

Research Project: Sustainable Technologies and Responsible Innovation.

Researchers: Prof Bob Lee, Dr Elen Stokes, Dr Diego Vazquez, Dr Chris Groves, Prof Joe Sarkis (Visiting Scholar), Prof James Cordeiro (Visiting Scholar).

Background: Innovation is often viewed as the key to a successful transition towards more sustainable production and consumption systems. Certainly in many of the areas of interest for BRASS research, such as the automotive industry (see project A1) or food (see project A7), innovation for sustainability is central to both corporate strategies and the priorities of institutions that seek to fund and promote research activity. Similarly the extension of notions of corporate social responsibility has increasingly challenged the idea that scientific progress and processes of innovation are in some way ‘value neutral’, and have led to growing interest in the concept of ‘responsible innovation’. Although much BRASS research in this area relates to specific technologies, the Centre also played an important role in developing thinking more broadly in the sphere of responsible and sustainable innovation.

Aims & objectives:

- To develop a greater understanding of the concepts of sustainable and responsible innovation and their implications in terms of governance frameworks and policy measures;
- To assess the potential for the precautionary principle to promote responsible and sustainable innovation processes;
- To examine different stakeholder perspectives in relation to responsible innovation and the means by which potential stakeholder conflicts can be managed and resolved;

About the research: BRASS work in some key areas of innovation for sustainability including hydrogen power, GM foods (see A12), nanotechnologies (see A13 and A14) and geoengineering (see A50), particularly in relation to issues of risk and regulation, led BRASS researchers to become increasingly involved in debates about how to establish an appropriate framework for responsible research and innovation within the UK and Europe. This led to work exploring how concerns are growing about emerging and converging technologies and the limitations of a narrow conception of risk to the environment or to human health as a basis for managing them. The degree to which some of these technologies have the capacity to deliberately manipulate and potentially transform the natural world at a variety of scales from the global (in the case of geoengineering projects) to the microscopic (as in the case of nanotechnologies), poses some very challenging questions about how such innovation can, and should, be governed and managed, and what an appropriate framework for responsible research and innovation might look like.

Work on the precautionary principle for responsible innovation included an analysis of the contribution that European Courts have made to defining the parameters of precautionary decision making, particularly for emerging and controversial technologies.

Another major element of this project was a pair of edited books covering particular aspects of sustainable and responsible innovation. The first, *Facilitating Sustainable Innovation through Collaboration: A Multi-Stakeholder Perspective*, was co-edited by Dr Diego Vazquez of BRASS and two BRASS Visiting Scholars, Professor Joe Sarkis and Professor James Cordeiro. This book sought to explore the inter-relationship between the notions of innovation, sustainability and collaboration and the role each plays as an approach to managing and integrating multiple dimensions of organisational and institutional policies and practices. Collaborative approaches to sustainable innovation are also of particular interest to the BRASS research agenda due to the emphasis on stakeholder involvement and sustainability strategies involving co-innovation efforts in key markets and sectors. The book brought together contributions from Australia, Europe, and North America with prominent policy makers, scientific researchers and practitioners in the field

providing a variety of inputs and analyses relating to the development of sustainable innovations across a number of industry sectors. The book was a collaboration with the Greening of Industry Network involving a special conference session being developed for the 2009 GIN Conference by the three editors, and with a number of papers presented at this academic/practitioner/policy maker conference forming the basis of chapters in the book.

The second edited collection, co-edited by Dr Peter Feindt, was a German language collection bringing together research from the environmental political science and technology studies fields. It explored issues of technology policy and governance in the context of various stakeholder conflicts with an environmental focus and the conflict resolution strategies employed.

Results and outputs: The work on responsible innovation explored what an appropriate framework for responsible research and the governance of innovation might look like in the face of emerging technologies whose potential negative consequences are less related to direct impacts on human health and more linked to their potential to transform environmental systems. It explored issues of priorities, the scale at which such a framework should operate, and which form of governance structure would be best suited to the oversight of research and innovation. The work on the precautionary principle showed how European court judgements have evolved to increasingly interpret risk assessment processes as having a pivotal role in determining precautionary intervention. Rather than finding simply that circumstances of uncertainty warrant precautionary measures, the courts are increasingly requiring that clear, or 'concrete', evidence of harm, deriving from risk assessment, is established before intervention is justified.

- Lee, R. (2012), [Look at Mother Nature on the run in the 21st century: Responsibility, research and innovation](#), *Transnational Environmental Law*, 1 (1), 105-117.
- Lee, R. and Petts, J. (2013), [Adaptive governance for responsible innovation](#), in Owen, R., Bessant, J. and Heintz, M. (eds.), *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*, Wiley, pp 143 - 164.
- Sarkis, J. Cordeiro, J. and Vazquez, D. eds. (2010), [Facilitating Sustainable Innovation through Collaboration: A Multi-Stakeholder Perspective](#), Springer.
- Feindt, P. and Saretzki, T., eds. (2010), [Environmental and Technology Conflicts](#), VS Verlag.
- Stokes, E. (2008), [The EC courts' contribution to refining the parameters of precaution](#), *Journal of Risk Research*, 11 (4), 491-507.
- Lee, R. & Stokes, E. (2005), [Ecological modernisation and the precautionary principle](#), in Gunning, J. and Holm, S., (eds.), *Ethics Law and Society*, Ashgate.
- Lee, R. (2002), [\(Pre\)cautionary tales: Risk, regulation and the precautionary principle](#), in Boswall, J. and Lee, R. (eds.), *Economic, Ethics and the Environment*, Cavendish, pp. 87-101.

Impacts achieved/potential for impact:

BRASS researchers have been very involved in policy and practice debates and have made a number of contributions to particular events, perhaps most notably Prof Bob Lee's invitation from the Danish Government to go to Copenhagen in April 2012 to speak at the Danish EU Presidency Conference on 'A European Model for Responsible Resource Innovation'. In addition Lee spoke at a Franco-British conference organised by the French Scientific Attache which gave rise to the paper with Petts (above) and he worked with RCUK on behalf of the ESRC on the grand challenge programme on nanotechnology and later with the ESRC acting as an assessor of risk registers, attached to funding applications, in an attempt to develop a framework for responsible innovation based on dimensions of anticipation, reflection, deliberation and responsiveness.