	Arief	Dr	Lecturer	Associate
Davis	Peadar	Dr	Lecturer	Associate
Davison	Lisa	Dr	Lecturer	Core
Delichatsios	Michael	Prof	Professor of Fire Dynamics and Flammability/Director of FireSERT	Core
Eadie	Robert	Dr	Lecturer	Associate
Gray	Paddy	Prof	Professor of Housing	Associate
Griffiths	Philip	Dr	Associate Head of School	Core
Grissom	Terry	Dr	Lecturer	Core
Haran	Imelda	Dr	Lecturer	Associate
Heaney	George	Prof	Professor of Construction	Core
Hemphill	Lesley	Dr	Lecturer	Associate
Hewitt	Neil	Prof	Professor of Energy/Director of CST	Core
Hine	Julian	Prof	Professor of Transport	Core
Huang	Ming Jun	Dr	Lecturer	Core
Huang	Ye	Dr	Lecturer	Core
Hyde	Trevor	Dr	Reader	Core
Joseph	Paul	Dr	Lecturer	Core
Kashyap	Anil	Dr	Lecturer	Associate
Keenan	Michaela	Dr	Lecturer	Associate
Lim	Lay-Cheng	Dr	Senior Lecturer	Core
Lloyd	Greg	Prof	Professor of Urban Planning/ Head of School of the Built Environment	Core
Lyness	John	Dr	Reader	Associate
MacIntyre	Sean	Mr	Senior Lecturer	Associate
Makarov	Dmitriy	Dr	Reader	Core
Martinez-Perez	Alona	Mrs	Lecturer	Associate
McAnulty	Ursula	Ms	Lecturer	Associate
McCluskey	William	Dr	Reader	Core
McConnell	Nigel	Dr	Lecturer	Associate
McCord	Michael	Dr	Lecturer	Associate

Surname	Forename	Title	Position	Institute Status
McDermott	Rodney	Mr	Lecturer	Associate
McGreal	Stanley	Prof	Professor of Property Research/ Director of BERI and RPP	Core
McIlveen-Wright	David	Dr	Lecturer	Core
McKeown	Clare	Ms	Lecturer	Associate
McLernon	Tim	Dr	Senior Lecturer	Associate
McPhillips	Karen	Dr	Lecturer	Associate
McQueen	Michael	Mr	Lecturer	Associate
Millar	Phillip	Mr	Lecturer	Associate
Molkov	Vladimir	Prof	Professor of Fire Safety Science/ Director of HySAFER	Core
Mondol	Jayanta	Dr	Lecturer	Core
Murphy	Martina	Dr	Lecturer	Associate
Nadjai	Ali	Prof	Professor of Fire Structural Engineering	Core
Novozhilov	Vasily	Prof	Professor in Fire Dynamics	Core
Odeyinka	Henry	Dr	Lecturer	Core
Peel	Deborah	Prof	Professor of Planning Research and Scholarship	Core
Pimenidou	Panagiota	Dr	Lecturer	Associate
Rafferty	Gavan	Mr	Lecturer	Associate
Ritchie	Heather	Dr	Lecturer	Associate
Ryan	Donal	Dr	Lecturer	Associate
Saffers	Jean-Bernard	Dr	Lecturer	Associate
Smyth	Mervyn	Dr	Reader	Core
Strong	Alan	Mr	Senior Lecturer	Associate
Van der Krabben	Erwin	Prof	Professor of Real Estate	Core
Woodside	Alan	Prof	Professor of Highway Engineering	Associate
Woodward	David	Dr	Reader	Core
Yohanis	Yigsaw	Prof	Professor of Building Services Engineering	Core
Zhang	Jianping	Dr	Lecturer	Core

3. RESEARCH INSTITUTE: RESEARCH STAFF MEMBERS STATUS AT 31 JULY 2012

Surname	Forename	Title	Position	Research Centre
Byrne	Cormac	Dr	Research Associate	FireSERT
Dave	Ashok	Mr	Research Assistant	CST
Fang	Yueping	Dr	Research Fellow	CST
Goodfellow	Nathan	Dr	Research Assistant	FireSERT
Haran	Martin	Dr	Senior Research Fellow	RPP
Keatley	Patrick	Dr	Research Associate	CST
Mcllhatton	David	Dr	Research Associate	RPP
McLarnon	Dominic	Mr	Research Fellow	CST
Novaes	Marcio	Mr	Research Associate	CST
Ramani	Alwar	Dr	Research Assistant	FireSERT
Redpath	David	Dr	Research Associate	CST
Rezvani	Sina	Dr	Research Fellow	CST
Suzanne	Mathieu	Dr	Research Assistant	FireSERT
Zacharopoulos	Aggelos	Dr	Research Fellow	CST

4. RESEARCH STUDENTS

The following research students were registered on research degree programmes in the Institute during 2011-2012.

Student Name	Thesis Title
Adi Maimun, Nural Hana	The economic values of green residential buildings
Akbar, Muhammad R	Sustainable Technologies, Environmental Subsidies, End User Needs and Business Opportunities in the delivery of Zero Carbon Homes
Akram, Waseem	Car culture and city design
Alexander, Gareth O	Novel floor constructions to improve the performance and energy efficiency of ground source heat pump (GSHP) powered underfloor heating
Ali, Sadiq	Thermal / Mechanical / Electrical storage systems suitable for deployment in the Built Environment
Anderson, Mark T	Biomass pelletisation, fuel variability and pelletisation for co-gassification process
Arya, Farid	Producing cheap vacuum glazing sheets which can be cut in different sizes
Atefi Aghayan, Hooman	Developing a numerical method for simulating intumescent materials in fire
Banerjee, Urbi	Effect of urban form on dynamic nature of travel behaviour
Byrne, Conor	Dynamical System (lattice Boltzmann) Modelling of Compartment Fires
Byrne, Orla M	Investigation into the potential practical application of “smart growth” within an Irish case study
Caldwell, Stephen	A study into sustainable bitumen use
Clarke, Mervyn C	Strategic property performance management
Dave, Ashok	Techno – Economic assessment of novel IGCC systems with CO ₂ capture
Dixon, Andrew JP	Experimental studies to investigate merging behaviour in a staircase
Eghbalighazijahani, Amir	Governance and planning policies to increase the resilience of urban areas to climate change
Eni, Sabariah	Value Capture Model as a Financial Tool for Urban Regeneration
Firth, Simona	Vacuum window performance evaluation and characterisation
Friel, Shaun	Early life skid resistance
Gamu, Faoziah	Analysing real estate values in emerging economies. A case study of Nigeria
Ghayur, Muhammad A	Techno-economic modelling of bio-refinery concepts
Golden, Saul	Urban design decision support systems - assessment tools for successful urban civic space
Gunasekera, Sanwara	Modelling the relationship between organisational and supply chain performance in the construction industry
Hardie, Brian	The behaviour of compartment masonry walls in fires
Harpur, Amy	Development and analysis of a database on dwelling fire deaths in Northern Ireland
Harrison, Justin	Sustainable communities - mapping and measuring the balance of trade-offs
Kashyap, Poonam	Innovative storage systems suitable for deployment in the Built Environment
Keenan, James J	Modelling and LES of vented hydrogen-air deflagrations
Keig, Peter Richard	An investigation into establishing a hierarchy of sequential retrofit solutions
Kelly, Rachel Mary	NAMA: asset management on non performing real estate in a depressed economy

Student Name	Thesis Title
Larkin, Keren	Modelling risk impacts on variability between contract sum and final account in contractor design and build projects
Lewis, John	Innovation in construction procurement – case based reasoning and artificial intelligence techniques
Lytvyn, Iurii V	Novel Evacuated Glazing System
Mahmoud, Moataz	Design, access and security in public transport infrastructure (an integrated assessment tool for sustainable public transportation)
McClelland, Andrew G	The anatomy of architectural heritage destruction in Northern Ireland from the 1960s to the 21st Century
McClements, Sharon	Selection of consultants based on trust
McDermott, Eva	Articulating heritage values
McDermott, Rodney PJ	A framework for the sustainable management of public health engineering pipelines
McDonald, Kiera E	The linkages between mobility and lifestyle: an analysis of older people's travel behaviour in Northern Ireland
McElduff, Linda	Regenerating coastal communities on the Island of Ireland
McKeown, Paul J	Legislative and operational issues for sustainable urban drainage systems
McNally, Yvonne	Energy saving via retrofit compared to replacement housing
McQuaid, Grainne	Potholes in asphalt surfacing materials
Mellor, Kate	Slippery surfaces: photography, architecture and the cityscape of seduction
Millar, Philip	A Spatial Rationale for Engineering Performance of Highway Surface Materials based on Digital Photogrammetry
Minic, Ivica	An experimental study of air-source heat pump defrosting using solar collector as heating source
Mitchell, Ruth	Durability of warm asphalts for road surfaces
Moorehead, Donagh	Tradable heat - using Northern Ireland as a demonstrator for resource mapping, demand mapping and transport concepts
Moss, John	Sustainable Rural Communities – A Carbon Model
Murray, Aaron	A study in traffic planning
Naili, El-Hadi A	Behaviour of composite floor structures in fire
Novaes, Marcio F	Oilseed rape as a potential feedstock for domestic boilers
O'Brien, Vincent	Development and performance evaluation of nano-encapsulated solar concentrating panels and their potential for modular construction techniques
Petrou, Klelia	Fire compartments having long span cellular steel beams
Quigley, Denise	Achieving an optimum balance across capital, life-cycle and environmental costs
Quinn, Matthew V	Heat pumps digital compressor
Quinn, Michael	Behaviour of glazing panel systems in tall buildings
Redpath, Gwyneth M	Risk mapping of minor ('B' Class) roads in rural Northern Ireland, reasons for the high proportion of collisions resulting in death or serious injuries, especially to young drivers
Rolfe, Angela	Integrated wind-compressed air energy storage system with combined heating and cooling
Salehi Kouhestani, Mohammad	Investigation on advanced heat pumps in domestic appliances

Student Name	Thesis Title
Samsudin, Salfarina	Exploring the role of land administration in supporting sustainable land use management
Scullion, Thomas	Performance of axially restrained steel columns subjected to severe fire
Shah, Nikhil K	Vapour compression heat pumps driven by advanced engine concepts and incorporating heat recovery
Shentsov, Volodymyr	Indoor Use of Fuel Cell and Hydrogen Systems
Williamson, Oscar	Assessing driver behaviour due to in-car distractions
Yi, Sung-Hee	Research on characteristics of fire behaviour and heat release rate of Korean high-rise buildings with state-of-the-art interior materials

Graduated December 2011

Student Name	Thesis Title
Colclough, Shane	Thermal energy storage
Khamkanya, Thadsin	Analysis of the holistic approach to workplace environments, management systems and new technologies in meeting corporate end-user requirements
McGrath, John	Interchange and travel choice: implications for mode shift
Paul, Damasen	Characterisation of Solar Concentrating Systems for Photovoltaics and their Impact on Performance

Graduated July 2012

Student Name	Thesis Title
Brown, Louise	Time on the market for single family residential property: the UK perspective
Doheim, Rahma	Development of a performance-based approach in fire codes in Egyptian architecture
Hinch, Martin	The liquidity crisis within real estate markets
Keatley, Patrick	Dynamic techno-economic analysis of power generation systems
Kelly, Hugh F	24-hour cities: advantages in commercial real estate investment
Lytvyn, Inna F	Techno-economic modelling of all-Ireland energy system
Nase, Ilir	Impact of quality led design on real estate value and performance
Oyedele, Joseph	Capital markets and innovative vehicles for financing infrastructure
Sultan, Zahid	Managing transport demand and sustainable transport
Ukleja, Sebastian S	Production of smoke and CO in enclosure fires
Zanjiri, Yasser	Urban regeneration policies towards a sustainable urban space development in Tehran

5. RESEARCH PUBLICATIONS

- Adair,A, McGreal, S and McIlhatton, D (2011) Northern Ireland Quarterly House Price Index for Q2 2011 Report 107. Northern Ireland Housing Executive and Bank of Ireland. University of Ulster, pp 8.
- Adair,A, McGreal, S and McIlhatton, D (2011) Northern Ireland Quarterly House Price Index for Q3 2011 Report 108. Northern Ireland Housing Executive and Bank of Ireland. University of Ulster, pp 8.
- Adair,A, McGreal, S and McIlhatton, D (2012) Northern Ireland Quarterly House Price Index for Q4 2011 Report 109. Northern Ireland Housing Executive and Bank of Ireland. University of Ulster, pp 8.
- Adair,A, McGreal, S and McIlhatton, D (2012) Northern Ireland Quarterly House Price Index for Q1 2012 Report 110. Northern Ireland Housing Executive and Bank of Ireland. University of Ulster, pp 8.
- Agyenim, F, Eames, P and Smyth, M (2011) Experimental study on the melting and solidification behaviour of a medium temperature phase change storage material (Erythritol) system augmented with fins to power a LiBr/H₂O absorption cooling system. *Renewable Energy*, 36 (1). pp. 108-117.
- Ahern,A and Hine, J (2012) Rural transport - valuing the mobility of older people. *Research in Transportation Economics*, 34 (1). pp. 27-34.
- Akram,W, Hine, J and Berry, J (2011) Transport governance, structures and policy implementation:A methodological framework. In: Irish Transport Research Network Annual Conference, University College Cork. Irish Transport Research Network, pp 8.
- Ali, F, Jeffers, A, Goodfellow, N, Nadjai, A, Scullion, T and Gardner, J (2012) Performance of Axially Restrained Hollow and Concrete Filled Oval Steel Columns Subjected to Hydrocarbon Fire. *Journal of Structural Fire Engineering*, 3 (2). pp. 181-198.
- Ali, F and Nadjai, A (2011) An Experimental and Numerical Investigation on the Performance of High Strength Concrete Slabs During Fire. In: *Innovations in Fire Design of Concrete Structures*. American Concrete Institute, Detroit, pp. 1-32.
- Artamendi, I, Phillips, P, Allen, B and Woodward, D (2012) An assessment of the evolution of the skid resistance of proprietary asphalt surfacings in the UK. In: *5th Eurasphalt & Eurobitume Congress*, Istanbul. Eecongress. pp 11.
- Baraldi, D, Papanikolaou, E, Heitsch, M, Moretto, P, Cant, RS, Roekaerts, D, Dorofeev, S, Kotchourko, A, Middha, P, Tchouvelev, AP, Ledin, S, Wen, J, Venetsanos, A and Molkov, V (2011) Prioritisation of Research and Development for modelling the safe production, storage, delivery and use of hydrogen. European Commission. Publications Office of the European Union, pp 50.
- Bragin, M and Molkov, V (2011) Effect of storage pressure on transient combustion of hydrogen released through a pipe to the atmosphere. In: *Proceedings of the Sixth International Seminar on Fire and Explosion Hazards*. Research Publishing, Singapore, pp. 473-480
- Brennan, S, Makarov, D and Molkov, V (2011) Dynamics of flammable hydrogen-air mixture formation in an enclosure with a single vent. In: *Proceedings of the Sixth International Seminar on Fire and Explosion Hazards*. (Eds: Bradley, D, Makhviladze, G and Molkov, V), Research Publishing, Leeds, pp. 493-503.
- Clapham, D, Mackie, P, Orford, S, Buckley, K, Thomas, I, Atherton, I and McAnulty, U (2012) *Housing Options and Solutions for Young People in 2020*. Joseph Rowntree Foundation. pp 72.
- Cucchiarelli, P and McGreal, S (2012) Real Estate Agents. *International Encyclopedia of Housing and Home*, 6. pp. 16-21.

- Danson, MW and Lloyd, MG (2012) Devolution, institutions and organisations: changing models of regional development agencies. *Environment and Planning C: Government and Policy*, 30 (1). pp. 78-94.
- Davis, P, McCluskey, WJ, Grissom, T and McCord, M (2012) An empirical analysis of simplified valuation approaches for residential property tax purposes. *Property Management*, 30 (3). pp. 232-254.
- Davison, L, Enoch, M, Ryley, T, Quddus, M and Wang, C (2012) Identifying potential market niches for Demand Responsive Transport. *Research in Transportation Business & Management*, pp 12.
- Delichatsios, M and Zhang, J (2012) An alternative way for the ignition times for solids with radiation absorption in-depth by simple asymptotic solutions. *Fire and Materials*, 36 (1). pp. 41-47.
- DeLisle, J and Grissom, TV (2011) Valuation procedure and cycles: an emphasis on down markets. *Journal of Property Investment & Finance*, 29 (4/5). pp. 384-427.
- Eadie, R and Millar, P (2011) Student Induction: A Critical Appraisal of Civil Engineering Undergraduates' Perceptions of the Transition to Tertiary Education. *CEBE Transactions*, 8 (1). pp. 60-73.
- Eadie, R, Perera, S and Heaney, SG (2011) Key process area mapping in the production of an e-capability maturity model for UK construction organisations. *Journal of Financial Management of Property and Construction*, 16 (3). pp. 197-210.
- Eadie, R, Millar, P, Perera, S, Heaney, G and Barton, G (2012) E-readiness of construction contract forms and e-tendering software. *International Journal of Procurement Management*, 5 (1). pp. 1-26.
- Eadie, R, Rodgers, J, McKeown, C and Smyth, P (2012) An analysis of public sector prequalification procedures in Northern Ireland. *International Journal of Procurement Management*, 5 (3). pp. 273-288.
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- Hewitt, N, Huang, MJ, Anderson, M and Quinn, M (2011) Advanced Air Source Heat Pumps for UK and European Domestic Buildings. *Applied Thermal Engineering*, 31. pp. 3713-3719.
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- Joseph, P, Tretsiakova-McNally, S and McKenna, S (2012) Characterization of cellulosic wastes and gaseous products from chicken farms. *Waste Management*, 32 (1). pp. 701-709.
- Joseph, P, Tretsiakova-McNally, S, Spiers, D and Polley, R (2012) A preliminary investigation into the efficacies of different adsorbents for neutralising formaldehyde from graveyards. *Journal of Environmental Health Research*, 11 (2). pp. 105-115.
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5.1 Conference Papers

- Adair, A, Berry, J, Haran, M, Hemphill, L, Hutchison, N, Gulati, M, Kashyap, A, Liu, N, McCord, M, McGreal, S, Oyedele, J and Tiwari, P (2012) New Approaches to Private Sector Funding of Public Sector Property: A Global Perspective, International Real Estate Research Symposium, Kuala Lumpur, April 2012.
- Anderson, M, (2011) Set Up and Experimental Operations of a Micro Throated Downdraft Gasifier Designed for Testing of Biomass Fuels, International Nordic Bioenergy Conference, Jyväskylä, Finland, September 2011.
- Boyce, K (2012) Evacuation of People with Disabilities – Recent Research, Northern Ireland Fire Safety Panel Annual Conference, Ballymena, February 2012.
- Bragin, MV, Makarov, DV and Molkov, VV (2011) Pressure limit of hydrogen spontaneous ignition in at T-shaped channel. Fourth International Conference on Hydrogen Safety, San Francisco, September 2011.
- Brennan, S and Molkov, V (2011) Safety assessment of unignited hydrogen discharge from onboard storage in garages with low levels of natural ventilation. 4th International Conference on Hydrogen Safety, San Francisco, September 2011.
- Croft, N, Peel, D, Ritchie, H and Sheppard, A (2012) Ready, Steady, Plan: serving up over ready planners – a teaching exchange between the universities of Ulster and West of England, 6th International Association on Planning, Law and Property Rights. Rights, Responsibilities in Land Use Planning, Belfast, February, 2012
- Davison, L, Enoch, M, Quddus, M and Wang, C. (2011) Demand Responsive Transport schemes in England: A Survey, Royal Geographical Society – Institute of British Geographers Annual Conference, London, August 2011.
- Davison, L, Enoch, M, Black, C, and Enemark, A (2011) Mobility Management in a Resource-Constrained World: Are Local Travel Plan Networks the Answer? Aalborg, August 2011.
- Davison, L, Enoch, M, Ryley, T, Quddus, M and Wang, C (2012) A survey of demand responsive transport in Great Britain. 91st Annual Meeting of the Transportation Research Board, Washington, January 2012.
- Davison, L, Enoch, M and Ison, S (2012) Lessons learnt from travel plan plus, 7th Strathclyde Passenger Transport Travel Plan Seminar, Glasgow, February 2012.
- Gibb, K, McGreal, S and Wong, C (2011) Fragile Recovery: A Housing and Neighbourhoods Analysis of Policy and Process across the UK, ESRA Meeting, Barcelona, September 2011.
- Gray, P and Mc Anulty, U (2011) The Private Rented Sector in Northern Ireland - Research evidence based on the Continuous Household Survey and House Condition Surveys and Landlord Interviews, ESDS Government 2011 Research Conference; Housing, Neighbourhood and Local Environment, London, October 2011.
- Gray, P (2011) The Future of Housing in Northern Ireland, University of Ulster, Jordanstown, November 2011.
- Gray, P (2011) UK and Global trends in Housing and Regeneration, Property Management and Hazards Mitigation International Conference, Taipei, November 2011.
- Gray, P, Mc Anulty, U and Shanks, P (2012) Vulnerable households and The Private Rented Sector in NI, European Network for Housing Research Conference Seminar. Oxford, March 2012.
- Gray, P and Mc Anulty, A (2012) The Private Rented Sector in NI, Housing Studies Association, York, April 2012.
- Gray, P (2012) Housing and Ex Offenders, University of Ulster, Jordanstown, May 2012.

- Gray, P, Mc Anulty, U and Shanks, P (2011) The Views of Landlords and Tenants in the Private Rented Sector, European Network for Housing Research 24th Annual Conference, Lillehammer, June 2012.
- Grissom, T, McCord, M, McGreal, S and McIlhatton, D (2012) Analysing the cyclical co-integration of house price diffusion in Northern Ireland, 19th European Real Estate Society Conference, Edinburgh, June 2012.
- Halsall, J, Lloyd, M.G, Peel, D and Pemberton, S (2011) Community Governance – where did it all go wrong? 2011 UK/Ireland Planning Research Conference ‘Planning Resilient Communities in Challenging Times’, Birmingham, September 2011.
- Haran, M, Adair, A, Berry, J, McCord, M and McGreal, S (2012) Public Private Partnerships (3Ps): Exploring the attributes from an investment perspective, 28th Annual Meeting of the American Real Estate Society, Florida, April 2012.
- Haran, M, Davis, P and McCord, M (2012) Competing or Complementary: The Role of Unlisted Real Estate within a Multi-Asset Investment Portfolio, 19th European Real Estate Society Conference, Edinburgh, June 2012.
- Hemphill, L, Berry, J and McGreal, S (2012) An analysis of the financial and investment capacity of business improvement districts, 19th European Real Estate Society Conference, Edinburgh, June 2012.
- Hewitt, NJ, Huang, MJ, Griffiths, PW (2011) High temperature lift retrofit heat pumps for upgrading district heating and seasonal thermal energy stores, 23rd IIR International Congress of Refrigeration, Prague, August 2011.
- Hutchison, N, Adair, A, Berry, J, Haran, M and McGreal, S (2012) Tax incremental financing: the key ingredients, 19th European Real Estate Society Conference, Edinburgh, June 2012.
- Kitagawa, K, Joseph, P, Novozhilov, V and Shimada, T (2012) Characteristics of chemically modified and nano-composite polymers as novel fuels for hybrid rocket propulsion”, 9th International Symposium on Special Topics in Chemical Propulsion, Quebec, July 2012.
- Kitagawa, K, Joseph, P, Novozhilov, V and Shimada, T (2012) Chemically-modified and nano-composite polymeric substrates for novel fuels for hybrid propulsion, Space Propulsion 2012, Bordeaux, May 2012.
- Kitagawa, K, Joseph, P, Novozhilov, V and Shimada, T (2011) Novel fuels based on chemically modified polymers with Si for hybrid rocket propulsion, 8th International Conference on Flow Dynamics, Sendai, November 2011.
- Lloyd, MG and Peel, D (2012) Towards Territorial Cohesion? Spatial Planning on the Island of Ireland, 25th Silver Jubilee AESOP 2012 Annual Conference ‘Planning to Achieve / Planning to Avoid: The Need for New Discourses and Practices in Spatial Development and Planning’, Ankara, July 2012.
- Lloyd, MG, Duck, RW and Peel, D (2011) Spatial planning as a tool for adaptation, IMCORE (Innovative Management for Europe’s Changing Coastal Resource) International Conference ‘Adapting to Coastal Change: local perspectives’, The Hague, September 2011.
- Lloyd, MG (2012) Corruption and the abuse of power in land and property development? 6th International Conference of the International Association of Planning, Law and Property Rights, ‘Rights, Responsibilities and Equity in Land Use Planning’, Belfast, February 2012.
- Lloyd, MG (2012) Opportunities from waste – beyond regulation to innovation Planning Aid for Scotland Conference 2012 – Can we cope with zero waste? Planning our way to a zero waste future. Edinburgh, March 2012.
- McCord, M, Grissom, T, Davis, P and McGreal, S (2012) The Cyclical Dynamics of Northern Ireland House Prices, 28th Annual Meeting of the American Real Estate Society, Florida, April 2012.

- McGreal, S (2012) Property: Nexus of Place and Space, Security and Performance 18th Pacific Rim Real Estate Society Conference, Adelaide, January 2012.
- McIlhatton, D, McCord, M, McGreal, S, Haran, M and Davis, P (2012) Determining price: going spatial, local and high tech, 28th Annual Meeting of the American Real Estate Society, Florida, April 2012.
- McIlhatton, D and McGreal, S (2012) Examining the performance of the Northern Ireland housing market and key issues for the future, Northern Ireland Housing Conference. Belfast, January 2012.
- MacIntyre, S and McKay, S (2012) Open Space Provision, Making Room for Healthy Lives. Sixth International Annual Planning, Law and Property Rights Conference, Belfast, February 2012.
- Molkov, VV and Saffers, JB (2011) Introduction to hydrogen safety engineering. Fourth International Conference on Hydrogen Safety, San Francisco, September 2011.
- Newell, G, McGreal, S and Kupke, V (2012) The Significance of Capital Flows into the Australian Commercial Property Markets, 18th Pacific Rim Real Estate Society Conference, Adelaide, January 2012.
- Peel, D (2012) Rights and Behaviours in Coastal and Marine Knowledge Exchange: An Information Science Perspective, International Academic Association on Planning, Law and Property Rights 6th Annual Conference 'Rights, Responsibilities and Equity in Land Use Planning', Belfast, February 2012.
- Peel, D, Aning Tedong, P, Nor Azriyati, W, Rosly Hanif, N and Lloyd, MG (2012) Good Fences Make Good Neighbours? Neighbourhood Securitisation and Community-driven Planning, UK-Ireland Planning Research Annual Conference 'Building Communities: Transforming Neighbourhoods into Community Spaces', Brighton, April 2012.
- Peel, D, Duck, R and Lloyd, M.G (2011) On the Move? Planning Issues for Coastal Caravan Parks 2011 UK/ Ireland Planning Research Conference 'Planning Resilient Communities in Challenging Times', Birmingham, September 2011.
- Peel, D and Lloyd, MG (2012) Judicial Review: Courts, Costs and the Common Good, 25th Silver Jubilee AESOP 2012 Annual Conference 'Planning to Achieve / Planning to Avoid: The Need for New Discourses and Practices in Spatial Development and Planning', Ankara, July 2012.
- Pemberton, S, Peel, D and Lloyd, MG (2012) Neighbourhood planning in the Celtic fringe and England: informing democratic engagement and resilience? Royal Geographical Society with Institute of British Geographers Annual International Conference, Edinburgh, July 2012.
- Quinn, MV, Hewitt, NJ, Smyth, M (2011) Comparison of the COP of an air-source EVI heat pump with and without a variable speed drive, 23rd IIR International Congress of Refrigeration, Prague, August 2011.
- Rafferty, G (2012) Where planning meets peace-building: Embracing the creation of shared space through community planning, UK-Ireland Planning Research Conference, Brighton, April 2012.
- Rafferty, G (2012) Theorising the role of planning and planners in reconciling urban conflicts: The case of Belfast, RGS-IBG Annual International Conference, Edinburgh, July 2012.
- Rossini, P, Kupke, V, Kershaw, P and McGreal, S (2012) An analysis of time on market and advertised to sale price differences over time, 19th European Real Estate Society Conference, Edinburgh, June 2012.
- Salehi Kouhestani, M, Hewitt, NJ, Huang, MJ (2011) Developing a combined compressor expander heat pump – experimental evaluation of the compressor & expander, 23rd IIR International Congress of Refrigeration, Prague, August 2011.

Shah, NN, Hewitt, NJ, Huang, MJ (2011) A review of diesel engine driven heat pumps (DEHPs) and their potential in the UK domestic sector, 23rd IIR International Congress of Refrigeration, Prague, August 2011.

Taltavull, P and McGreal, S (2012) The fallacy of house price appreciation: new evidence from a spatio-time and quality adjusted index, XV Applied Economics meeting, Coruna, June 2012.

Wang, C, Quddus, M, Enoch, M, Ryley, T and Davison, L (2012) The impact of socio-economic factors on the demand for demand responsive transport (DRT) in Greater Manchester: a multilevel modelling approach. 91st Annual Meeting of the Transportation Research Board, Washington, January 2012.

Wang, C, Quddus, M, Enoch, M, Ryley, T and Davison, L (2012) Spatial models in transport: a review and assessment of data and methodological issues. 91st Annual Meeting of the Transportation Research Board, Washington, January 2012.

**6. RESEARCH FUNDING: NEW AWARDS NOTIFIED -
1 AUGUST 2011 - 31 JULY 2012**

Research Institute Member	Title of Award	Funding Body	Value
Adair, Prof AS McGreal, Prof WS	Northern Ireland Quarterly House Price Index	Bank of Ireland	£30,000
Adair, Prof AS Berry, Prof JN Haran, Dr M McCluskey, Dr WJ McGreal, Prof WS	Northern Ireland Commercial Property Index	Dept of Social Development, Belfast City Council, and Estate Agency Practices	£40,800
Adair, Prof A Berry, Prof J Haran, Dr M Kashyap, Dr A McCord, Dr M McGreal, Prof S Smyth, Mr C	Value for Money Framework for PPP/PFI	Royal Institution of Chartered Surveyors	£27,500
Choi, Dr SK Zhang, Dr J	Fundamental Technologies for Development of Nanoclay Dispersed in tumescent polymer composition in Applications for Built Environments and Automobiles	Korea Evaluation Institute of Industrial Technology	£174,000
Haran, Dr M Adair, Prof AS Berry, Prof JN McGreal, Prof WS McIlhatton, Dr D	Development Land in Northern Ireland	National Asset Management Agency	£20,000
Haran, Dr M Davis, Dr PT McCord, Dr M McGreal, Prof WS Grissom, Dr TV	Commercial Real Estate Investment: Convegence, Cyclicity and Portfolio Optimisation	EPRA European Public Real Estate Association	£6,900
Hewitt, Prof NJ Griffiths, Dr PW Huang, Dr M Yohanis, Prof YG	EINSTEIN: Effective Integration of Seasonal Thermal Energy Storage Systems in Existing Buildings	CEC - Framework 7	£429,415
Hewitt, Prof NJ Huang, Dr Y	TEMPO: Total Energy Management for Production Operations	Enterprise Ireland	£196,722
Hewitt, Prof NJ Griffiths, Dr PW Anderson Mr M	CESAR: Cost Effective Solar Air Conditioning	CEC - Framework 7	£119,787

Research Institute Member	Title of Award	Funding Body	Value
Hewitt, Prof NJ Huang, Dr MJ Anderson Mr M	SuLA: Sustainable Living Assistant	NPP – Interreg EU	£109,816
Joseph, Dr P Byrne, Dr J McBride, Dr N	KTP Programme between the University of Ulster and Precision Processing Services Ltd, Northern Ireland	The Technology Strategy Board and Precision Processing Services Limited, Northern Ireland	£107,200
Keatley, Dr P	Fusion Project with Transmission Links Ireland Limited	Intertrade Ireland	£29,500
McCluskey, Dr WJ Davis, Dr PT	Empty Property Rates Survey	RICS	£7,000
McCluskey, Dr WJ	Desk Review of Property Tax Issues for Ireland	Economic & Social Research Institute	£1,500
McIlhatton, Dr D Berry, Prof JN Davis, Dr PT Haran, Dr M Kashyap, Dr A Lim, Dr LC McCluskey, Dr WJ McCord, Dr M McGreal, Prof WS	BESECURE	CEC - Framework 7	£450,000
Molkov, Prof V Brennan, Dr SL Makarov, Dr DV	Integrating European Infrastructure to support science and development of Hydrogen and Fuel Cell Technologies	CEC - Framework 7	£460,899
Molkov, Prof V Makarov, Dr DV	Hydrogen and Fuel Cell Supergen hub	EPSRC	£182,231
Molkov, Prof V Brennan, Dr SL Makarov, Dr DV	HYINDOOR 2010: Pre-normative research on Safe Indoor Use of Fuel Cells and Hydrogen Systems	CEC - Framework 7	£276,924
Molkov, Prof V	HyCube	European Institute of Innovation and Technology	£30,176
Mondol, Dr JD Smyth, Dr M Zacharopoulos, Dr A Anderson, Mr M Huang, Dr M Hewitt, Prof N	UKIERI Thematic Partnership (UK India Education and Research Initiative). Solar accelerator design for small scale bio-gas production	British Council	£39,901

Research Institute Member	Title of Award	Funding Body	Value
Mondol, Dr JD Zacharopoulos, Dr A Smyth, Dr M	Energy Efficiency and Auditing Fusion Project with Errigal Seafood Ltd, Meenaneary, Co. Donegal	InterTradelreland	£28,500
Nadjai, Prof A Han, Dr S	MACS+: Membrane Action on Fire Design of Composite Slab with Solid and Cellular Steel Beams	CEC – Coal and Steel	£20,000
Smyth, Dr MA Anderson, Mr M	KTP Programme between the University of Ulster and Copper Industries (Ireland) Ltd	Momenta & Copper Industries (Ireland) Ltd	£107,200

