

Research Project: Sustainable Technologies and Responsible Innovation: Energy Technologies and Energy Futures.

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Background: Energy technologies are frequently discussed in relation to their relative contributions to climate change through the generation of greenhouse gasses such as CO₂. There are however other issues of risk and sustainability related to particular energy technologies and their impacts on particular stakeholders such as local communities, a subject brought into particularly sharp focus recently through the controversy about the potential for recovering shale gas through ‘fracking’ technologies (and issues relating to the impact of energy infrastructure projects on local communities is considered in Project A43). This project considered issues of risk, risk perception and regulatory implications for key energy technologies, and also considered the likely implications of future energy demand and supply scenarios for UK social and economic sustainability.

Aims & objectives: This area of project work sought to:

- Understand the potential energy futures for the UK and their implications for UK regional economies, the development of particular technologies and the contribution of consumers as energy users to transformations in the production/consumption system;
- Examine how public attitudes towards technologies aimed at reducing CO₂ emissions and/or responding to the threat of climate change may influence the potential for their development;
- Build knowledge of public views on energy systems, technologies and transitions, in order to inform the future policymaking process;

About the research: This research project had several distinct but interrelated strands including:

- **Energy futures and the UK regions:** This energy policy analysis examined the potential implications of the future forecast ‘energy crunch’ on different UK regions in order to understand the nature and spatial distribution of energy crunch impacts,
- **Transforming the UK energy system: public values, attitudes and acceptability:** This UKERC/NERC funded research under RCUK’s Energy Programme used different future energy system scenarios to engage people in the notion of whole energy system transformation to understand how publics engage with notions of low carbon transitions.
- **Perceived nuclear power risks:** This work comprising a major household interview programme conducted near the nuclear power stations at Oldbury and Hinkley Point. It sought to investigate the roles of perceptions of place and hazard proximity in considering (a) perceptions of risk and (b) public attitudes towards the building of a new nuclear power station in the nearby area.
- **Networks of influence and energy infrastructure investments:** This work examined the claims made by competing networks of influence over the safety or risk attached to an energy-from-waste (EfW) plant in Crymlyn Burrows in South Wales. The work evolved into a longitudinal case study examining how influence networks operate beyond the initial development decisions linked to infrastructure investments.
- **Carbon capture and storage:** This review of seabed carbon capture and storage technologies sought to review the legal and policy frameworks relating to both climate change mitigation and marine protection and the influence that they would have over the UK’s plans to develop CCS investments in the North Sea.

Results and outputs: The analysis of potential energy crunch impacts revealed that energy scarcity and price volatility will have substantial negative welfare impacts, but these will not be evenly distributed, with the North East, Yorkshire & Humberside and Wales particularly susceptible to negative impacts in terms of industrial competitiveness and wider socio-economic resilience.

The work on attitudes to living with nuclear power suggested that within local communities a sense of place mediates (but does not moderate) perceptions of risk, and that public attitudes to new build in communities situated very close to established nuclear sites may be largely dependent on the extent to which the existing facility is perceived to contribute towards that sense of place. In addition, a novel scale was developed to measure the perceived contribution of the nearby nuclear power station to sense of place. The work on public attitudes to energy transitions more generally showed that public opposition to large scale renewable energy schemes was often driven by a lack of tangible local benefits, threats to valued landscapes or community identity, distrust of outside agencies and poorly executed dialogue and communication processes. A key conclusion was that the renewables industry could learn from the nuclear industry's experience in terms of public engagement. The EfW plant work found three influence networks at the heart of decision-making, a dissenter network, a developer network and a regulatory network. The arguments put forward by each network provided insights into how power relations are realised at a local level. The work also demonstrated that such networks have a life beyond the initial development decision and that key actors can align themselves with competing networks at different points in the development and operation phase of an EfW plant.

- Hacking, N. and Flynn, A. (2013), [Networks, protest and regulatory systems: the case of energy from waste](#), *Local Environment: The International Journal of Justice & Sustainability*, in press
- Venables, D., Pidgeon, N., Parkhill, K., Henwood, K. and Simmons, P. (2012), [Living with nuclear power: Sense of place, proximity, and risk perceptions in local host communities](#), *Journal of Environmental Psychology*, 32 (4), 371-383
- Corner, A., Venables, D., Spence, A., Poortinga, W., Demski, C., and Pidgeon, N. (2011), [Nuclear power, climate change and energy security: Exploring British public attitudes](#), *Journal of Energy Policy*, 39, (9), 4823-4833
- Butler, C. Parkhill, K. and Pidgeon, N. (2011), [Nuclear power after Japan: The social dimensions](#), *Environment*, 53 (6), 3-14
- Pidgeon, N. and Demski, C. (2012), [From nuclear to renewable: Energy system transformation and public attitudes](#), *Bulletin of the Atomic Scientists*, 68 (4), 41-51
- Jones, C. (2010), [Less and less favoured? Britain's regions in the energy crunch](#), *Environment and Planning*, 42 (12), 3006-3022
- Parkhill, K., Pidgeon, N., et al. (2010), [From the familiar to the extraordinary: The ebbs and flows of local residents' perceptions of risk when living with nuclear power in the UK](#), *Transactions of the Institute of British Geographers*, 35, 39-58
- Spence, A., Poortinga, W., Pidgeon, N. and Lorenzoni, I. (2010), [Public perceptions of energy choices: The influence of beliefs about climate change and the environment](#), *Energy & Environment*, 21 (5), 385-407
- Pidgeon, N., Lorenzoni, I. and Poortinga, W. (2008), [Climate change or nuclear power - No thanks! A quantitative study of public perceptions and risk framing in Britain](#), *Global Environmental Change*, 18 (1), 69-85

Impacts achieved/potential for impact: The energy futures work has been fed into the policy making process, particularly within Wales where the 'Wales and the Energy Crunch' report was launched at the Sennyd and distributed to all Assembly Members. A humorous short film, 'A Million Years of Sunshine', was also developed and released by BRASS with supporting education resources to highlight future energy crunch risks to current lifestyles. The perceptions of nuclear risks research has significant implications for the industry and for the Government in their intention to expand the UK's nuclear capacity, and this work together with the work on influence networks provides insights for all sectors of the energy industry about working effectively with stakeholders. Much of this work will have the potential to inform the evolving debate about 'fracking'.