



Engaging the public with low-carbon energy technologies: Results from a Scottish large group process



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HIGHLIGHTS

- We report the results of a Scottish large group workshop on energy technologies.
- There is strong public support for renewable energy and mixed opinions towards CCS.
- The workshop was successful in initiating discussion around climate change and energy technologies.
- Issues of trust, uncertainty, costs, benefits, values and emotions all inform public perceptions.
- Need to take seriously the full range of factors that inform perceptions.

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ABSTRACT

This paper presents the results of a large group process conducted in Edinburgh, Scotland investigating public perceptions of climate change and low-carbon energy technologies, specifically carbon dioxide capture and storage (CCS). The quantitative and qualitative results reported show that the participants were broadly supportive of efforts to reduce carbon dioxide emissions, and that there is an expressed preference for renewable energy technologies to be employed to achieve this. CCS was considered in detail during the research due to its climate mitigation potential; results show that the workshop participants were cautious about its deployment. The paper discusses a number of interrelated factors which appear to influence perceptions of CCS; factors such as the perceived costs and benefits of the technology, and people's personal values and trust in others all impacted upon participants' attitudes towards the technology. The paper thus argues for the need to provide the public with broad-based, balanced and trustworthy information when discussing CCS, and to take seriously the full range of factors that influence public perceptions of low-carbon technologies.

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1. Introduction

Reducing greenhouse gas emissions is essential for mitigating climate change and both Scotland and the United Kingdom have set ambitious targets of an 80% reduction in CO₂ by 2050 (CCC, 2008; Scottish Government, 2011). It is widely believed that a portfolio of low-carbon technologies including renewable energy, nuclear, carbon dioxide capture and storage (CCS) and energy efficiency measures, will be required in order to meet these carbon reduction targets (CCC, 2008). Scotland is well placed to work towards meeting the targets, the country is at the forefront of the research and deployment of renewable energy technologies such as wind, wave and tidal and has the natural resources to develop these technologies (Scottish Executive, 2005). In addition, Scotland

has suitable infrastructure and geology for the implementation of CCS (SCCS, 2009).

The large-scale implementation of any of these new energy technologies requires societal acceptance and support. Without this, the deployment of the technology is likely to be jeopardised. This has been well documented in earlier examples such as resistance to wind turbines (Haggett, 2008; Devine-Wright and Howes, 2010), bioenergy plants (Upham and Shackley, 2006) and CCS projects (Feenstra et al., 2010; Dütschke, 2010). These examples have shown that lack of public support can lead to delays, expensive legal disputes or even the outright cancellation of projects.

This paper focuses on social considerations by presenting the results from a large group workshop into public attitudes towards CCS and low-carbon energy technologies conducted in Edinburgh, Scotland in September 2011. It is worth noting that this was a few weeks before the proposed Longannet CCS plant in Scotland was cancelled, as well as six months after the Fukushima nuclear accident and eighteen months after the Deepwater Horizon event.

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The large group process (LGP), developed by Ashworth et al. (2009), is a full-day workshop designed to engage the lay public on the issue of climate change and low-carbon energy technologies and to explore publics' acceptance of CCS within the suite of available technologies. During the workshop, participants considered their preference for a dozen energy technologies that can be used in the supply of delivered electricity. The Scottish LGP was part of a series of workshops held across four countries (Ashworth et al., 2013; Einsiedel et al., 2013).

This paper briefly reviews the theory and practice of social acceptance of energy technologies and public engagement thereof, and then introduces the LGP concept. Results from the workshop are then presented and the factors informing the participants' attitudes towards the different energy technologies are discussed. Finally, we present some reflections on the process. An extended presentation of the results can be found in the workshop report (Howell et al., 2012).

2. Research context

Given the public acceptance difficulties that some projects have faced, there has over time been an increasing interest in public engagement on energy technologies, and more recently there has been a particular focus on building social acceptance for specific projects (Wustenhagen et al., 2007; Ashworth et al., 2012). Research has shown that public awareness of CCS remains low (Eurobarometer, 2011; Reiner and Nuttall, 2011) and as such there is a need to both raise awareness of, and build acceptance for, the technology.

2.1. Perceptions of CCS

Whilst public awareness of CCS is generally low and people's early opinions are liable to change, studies to date in CCS and other low-carbon energy options suggest there are several factors that help to crystallise publics' standpoints. For CCS in particular, we identify three key themes in recent public perception studies: CCS in the context of low-carbon energy; factors that inform opinions; and evaluation beyond technology assessment.

2.1.1. CCS in context

There is a growing understanding that perceptions of CCS are not formed in isolation, but in relation to a wider context of energy, climate change and socio-political factors. The use of Information Choice Questionnaires (ICQs) by de Best-Waldhober et al. (2011) reflects this acknowledgment that perceptions of CCS will depend on the wider contextual information publics are presented with, particularly with regard to other low-carbon energy options. In terms of climate change, de Best-Waldhober et al. (2009) look at the relationship between knowledge of climate change and acceptance of CCS, and Itaoka et al. (2013) hypothesise that better understanding of CO₂ itself can increase the likelihood of acceptance of CCS. As for socio-political factors, looking at six CCS proposals in the USA Bradbury (2012) suggests the level of public support for the project depended very much on the social context of the area in question.

2.1.2. Factors that inform opinions

2.1.2.1. Trust. With technologies such as CCS where public knowledge is low, the public's willingness, or lack thereof, to accept uncertainty is often linked to the trust that they have in the organisations, institutions and individuals that are developing and promoting the technology. This issue of trust has been shown to have even more significance than the technical qualities of the project or the nature of information communicated. For instance,

Terwel et al. (2012) found trust to be a far greater determining factor than perceptions of risk or safety when exploring public perceptions of CCS in the Netherlands.

Two main trust factors can be distinguished, the perceived integrity of a trustee, and their perceived competence (Huijts et al., 2007). That is, people make decisions based on someone's perceived good intentions, and based on the outcomes of processes. In experimental research Terwel et al. (2011) found that acceptance of CCS is higher when competence-based trust in a CCS proponent is high. If integrity-based trust is low then people will take the opposite viewpoint to the proponent. Alignment between inferred motives and communication builds trust, hence communication should be done that develops trust, for example by being honest about your motives.

Research by ter Mors et al. (2010) looking at information communication found that people perceive information about CCS provided by individual stakeholders to reflect the stakeholder's own motives and perspectives. In contrast when information is provided by collaboration between different stakeholders it is perceived to be of higher quality, with more balanced information which is of a greater value.

Trust in engagement processes themselves are an area of increasing interest to CCS researchers. de Groot and Steg (2011) and McLaren (2012) discuss the question of procedural justice in CCS, arguing that perception of a 'fair' engagement and decision-making process can affect whether or not publics support the technology.

2.1.2.2. Uncertainty. Uncertainty about unknown future events can play a role in informing perceptions of novel technologies (Slovic, 1993). It is also worth noting that in situations of high uncertainty or complexity, social responses to uncertainty can be very closely linked to trust in the institution responsible for dealing with the uncertainty and/or risk, and that if it is too difficult to assess the risk itself, people instead make a judgment based on their assessment of the person or institution taking the risk (Wynne, 1992).

Wolsink (1994) hypothesised that public acceptance of wind turbines follows a "U" shaped curve. Initially, support falls as more details emerge and negative impacts are discovered. Support then recovers as people become accustomed to the turbines and the impacts are found to be less negative than feared. In the context of CCS, research by L'Orange Seigo et al. (2011) with Swiss publics found that providing additional information about CO₂ monitoring to the public to address uncertainties did not reassure them about the safety of CCS, and instead led to increased risk perceptions. Given the very low initial awareness of CCS among European publics, it may well be the case in studies such as L'Orange Seigo et al.'s that giving publics some information allows them to better imagine the potential risks of CCS, thus leading to a drop in support consistent with Wolsink's U-shaped model.

2.1.2.3. Economics. It should come as little surprise that support for low-carbon infrastructure tends to be more favourable when there are perceived economic benefits for the public. Participants in a citizens' conference on CCS in Moray, Scotland saw the potential economic benefits of CCS as being a factor that would increase their support for deployment (Brunsting et al., 2013). ter Mors et al. (2012) suggest that host community compensation in the form of improvements to infrastructure (itself a kind of economic investment) could help to foster support for CCS. On the other hand, Dütschke (2010) links public opposition to the Beeskow project in Germany to the perception that the developer stood to gain financially from the project, suggesting economic arguments may not build support if the financial or infrastructural benefits of the project are not viewed as benefiting the public at large.

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