



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

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# **BUILT ENVIRONMENT RESEARCH INSTITUTE**

## ***ANNUAL REPORT***

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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

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

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

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

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

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

Student Name	Thesis Title
<b>Samsudin, Salfarina</b>	Exploring the role of land administration in supporting sustainable land use management
<b>Scullion, Thomas</b>	Performance of axially restrained steel columns subjected to severe fire
<b>Shah, Nikhil K</b>	Vapour compression heat pumps driven by advanced engine concepts and incorporating heat recovery
<b>Shentsov, Volodymyr</b>	Indoor Use of Fuel Cell and Hydrogen Systems
<b>Williamson, Oscar</b>	Assessing driver behaviour due to in-car distractions
<b>Yi, Sung-Hee</b>	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
<b>Colclough, Shane</b>	Thermal energy storage
<b>Khamkanya, Thadsin</b>	Analysis of the holistic approach to workplace environments, management systems and new technologies in meeting corporate end-user requirements
<b>McGrath, John</b>	Interchange and travel choice: implications for mode shift
<b>Paul, Damasen</b>	Characterisation of Solar Concentrating Systems for Photovoltaics and their Impact on Performance

Graduated July 2012

Student Name	Thesis Title
<b>Brown, Louise</b>	Time on the market for single family residential property: the UK perspective
<b>Doheim, Rahma</b>	Development of a performance-based approach in fire codes in Egyptian architecture
<b>Hinch, Martin</b>	The liquidity crisis within real estate markets
<b>Keatley, Patrick</b>	Dynamic techno-economic analysis of power generation systems
<b>Kelly, Hugh F</b>	24-hour cities: advantages in commercial real estate investment
<b>Lytvyn, Inna F</b>	Techno-economic modelling of all-Ireland energy system
<b>Nase, Ilir</b>	Impact of quality led design on real estate value and performance
<b>Oyedele, Joseph</b>	Capital markets and innovative vehicles for financing infrastructure
<b>Sultan, Zahid</b>	Managing transport demand and sustainable transport
<b>Ukleja, Sebastian S</b>	Production of smoke and CO in enclosure fires
<b>Zanjiri, Yasser</b>	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/H<sub>2</sub>O 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.
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- 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.
- Eadie, R, Perera, S and Heaney, G (2012) Capturing maturity of ICT applications in construction processes. *Journal of Financial Management of Property and Construction*, 17 (2). pp. 176-194.
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- Friel, S, Woodward, D and Woodside, A (2011) Laboratory prediction of thin surfacing early life asphalt surfacing properties. *The International Journal of Pavement Engineering and Asphalt Technology*, 12 (2). pp. 63-77.
- Ghayur, MA, Huang, Y, McIlveen-Wright, D and Hewitt, N (2011) Process simulations for wheat and wheat straw based ethanol biorefinery concepts. In: *Proceedings of the bioten conference on biomass, bioenergy and biofuels 2010*. (Eds: Bridgwater, AV), CPL Press, Newbury, pp. 146-152.
- Godfrey, A, Grail, J, Clement, P, Telles, S, Berry, J, Hemphill, L, Haran, M, Adair, A, McGreal, S, Kashyap, A, Eriksson, C, Rowlands, J, Johal, A and Fielder, A (2011) Nationwide Business Improvement Districts Survey 2011. *British BIDs & University of Ulster*. pp 66.
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## 5.1 Conference Papers

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- 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.
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- 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 24<sup>th</sup> 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, 19<sup>th</sup> 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, 28<sup>th</sup> 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, 19<sup>th</sup> 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, 19<sup>th</sup> 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, 23<sup>rd</sup> 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, 19<sup>th</sup> 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”, 9<sup>th</sup> International Symposium on Special Topics in Chemical Propulsion, Quebec, July 2012.
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- Lloyd, MG and Peel, D (2012) Towards Territorial Cohesion? Spatial Planning on the Island of Ireland, 25<sup>th</sup> 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? 6<sup>th</sup> 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, 28<sup>th</sup> Annual Meeting of the American Real Estate Society, Florida, April 2012.



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- McIlhatton, D, McCord, M, McGreal, S, Haran, M and Davis, P (2012) Determining price: going spatial, local and high tech, 28<sup>th</sup> 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, 18<sup>th</sup> 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 6<sup>th</sup> Annual Conference 'Rights, Responsibilities and Equity in Land Use Planning', Belfast, February 2012.
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- Peel, D and Lloyd, MG (2012) Judicial Review: Courts, Costs and the Common Good, 25<sup>th</sup> 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, 23<sup>rd</sup> 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, 19<sup>th</sup> European Real Estate Society Conference, Edinburgh, June 2012.
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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**

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

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

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

