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Lay discourse about hydrogen energy and the environment: Discussion by young people and adults following a first visit to a Hydrogen Research and Demonstration Centre

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ABSTRACT

This paper explores the public's understanding of 'sustainable energy', focusing upon hydrogen, which for most is unfamiliar. We report reactions to a first tour of the recently established 'Hydrogen Research and Demonstration Centre' in the Valleys of South Wales, which was guided by its scientists and engineers. The visitors lived within 50 miles and fell into three age-categories: 14-year old Baccalaureate students; 18–19 year old students at Tertiary College; and adult- members of a Citizens' Panel. They took part in six focus groups which were facilitated, recorded and then analysed thematically by independent sociologists. The paper examines themes on which the groups agreed or disagreed, and how clear or ambiguous their discourse was. While broad consensus was reached on benefits, costs and safety of hydrogen, there were differences in how groups imagined incorporating it into their lives. In conclusion, we draw lessons for securing wider public commitment to sustainable energy.

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Introduction

Hydrogen energy is not widely familiar. Nevertheless, as happened with nuclear power in the 1950s, it has been projected as the clean energy of the future. Some have envisaged a coming 'hydrogen economy' [1] and in 2013 the UK government published a 'roadmap' for putting 1.5mn hydrogen-powered vehicles on UK roads by 2030 (www.news.bis.gov.uk).

The UK Sustainable Hydrogen Energy Consortium (UKSHEC) facilitated deliberation by panels of experts on the roles that hydrogen energy could have [2]. These roles include not only powering transport, but also storing electricity from intermittent (solar, wind, wave) or else more-efficiently constant (nuclear) sources, and micro-generating hydrogen rather than producing it at the centre and then distributing it.

When the lay public has been introduced to hydrogen energy by researchers, it has been more often in the abstract

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than in action. The main exception to this is the international CUTE project [3,4], which tested public reaction to hydrogen fuel-cell buses. The media too speak more of hydrogen in transport than in wider uses and seldom about the infrastructure required for generation, storage and distribution of hydrogen [5]. Here we examine how lay focus groups reacted to a more systemic model of hydrogen energy when they saw it in action in 2011.

The 'public' consulted has usually been adult and rarely includes the young people who will become consumers, workers and voters if and when a hydrogen economy takes shape. Accordingly young people as well as adults were given prominence. Moreover, we encouraged participants to consider the impact hydrogen energy might have on the place where they lived – the Welsh Valleys.

In a companion paper we consider public engagement with hydrogen energy from the standpoint of the Centre staff involved [6] and whether the risk they took in opening their research to the public when it is at an early stage were outweighed by the risk of not doing so.

In a wider context, we seek insight into lay discourse about energy in general. Here the terms 'sustainability' and 'environment' are prominent, but each has more than one meaning. Other non-scientists – politicians - have been engaged in similar discourse at so-far inconclusive global climate change summits. Here we explore areas of agreement and disagreement within and between our focus groups and, just as significant, areas of ambiguity.

Methods

The Hydrogen Centre as Exemplar

The Hydrogen Research and Demonstration Centre opened in October 2008 as the first of its kind in the UK. Here 'demonstrate' means developing prototypes, testing them and improving the technology incrementally [7]. It does not necessarily involve exhibiting the work to the public. Thus, unlike the now well-established Centre for Alternative Technology at Machynlleth, Powys in West Wales, the Hydrogen Centre is not normally open to the public. Nevertheless, it is committed to broadening public understanding of hydrogen energy (www.h2wales.org.uk).

The Centre is situated in Baglan Energy Park in the Valleys of South Wales, next to the 'M4 (Motorway) Corridor' from South Wales to London – a potential 'hydrogen highway'. There is a prototype hydrogen refuelling station for vehicles at the Centre. There is also a fuel cell, but it is stationary not mobile as in some hydrogen-powered vehicles. The Centre plans to develop hydrogen's use in internal combustion engines, storing compressed gaseous hydrogen on board, rather than the fuel cell and solid state storage. Hydrogen is micro-generated and production of and demand for electricity are balanced by using hydrogen as store. Nor is hydrogen produced by steam-reforming natural gas – a non-renewable hydrocarbon - as in most industrial applications, but from renewable sources - presently photo-voltaic cells. The central electricity grid merely backs the system up and accepts any surplus product.

Sampling and recruitment

Our sampling and recruitment strategy was based on the ideas that shared place might make for similarity and varied age might produce difference in people's perspectives.

The participants lived within 50 miles of the Centre. Not only actual place but also sense-of-place are likely to influence them, as in a study of public reactions to wind farms in North Wales, where some respondents focused on visual impacts on the landscape and others on benefits to the economy [8]. The Welsh Valleys have been shaped by their nineteenth- and twentieth- century history of coal extraction and iron and steel production and subsequent deindustrialization, beginning after the First War and accelerating from the mid-1980s. Following the credit crash of 2008, the economy of London and the South East has begun to recover, though the Welsh Valleys remain in recession [9]. On the other hand, loss of coal-mining has returned much of the countryside to the state that Llewellyn, in his novel 'How Green was my Valley' of 1939, could only reminisce about.

Personal trajectories related to the 'age' of those who took part are also probable influences. People of three ages visited on separate days: 1) secondary students aged 14 taking the Welsh Baccalaureate, 2) sixth-form and also apprenticeship students at Tertiary College aged 18-19, and 3) adult neighbours of varying age and usually not in education, who were members of a Citizens' Panel regularly consulted on environmental issues by the local authority. The authors approached the organizer of the local Citizens' Panel and the Principal of the local Tertiary College in recruiting two of the age-groups. The Hydrogen Centre was itself approached with a view to a programme of school visits by a member of staff of the Secondary School, who had found the Centre's website. The school lies to the near-west of Cardiff.

Age has two aspects: generation and stage in life [10]. Those aged 14 are entering and those of 18–19 are about to leave a stage in life which is 'liminal' – that is, on the threshold between the dependence of childhood and the relative independence of adulthood, in a state of 'anti-structure' [11]. The symbolic markers of exit from childhood and then entry to adulthood differ from culture to culture, and are likely to vary with gender. By happenstance, here all the younger people were male. For today's males at least, in the UK, being initiated into employment and 'having wheels' mark the transition to adulthood [12].

Perspectives are also likely to differ between generations, notably so in changing cultures. Though people acquire new knowledge throughout life, those of the same generation are likely to have shared their most formative experiences and hence have similar perspectives. The adults here are in many cases old enough to have gone through their formative years in the 1980s or earlier still, when coal mining was immersed in conflict between trade unions and government, followed by extensive pit closures.

Research techniques

The techniques we adopted were based on three premises. The first is that, in order to research lay spoken discourse

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