Institution: University of Abertay Dundee

Unit of Assessment: 7

a. Context

The approach of the Abertay Centre for the Environment (ACE) has been to invest substantially to build and grow relationships with stakeholders to inform our research. We have invested in several Knowledge Exchange networks and supported 5 staff with the main task to develop these networks, and to identify additional research opportunities in ACE. This ensures that we maximise opportunities to expand interactions across our research base, taking full advantage of our inter-disciplinary approach. In this way, ACE has been successful in developing a wide ranging portfolio of stakeholders, recognizing that change to the environment requires both bottom up (behaviour change in society) and top down (policy driven) approaches. As detailed in our approach, we have identified and interacted with the following groups:
1. UK and Scottish Government. We have responded to policy needs and provided policy-focussed research, with a particular strength related to water in the urban environment.
2. Local Planning Authorities, e.g. our research on sustainability decision making and enhancement, impacted on the £1 bln regeneration of Dundee Waterfront.
3. Regulators, including Scottish Environment Protection Agency (SEPA), where our research on Sustainable Urban Drainage Systems (SUDS) informed the approach of SEPA to regulation.
4. Industry, e.g. our EU/ERDF funded KE networks (Eco-Parks and LocalNet), helped >300 small and medium sized businesses to identify sustainable solutions for their products and practices.
5. Society and Public Understanding, where we deploy a very active agenda aimed at communicating science in general and our particular strengths to societal groupings ranging from schools, to lay audiences and politicians.
6. Consultancy and training activities, from small projects where we offer our specific expertise to advanced training programmes for practitioners with >40,000 downloads of our SUDS manual.

As detailed in the approach below, many of our research activities originate from stakeholders' needs and we have used these to inform and develop our distinct areas of expertise. We believe that sustained impact requires us to develop relationships across forenamed groupings rather than a focus on a single stakeholder group.

b. Approach to impact

Our approach to impact is based on developing long-term relationships between the stakeholders listed above and our researcher groupings, notably building upon the close interactions developed in our Urban Water Technology Centre. An essential element of this is engagement with end users at all stages of our research, including identification of research themes, research programme design, development of end user applications and implementation of results at local and national level. As exemplified below, our approach has been pro-active, supported by internal funds where appropriate and characterised by follow-up activity designed to expand the interactions across our research base, making full use of our strength in inter-disciplinary research.

For example, our sustainability research was initiated in response to Dundee City Council's determination to demonstrate sustainable management of their major £1 bln investment to regenerate the city centre, the second most active regeneration project in the UK (and 16th largest investment in the UK). We developed a decision-making framework, integrating social, environmental and economic factors working in close co-operation with the Council and based upon the valuation of multiple factors. During discussions with stakeholders the complexity of the framework model was identified as a communications barrier. Drawing upon the University's inter-disciplinary ethos and drawing on expertise in creative industries and social sciences, a new inter-disciplinary research grouping was quickly formed - combining our sustainability research with parallel developments in interactive gaming technologies. A 3D interactive visualisation platform capable of communicating complex output was created allowing stakeholders to assist with decision making through their response to the interactive visualisations. This example is typical of our approach to stakeholders and the way we use these to grow partnerships across our research

base.

Through this approach of expanding involvement across our research base we formed a new inter-disciplinary research grouping who were able to identify wider applicability for this framework. For example through developing networks of contacts with regional planning agencies, SMEs and regulators, we identified ways in which the framework could be used in relation to land and water management. In particular through our engagement with CREW (the Centre for Expertise in Water) we were able to propose the use of our novel interactive visualisation approach for sustainability enhancement and secured a third project with Scottish Water and Government to produce a map integrating interests of all water stakeholders in Scotland.

Through demonstrating the clear impact with these stakeholders, we are also able to demonstrate that our research outputs impact at national level - for example by ensuring that water management in the urban environment is considered in ecosystem assessment. Building upon our network of researchers and stakeholders in urban sustainability, we organised an ESRC/EPSRC/NERC funded trans-disciplinary seminar series ISSUES (Integrating Sciences to Sustain Urban Ecosystem Services). Through this successful series we were able to demonstrate the importance of our research for water management in the urban environment, resulting in a lead author contribution to Chapter 10 of the National Ecosystem Assessment. This impacted on UK Government Policy with the publication of a White paper and is now followed up in the National Ecosystem Assessment 2, where Abertay is contributing to the assessment of response options within the UK NEA scenarios by evaluating views from stakeholders and experts. UK NEA 2 is expected to be published towards the end of the year.

Another example of our pro-active approach to stakeholder interactions is provided by our interactions with CREW. Originally through close interaction with Scottish Government who had identified the need for research in diffuse pollution we developed research strength in this area which put us in a position to lead a project on urban diffuse pollution to CREW. We then aligned this work with our renowned expertise in SUDS (elaborated in our case study) through inviting members of our SUDS network to meetings, with this then leading to a second project (with SEPA and the Scottish SUDS Working Party).

Staff in ACE recognise the importance of public understanding and engagement in science, in particular in relation to environmental sciences where changing societal behaviour may be an important driver to improve the environment or influence Governments. To maximise outreach across the University, the University employed 2 coordinators for this area of work. In a given year between 25-50% of staff of ACE are involved in outreach programmes. Selected examples include:
- Science Roadshows, which aim to deliver basic science experiments to age 9-11 yrs pupils and has been oversubscribed since 2007, reaching an estimated 12,000 pupils period in local regions.
- The Tayside Space School targets older primary children, age 12-13 yrs, delivering a series of events with the support of a NASA astronaut and Educator (approx. 500 pupils selected from 20 schools).
- Café Science is co-organised by researchers from ACE with institutions in Dundee. To date, 38% of staff in ACE has delivered lectures to debate topical issues with the public.
- Science meets art. We use partnerships with artists and museums to communicate science. Exhibitions took place in the Hannah Maclure Centre in Dundee including an exhibition on soil (soil science and local artists) and ‘signals in the city’. We have also developed collaborative links and used our expertise in X-ray CT to scan fossils for the National Museum of Scotland, both aimed at public enhancement as well as academic understanding, e.g. relating the evolution of flight to the size of bird brains measured in fossils. We participated in an exhibition in Aberdeen based on environmental conflicts in upland Scotland (Nov 2013), involving collaborations funded by Creative Scotland.

c. Strategy and plans

Our strategy is founded on an inter-disciplinary research environment that enables us to respond quickly to stakeholders’ needs, something which is especially important in environmental science where emerging problems frequently require inter-disciplinary approaches and rapid response. Our

strategy is to build on our research culture where stakeholder and industry focused research is integrated and strengthened by fundamental research (e.g. our fundamental research in complex systems and interactive media). We are in this position due to our substantial investment in the development of this strong culture of interactions with stakeholders, through employment of 5 staff that were predominantly involved in KE activities. These posts have been critical in bridging gaps between stakeholders and more established researchers. While this strategy has unquestionably been successful for us to date, our future strategy aims at developing the currently emerging research profiles of these staff to further grow ACE. We plan to further develop our impact through interacting with the new University-wide research strategy and in particular build upon the KE networks in the food and drink and creative industries.

To be a leader in sustainable KE networks will continue to be an important aspect of our strategy. Our networks bring SME's into contact with researchers and exemplars include: (1) **LoCal-Net**, our Low Carbon Land Use Innovation Network (ERDF-funded), which coordinates R&D and innovation in low carbon activities for SMEs across Scotland. Project staff visit SMEs to pro-actively identify areas where partnership working is needed to progress R&D or innovation projects. To date it has encouraged 123 SME's to develop innovative products and services that contribute to a reduction in greenhouse gas emissions, protecting 4 jobs at SME's; (2) **ACE Eco-partnerships** (jointly funded by the University of Abertay Dundee and the European Union to the value of £1.1M, 2008-2011), a knowledge exchange partnership that offers free comprehensive assistance to SME's to identify commercially viable environmental solutions to their products and processes. To date it has helped 119 SME's ranging from small savings on energy bills up to £10,000 annual savings, assisted in the creation of 12 new jobs and secured 13 additional posts within SME's; (3) **Scottish Biofuel Program**, (jointly funded by the Scottish Government, Scottish Enterprise and ERDF to the value of £1.4M) focuses on the development of next generation biofuels from renewable resources with Abertay's expertise in anaerobic digestion and fermentation in partnership with SAC, UKBiochar, Napier University and SAMS. Our involvement with the newly formed **Industrial Biotechnology Innovation Centre** (funding to the value of £21M) will be key to our future strategy. We have made a new appointment to continue the development of **SUDSnet,** expanding our expertise in sustainable urban drainage systems in response to Government needs and environmental concerns.

To further optimise our outreach program we have created an Outreach and Public Engagement Network (OPEN) and work with the University's centralised and coordinated Communications Centre. The Centre manages and influences our reputation for excellence and ambition in applied research. This includes a programme of media releases designed to generate coverage in news media locally, nationally and internationally and in specialist media, supported by engagement with key audiences and stakeholders. Our commitment to maintaining this strategy through the REF period is demonstrated by our publication of a large number of press releases for an institution of our size, resulting in approximately seven per year. for research related to ACE. Staff in ACE interact with the Communication Centre through a dedicated officer which ensures in-depth knowledge of on-going research in the Unit and optimisation of the timing of press releases to maximise impact. In partnership, articles have been written for local and national newspapers and research was profiled to eminent visitors (incl: Alex Salmond; David Gani; Alistair Darling; John Swinney; and David Willets).

d. Relationship to case studies

Both case studies are exemplars of our approach and strategy. The SUDS case study is an example of a mature network originating from interactions with regulators and now interacting with the full range of stakeholders, building on a network spanning over 800 members, with 70% practitioners and 30% researchers, affecting policy (UK and EU), and offering professional training related to Sustainable Urban drainage Systems. The second case study deals with sustainability enhancement. This case study, exemplified with a £1 bln regeneration of Dundee waterfront, was initiated from direct interactions with planning agencies and our strategy here is to use the evidence of impact to grow the applications nationally and internationally following the approach and strategy outlined above.