

<p>Institution: Edinburgh Napier University</p>
<p>Unit of Assessment: 16: Architecture, Built Environment and Planning</p>
<p>a. Context</p> <p>Within this UoA research effort is concentrated on the applied sciences and the focus is on collaboration with industry, government and the third sector to create innovations in the design, planning, construction and regulation of the built environment. Product innovation in the design, planning and construction of the built environment is the hallmark of the Building Performance, Energy, Offsite Construction and Timber Engineering Centres, as well as the Wood Studio. These centres augment wealth creating capacities for industry in the built environment. Process innovation is the mainstay of the Centre for Sustainable Communities. This serves to underpin wealth creation and emerges as policy briefs, guidance notes, evaluations and baseline assessments supporting government policy.</p> <p>Partnerships developed with industry include: Construction Scotland, the Scottish Builders Federation, Home Builders Federation, Major Contractors Group, Commonwealth Games Legacy Consortia, NHBC, WSP Group, Jones LaSalle and BRE. These partnerships have benefitted organisations across the manufacturing, construction and services sectors, including: the Proctor Group, Enewall, CCG, Blake Group, Scotframe, Stewart Milne, J. Smart & Co., Miller Group, CALA, Donaldson Timber, Cruden, Mactaggart & Mickel, James Jones and Sons, Oregon, Capvond, Walker Timber, BCA Group, ITW-Cullen, IWS, Glendevon Energy Co., Danskin (SIG) and Mineral Products Association.</p> <p>Partnerships benefitting the UK, Scottish and European government have also been built. Here the UK and Scottish beneficiaries include: the Building Standards Division, Housing Supply Unit, Key Sectors Team, Scottish Enterprise, Highlands & Islands Enterprise, Scottish Development and Industry, the 2020 Built Environment Group, Scottish Housing, Scottish Federation of Housing Associations, Scottish Association of Building Standards Managers, Resource Efficient Scotland, Architecture Design Scotland, the London Borough of Sutton and City of Edinburgh. Other beneficiaries of the partnerships built with the European Commission (DG Regio and the European Investment Bank) include: Manchester Digital Development Agency, Amsterdam’s Innovation Motor, District @22, Barcelona and BO10, Malmo.</p> <p>The beneficiaries of partnerships built with the third sector include: the Carbon Trust, Edinburgh Urban Regeneration Forum, PARC (Promoting and Regenerating Craigmillar), the Craigmillar Partnership Community Council and Neighbourhood Management Board, and the Edinvar Housing Association.</p> <p>The impact of the Building Performance, Energy, Offsite Construction, Timber Engineering Centres and the Wood Studio takes the form of product innovations registered as patents in the design, planning and construction sectors. Examples of product innovation impact include: the Thin Membrane Isolator Technology for Acoustic and Thermal Application. This achieved three national nominations for UK Housing Innovation Product of the Year in 2009, 2010 and 2012 and has led to eight different product developments including: SmartPly Europe; Homegrown Stacked-Closed and Crosslam-Plank Systems and High Performance Floor and Wall Insulation based on novel nanotechnologies and smart metering. The impact of the Centre for Sustainable Communities include: the specification of socially-inclusive visioning guidelines for the UK’s Department of Communities and Local Government; design of a decision support system for evaluating the sustainability of urban regeneration in Manchester, Swansea and Cardiff; the evaluation of the European Investment Bank’s (EIB) JESSICA (Joint European Support for Sustainable Investment in City Areas) fund for the development of smart and sustainable cities and baseline assessment methodologies for the London Borough of Sutton’s mass retrofit proposals.</p> <p>Under the UoA’s Corporate Social Responsibility (CSR) Strategy, these impacts are augmented further by way of the third sector and through a series of civic organisations (voluntary organisation, trusts, charities and other not-for-profits). This occurs as part of the UoAs commitment to public engagement. Examples of the impact this is having on public life can be</p>

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found in the Carbon Trust's use of leading case-study material on the environmental sustainability of mass retrofit proposals, which includes reports evaluating the socio-demographic components of fuel poverty and equitable distribution of the costs associated with energy efficient-low carbon, zones, and PARC's deployment of socially-inclusive visioning as a means to evaluate the sustainability of community development proposals.

b. Approach to impact

The UoA's success relies on the agility of research staff to collaborate, work in inter-disciplinary teams and promote innovation. Here the focus of attention is on applying science and technology through research and innovation that meets the needs of industry and government and through a CSR strategy which sustains these developments while also leveraging impact for other third sector beneficiaries. In this way the UoA participates in research and innovation that builds-in impact and which allows the public to not only underpin product developments, but support process change. Examples of this impact include the:

- Low Carbon Building Technology Gateway's support for the development of innovative products by industry, use of them by the construction sector and showcasing of the buildings this generates. This has generated over 280 new products, developed 28 supply chain partnerships and led to the showcasing of 25 buildings;
- SmartCities' use of Web2.0 technologies to electronically-enhance service provision across the North Sea Region and allow the public to participate in this process;
- CLUE's (Climate Neutral Urban Environment's) adaptation of existing infrastructure systems to save energy and reduce carbon emissions in line with public expectations;
- Contract research with leading consultants from industry and government (for example; the EC (JRC-IPTS), EIB and Scottish Government) aimed at improving the quality of life experienced by members of the public.

The UoA also promote impacts beyond the lifespan of such projects. This is achieved by setting up knowledge partnerships needed to develop the scientific applications and then handing over the technologies required in order for the beneficiaries in industry and government to sustain their impact. This impact model allows senior academic staff to lead the research and innovation with industry and government in knowledge transfer partnerships (KTPs). The model in turn allows the UoA to monitor and evaluate the impact of the KTPs through:

- the Edinburgh Centre for Carbon Innovation (ECCI). Here knowledge partnerships between Edinburgh University, Edinburgh Napier University and Heriot-Watt University, underpin applied research and support innovation, including the setting up of Green Dragons' Den for Low Carbon Built Environment Innovation Support - funded by Scottish Enterprise (partnering with BRE and the University of Strathclyde);
- SCRAN's (the Smart City Inter-Regional Academic Network's) development of these low carbon innovations by way of the Digital Agenda for the North Sea and through the actions taken to augment Europe's digital skills in the manufacturing, construction and services sectors;
- consultancy work undertaken with Scottish Enterprise to mainstream such Smart and Sustainable City developments and extend their impact throughout the advanced manufacturing, construction and services sectors.

The UoA also makes use of internships to build research capacity and offers them a route into industry and government where innovation can gain further impact. PhD students are also encouraged into research projects capable of impact. Training is provided by the University for them to build up such capacities. This can be secured by way of in-house training, or through workshops. In line with University policy, the UoA also participates in the development of research-informed teaching by feeding the results of the innovation into the learning environment.

Awards that **evidence the impact** of the research include: the first ever Proof of Concept Award for Construction - from Scottish Enterprise, 2008. The Queen's Anniversary Prize, 2009 - for Innovative Housing Delivering Environmental Impact and Quality of Life. The ERDF Prize in 2013 awarded for Best Project Marketing - related to the use of Digital Animations for the Design of Low Carbon Products and Buildings. The Best BREEAM Rated Non-Domestic Building - for the BRE

Innovation Park Visitors Centre, 2012. The Commonwealth Games Athletes Village (Very low Carbon Development of 700 housing units) award from Scottish Property, Glasgow Business and Homes for Scotland, 2013. The RIAs, Saltire Housing and Scottish Design Awards (2008-2009) for the Quartermile Edinburgh - one of Europe's largest regeneration projects.

c. Strategy and plans

Over the next 5 years the UoA's impact strategy will aim to:

- build upon and further develop the 'twin track' (product and process) approach to impact;
- continue to engage with Research Council Funding (EPSRC, ESRC) and applied research programmes (EC, TSB & KTP) as a way to further extend the UoA's knowledge transfer with industry and government;
- invest over £3 million over the next two years in a 'state-of-the-art' research laboratory for construction products and offsite systems. This shall build on the recent successes of the Building Performance Centre;
- develop new research partnerships as invited lead HEI for Scotland's Universities in the Built Environment and member of the Industry Leadership Group for Construction Scotland;
- export the UoA's growth potential by way of industry partnerships and through the Advanced Construction Thematic Group's pan-Scotland Innovation Centre. This is a £10 million government investment that builds on the success of the UoA's Low Carbon Building Technologies Gateway (2010-13) and which supported the initial development of 300 new products and processes by SMEs;
- further exploit the opportunities the current INTERREG funds offer to accelerate the development of Smart and Sustainable Cities in Amsterdam, Stockholm, Barcelona, London and Edinburgh as the mainstay of Europe's climate change adaptation strategy and tangible demonstration of the positive impact smart, sustainable and inclusive growth initiatives can contribute to the built environment. Here particular attention shall be given to the opportunities Horizon 2020 offers for the UoA to work alongside industry and government and secure further KTPs targeting energy consumption, carbon emission and waste management;
- extend the UoA's commitment to knowledge transfer by way of CSR strategy and through the third sector via expansion of the Unit's recent ventures into public participation. In particular by way of and through the use of social media. Current examples of this include the use of: Wikipedia, Slideshare, Facebook, LinkedIn and YouTube.

d. Relationship to case studies

The first case study reports on the impact of "robust details" (RD) for sound insulation. It documents how the research undertaken during 2001-04 led to the development of a new regulatory approach with higher building standards for home occupants, multi-stakeholder engagement and substantial knowledge exchange via the design of the RD Handbook that has 4,700 subscribers. Outputs include the construction of 300,000 robust detail homes, and an EU COST Action (32 countries) Working Group developing 'Robust Construction Solutions' for which the research project team was awarded the Queen's Anniversary Prize. The second case study explains how communities previously deemed 'unsustainable' are now being 'turned around'. It highlights how policy briefings with the Scottish and UK Government and leading charities, such as the Esmee Fairbairn Society and Association for Sustainable Communities, have led to a set of 'Guidelines for Socially-inclusive Visioning' in the 'Community-based Approach to Sustainable Urban Regeneration'. Guidelines reviewed by the *Planning Journal* (30/09/2009) and adopted by Urban Regeneration Partnerships to provide Community Councils and Neighbourhood Management Boards with the policies, civic decision-making powers, budgets, resources, skills and competencies needed for them to meet the value-adding and cost-saving requirements of the public sector's welfare agenda. Such organisations in turn see the guidelines as successful in meeting the welfare agenda because they account for as much as a 60% improvement in all of the official data sets used to measure the sustainability of community development.