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Framing Fracking: Public responses to potential unconventional fossil fuel exploitation in the North of England

Laurence Williams

Material Abstract

The emerging prospect of the exploitation of onshore unconventional fossil fuels (unconventionals) across the UK has been accompanied by a significant degree of public unease. Institutional actors have regularly claimed that the risks associated with hydraulic fracturing (fracking), the controversial technique often involved in the extraction of unconventionals, are safely manageable. Public concern over both the technique of fracking and the prospect of the exploitation of unconventionals has regularly been categorised by these institutional actors as being ostensibly about these risks. As a result sceptical public positions have often been represented as lacking (technical) understanding and as in need of being informed of "the facts". This account of the controversy, regularly evident in media, expert, and political discourse, makes a series of questionable assumptions about public responses and is showing signs of a failure to learn lessons from previous instances of controversy surrounding emerging technological innovation. This research is an attempt to articulate the currently scarcely acknowledged factors underlying public concerns and a series of conditions upon which the 'acceptability' of fracking and unconventionals may rest. In order to do so a deliberative focus group methodology is employed, with an explicit focus on the framing of the issue, including institutional treatment of questions from beyond established scientific risk knowledge and often unquestioned normativities involved in nominally expert accounts.

Framing Fracking: Public responses to potential unconventional fossil fuel exploitation in the North of England

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September 2013

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Framing Fracking: Public responses to potential unconventional fossil fuel exploitation in the North of England

Executive Summary

Expert accounts have regularly claimed that the risks associated with hydraulic fracturing (fracking) are safely manageable. The notion that public concern over both the technique of fracking and the prospect of the exploitation of unconventionals is ostensibly about these risks remains relatively dominant through-out expert, political, and media discourse. As a result sceptical public positions have often been represented as lacking (technical) understanding and as in need of being informed of "the facts". This account of the controversy makes a series of questionable assumptions about public responses and is showing signs of a failure to learn lessons from previous instances of controversy surrounding emerging technological innovation.

The framing of this issue as predominantly one of risk and safety locates scientific risk science as essentially *the* site and mode of its deliberation. This clearly marginalizes questions and concerns that either come from beyond present established risk knowledge (i.e. about ambiguities, uncertainties, ignorance, contingencies, etc.) or go beyond questions of safety (i.e. about normative visions of the future; institutional behaviour; industry structure; exploitation and justice; the power and proximity of social, economic, and political incumbent interests; human-environmental ethics, etc.).

This problematic framing may be further confounded by a 'case-by-case', safety-focused model of regulatory oversight geared towards addressing issues from within present and established scientific risk knowledge.

Public engagement may have the potential to address these issues of framing, deliberation, and authorship, but is no silver bullet. It is too early to assess the likelihood of nascent government public engagement processes acknowledging, identifying and giving influence to public framings. However, achieving successful engagement processes that secure the goodwill of those they seek to engage, may, at this stage prove a challenge due to the danger of the perception that powerful institutional actors are already committed in favour of exploitation.

A deliberative focus group methodology was employed due to its focus on interaction and its ability to generate rich qualitative material. The sampling was designed to ensure a breadth and diversity of voices and to be representative of broader judgements and responses beyond the research sample in a theoretical sense, rather in any positivistic or statistical sense. This diverse interaction was driven by questions and visual stimulants designed to open up the discussion and get the participants to elaborate on their feelings, reasoning, judgements, and questions. The rich qualitative material generated allowed for analysis of lay issue definitions, salient questions, hopes and concerns, and the narratives employed in relation to the topic. This allowed for an attempt to articulate both the underlying factors structuring public responses to fracking and unconventionals and a series of possible conditions upon which the public acceptance of exploitation may rest.

Findings

The Nature of Concern:

- Responses were regularly complex and sophisticated.
- Concern (and for that matter hope) expressed in the groups was not 'irrational', nor did it regularly take the form of 'nimbyism'.
- Concern was rarely about risk and risk alone in any straightforward way. Instead concern was more often a complex mix of judgements including perceptions of danger, but alongside, and in the context of, more social concerns (i.e. trust, alienation, exploitation etc)
- Perhaps due to the emerging and ambiguous nature of the debate, or perhaps because of a lack of technical understanding, as well as focusing on the relative merits of fracking and exploitation of unconventionals themselves, responses often also focused on judgements about the motivations, desires, beliefs, competencies and other factors that guide the actions of research, industry, and policy actors.
- The current form of debate dominant within government, industry, the media, and academia (science and social science) focuses primarily on a rather limited set of questions (i.e. Is it technically feasible? Is it economically feasible? Is it safe? Do people understand the facts that answer these questions?). It seems clear from this research that the right questions are not being asked, let alone the right answers being found, to properly address the true nature of public concern.

The Forms of Concern:

- Trust – trust was a theme that often dominated early group discussions and was regularly referred back to as the groups progressed. The issue at the heart of discussions about trust was an anxiety about the ability and willingness of institutions and actors in positions of authority to put the public interest, public values and genuine social goods at the heart of policy and practice in relation to fracking.
- Alienation – closely related to trust, there was a sense of a game weighted in the favour of big business, of unequal power relations and of an unsatisfactory inevitability. The main fear contributing to feelings of alienation was perhaps that of being by-passed, of decisions being made on your behalf without being given the possibility to voice an opinion.
- Exploitation - the will to exploit was seen as a "dash for cash" informed overwhelmingly by an unfettered economic rationale that was seen as being short-term, as unlikely to benefit those who would have to live with its risks and broader consequences, and as likely to be dangerously seductive to policy-makers, industry actors and publics alike. Unconventionls were seen as something many of us want, but not *necessarily* something we need. This is not to say that, for many, the possible benefits of unconventionals would not be welcome, rather that grand promises of tumbling gas prices and trickle down effects were taken with a pinch of salt given both the array of uncertainties and contingencies at the present moment, and the issues of trust previously discussed.
- "Risk" - as I have already suggested participants rarely spoke straightforwardly and singularly abut risk and risk alone. Fracking was seen as a problematic proposition, in part, because of the 'materialites' and 'unnaturalness' of the dangers themselves, as well as the symbolic importance of what was seen as being in jeopardy (i.e. water resources, 'the countryside', etc.). However this research also suggests that quite apart from the dangers themselves, the institutional responses to both the risks, and public concerns defined as ostensibly about those risks, is a source of at least a degree of concern. As such, as well as expressing concern over the 'dangerousness' of risks, participants also regularly reflected on possible 'blind spots' of present and future knowledge, the problematic nature of the dominance of risk assessment style analysis, and the framing of the debate more generally.

- Uncertainty and Ignorance - there was a broad consensus over the need for greater knowledge and understanding on fracking and unconventionals. Many were optimistic that this could be achieved and were therefore concerned by the sense that the decision to exploit was being rushed through. A rushed decision, it was widely held, would almost inevitably be regretted at some point in the future. Others were less willing to assume that it was only a matter of time before we knew the full facts and instead called for greater humility and caution in assessing the limits of present and future knowledge. For these participant's fracking seemed to be 'asking for trouble'. Risk-assessment style assurances expressing minimal danger were likely to exacerbate these concerns rather than defuse them, and were seen as communicating institutional arrogance and complacency. Overall, though not unequivocally, when making judgements and decisions in conditions of uncertainty and ignorance, participants favoured some form of precautionary approach.
- Appraisal – there was concern as to whether fracking and unconventionals merited its possible place in a future energy mix through a process of genuine technological appraisal and social choice, or whether it was merely due to 'lock-in', habitual preference and incumbent interests. There was much discussion as to whether fracking and unconventionals were a good response (to the energy crisis, to the climate crisis, or to both) for good reasons. There was the fear of a disconnect between the publics definitions of 'a good response' and 'good reasons' and those of actors in positions of authority; and therefore scepticism about the extent to which normal people would be invited to take part in (and crucially influence) processes of appraisal and choice.

Potential Conditions of 'Acceptance':

Representation: the necessity for publics to be given the space and opportunity to deliberate the issue (e.g. public engagement), possibly arrive at a degree of consensus, and influence the decisions of representatives (i.e. the invigoration of the relationship between represented and representative).

Redistribution of Expertise: the necessity for publics to be given the space and opportunity to shape the scope, direction, and pace of innovation; and the necessity for a scientific

culture that is responsive to public (invited or uninvited) scrutiny, values, and interests (i.e. the invigoration of the relationship between laypeople and experts).

Justice: the necessity for public values concerning ethics, fairness, and justice to influence both the direction of innovation at an upstream phase and the conditions of application at a downstream phase.

Precaution: the necessity for uninvited controversy and concern over innovation to prompt scrutiny and debate over both questions about the limits of present scientific risk knowledge related to an innovation and its potential consequences; and questions about the normative visions, values, and assumptions embedded in an innovation

Humility: the necessity for scientific risk knowledge to be envisaged as making an invaluable contribution to such debates, but not as defining, dominating, or determining such debates.

Appraisal: the necessity for technological choices of this importance to be subjected to a process of deliberative appraisal and scrutiny. This appraisal process would need a particular focus on rendering explicit the human and environmental values embodied in an innovation or a range of possible technological pathways, and in so doing open these choices to deliberative political engagement.

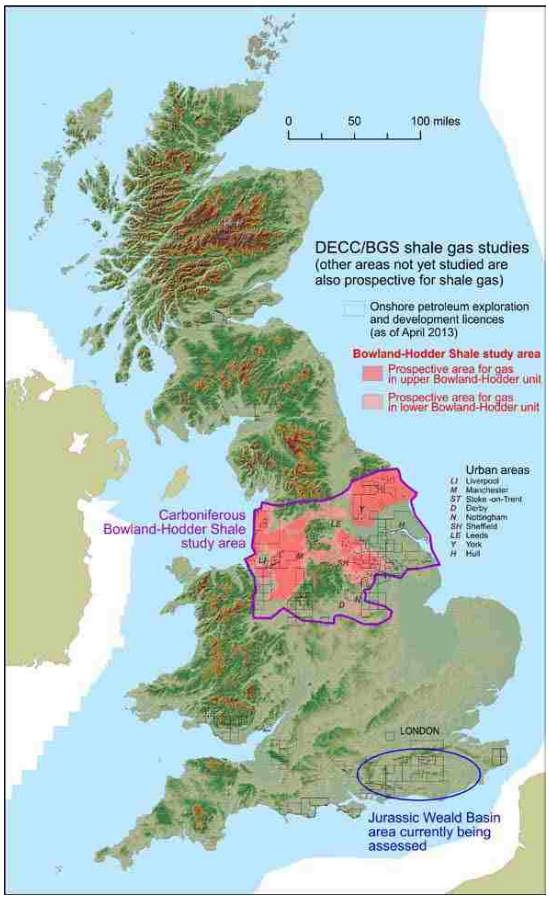
Taken together, the first three conditions are consistent with the task Callon et al. (2009) call ‘the democratisation of democracy’. Uninvited, unanticipated technological controversies play an important role in this task. The first three conditions call for the will and the procedures to better accommodate the explorations, ‘problematisations’, and scrutiny that these episodes bring about.

The second three conditions, taken together, represent what might be termed ‘the politicisation of technology’. This task is necessitated when technological choices are viewed, at least at an early enough stage, as essentially malleable – that is, a matter of social choice. The second three conditions call for explicit acknowledgement and intentional deliberation of technological choice, limits to knowledge and understanding, and the normative visions and agendas shaping ‘progress’.

1. Introduction

Hydraulic fracturing, commonly known as 'fracking', is a controversial technique used in the extraction of unconventional fossil fuels ('unconventionals'): oil and gas found in geological conditions distinct to traditionally conventional sources, for instance from shale or coal rather than limestone or sandstone. Whilst the technique of fracking is not particularly novel – its development stretches back to the mid-twentieth century – the refinement of the process of horizontal drilling and the emergence of conditions within which the exploitation of unconventionals has become economically feasible have meant its widespread application has only become a significant prospect in the last decade or so.

The development of onshore unconventional resources has been pioneered in the US, where today the majority of production-phase, commercial-scale operations are located. However substantial unconventional resources are thought to be widely dispersed geographically and early stage exploratory and development operations are underway in a host of other countries around the world. In the UK shale gas has become the primary focus, although coal bed methane and shale oil resources also exist. The Bowland-Hodder shale, which lies underneath large swathes of Central and Northern England, and the Weald Basin, which lies underneath parts of the South-East of England, in that order, are seen as the major UK shale "plays".



Source: Andrews (2013) The Carboniferous Bowland Shale gas study: geology and resource estimation. British Geological Survey for Department of Energy and Climate Change.

The proliferation of the exploitation of unconvetionals, and particularly the use of fracking, has been accompanied by a range of social and environmental concerns, most notably about the industrialisation of rural landscapes; effects on food production; corporate power, democratic legitimacy, and community disempowerment; possible contamination of water resources (groundwater and surface water); high levels of water consumption; induced seismicity; and questions about how the exploitation of unconventionals and obligations under international climate change agreements might be reconciled. These concerns and others have driven the emergence of diverse and localised grassroots protest groups around the world.

The epicentre of the debate in the UK has so far been around Blackpool, the Fylde, and West Lancashire (joined recently by Balcombe, West Sussex). On the 1st of April and 27th of May 2011 there were two earthquakes with magnitudes of 2.3 and 1.5 respectively in the Blackpool area. Nearby hydraulic fracturing treatments were subsequently deemed as the cause of these seismic events by a series of studies commissioned by Caudrilla Resources Limited, the company responsible for the treatments, and reviewed by The Department of Energy and Climate Change (DECC 2012a). As a result in the UK, perhaps uniquely, seismicity has been the main risk "the general public" associate with fracking (Britain Thinks 2012a; O'Hara et al 2013), and Caudrilla has become the public, if not for some, infamous face of fracking in the UK. The fracking and unconventionals debate is still emerging in the UK and perhaps the majority of minds are far from made up on the issue (with perhaps a significant proportion remaining scarcely aware of the issue).

This project is an attempt to elicit and articulate lay judgements on fracking and the exploitation of unconventionals and the underlying factors driving them. The projects starting point was the assumption that rather than demonstrating a deficit of understanding revealing the need for one-way pedagogical instruction, public unease may be based on perfectly legitimate and reasonable social, political, and ethical judgements. Firstly, an account of emerging media representations and institutional discourse will be presented, as well as the early stages of social sciences' engagement with the topic. The institutional discourse will then be critiqued as frequently misrepresenting the nature of public concern and being incapable of fully addressing that concern due to the dominance of a secluded risk assessment and management approach. I will then describe and justify the deliberative focus group methodology used here to try and elicit some of the factors structuring public

unease surrounding fracking and the exploitation of unconventionals. Factors that, as I have already suggested, are under-acknowledged and poorly represented by expert and institutional actors. I will then present the findings of this project, structured into six themes seen as underlying and guiding public responses to the debate. These themes will form the basis of a series of conditions upon which "public acceptance" is found to be contingent.

2. Literature Review

This review will initially present an account of media representations of fracking and unconventionals. This is not a full and comprehensive attempt at media discourse analysis but is instead intended to provide a broad sense of the hopes and concerns at play in early media representations of this emerging prospect. Therefore this section gives a useful impression of the emergence of a public debate, in and through the media, attempting to get to grips with the complexity and ambiguity of this issue. This review then presents an account of eight key elements of institutional discourse, which emerged simultaneously with and in part in response to emerging public responses reflected in the media coverage set out in the previous section. "Institutional discourse" is broadly defined here as contributions to the debate from actors working at the 'science-policy interface' and therefore bestowed with a degree of expertise and/or authority. This review then turns to the social sciences and first presents a brief account of early insights on this specific issue from the anthropology of energy, before identifying four key ways in which literature from science and technology studies can make a critical contribution to the fracking and unconventionals debate.

2.1 Media Representations

2.1.1 An Unnatural Disturbance?

Media representations on hydraulic fracturing and unconventional fossil fuels can be justifiably, if slightly clumsily, split into two broad and distinct responses which often find themselves in opposition to each other. The first views fracking as an unnatural disturbance which is asking for trouble, an act of hubris or desperation, inspired by greed, which will inevitably be punished. This representation emphasises present and continuing gaps in scientific knowledge (Russell-Jones 2013) and at the same time invokes scientific knowledge and techniques to invoke the need for caution. It also problematises fracking's relationship with water (contamination and consumption) (McGrath 2013), anthropogenic climate change (Simms 2013) and valued rural landscapes (Watts 2012); and places the burden of proof firmly on those who would wish to frack to prove its safety, often ostensibly demanding certainty. The response informed by this representation often brings together diverse and unusual coalitions of actors and perspectives, what Hajer (1995) would call 'discourse-coalitions', such as those representing Middle England aligned discursively with environmental activists (Townsend 2013), say. The 2010 documentary film *Gasland* (*Gasland* 2010) written and directed by Josh Fox, reflected this response and

has since become shorthand for people's unease, an entry point into the debate, and a point of coalescence for people who share this concerned response.

It is worth briefly exploring the meaning of this influential film. *Gasland* is the story of 'hybrid popular epidemiology' (Callon et al. 2009), the lay instigated search for explanations spurred on by a worrying exceptional and unexpected singularity which seeks to secure expert help (Callon et al. 2009). Faced with murky and bubbling drinking water and increasing inventories of felt ailments, the subjects of *Gasland*, much like Callon et al's account of the citizens of Woburn, Massachusetts in the 1980's upon noticing high levels of infantile leukemias:

> "throw themselves wholeheartedly into the exploration of the causal chains… with the sole aim of establishing connections and revealing the relations of cause and effect" (Callon et al 2009: 79).

Where the concerned parents of Woburn found industrial dumps, the subjects of *Gasland* find fracking operations. They form:

> "a community that has integrated into its daily life the [perceived] presence of pollutants that take part in collective life by acting day by day on the health of the inhabitants. They talk to officials, meet scientific experts, and endeavour to acquire knowledge about the supposed effects of toxic waste on the heath of the residents. They grab hold of government experts to whom they pass on their information. The latter conclude (should we be surprised?) that there is nothing strange or monstrous… The group thinks it understands that the official experts do not understand anything" (Callon et al 2009: 79-80)

The comparison, between Callon et al's example of Woburn in the 1980's and the contemporary emerging controversy surrounding fracking, fails to acknowledge a crucial difference between the 80s and 2010. The development and widespread proliferation of information and communication technologies, as well as the new forms of political and epistemological subjectivity emerging around them. The relationship between the fracking debate and the Internet will be largely 'black-boxed' in this study but it ought to be opened-up and explored elsewhere. *Gasland* is about more than just the exploration of relations of cause and effect and the attempt to persuade reluctant officials and experts to legitimise lay quasi-scientific observations. Through the scenes of elusive and secluded or dismissive industry actors and public officials juxtaposed to the refrain of Woody Guthrie's unofficial American national anthem 'This Land is Your Land', *Gasland* makes a not particularly subtle series of social and political points about power, representation, and alienation. In other words the film not only (re)presents, gauges and queries the gap

between expert and non-expert, but elected representative and citizen too. It is these gaps, in the context of perceived danger, that animate the 'unnatural disturbance' response to fracking and unconventionals.

2.1.2 A Timely Triumph?

The second media representation of fracking doesn't recognise these gaps as problematic. This response sees fracking as a timely triumph of the problem-solving capabilities of science, innovation, and the market and another step on the singular and linear road of progress. In the UK this representation emphasises unconventionals potential to bolster security of energy supply and to provide "greener" electricity than coal or play the role of a 'transitional fuel' whilst alternatives are developed and refined (Lomborg 2013). Furthermore emphasis is also placed on unconventionals potential to provide a much needed economic stimulus through providing employment in the industry itself, with associated but often vaguely defined notions of knock-on and trickle-down effects, and provide seemingly guaranteed falls in energy prices (or at least limiting the rise in energy prices) for consumers and businesses alike (Fallon 2013; Rayment 2011). These hopes are bound up with a lingering dissatisfaction with processes of de-industrialisation and nostalgia for a proud industrial history (Moore 2013). Our apparently proud history of regulating onshore and offshore oil and gas industries is also emphasised where it is often implied that European/British regulation will constitute 'best-practice' and so avoid some of the questionable aspects in the American fracking story from a regulatory and governance perspective (BBC News 2013a). Fracking is an opportunity that is 'too good to turn down' and the invocation of precaution is either an irrational and hyperbolic overreaction or an unnecessary luxury (Bingham 2013). The 'timely triumph' response, informed by this representation, does not see the separation of expert and layperson, and representative and citizen, as an issue in the way the previous response does. Moreover this response is likely to see these gaps and delegations as the proper and successful functioning of science and technology governance. Whilst the 'unnatural disturbance' response lists previous controversies (BSE, GM, etc.) as evidence of the need for a re-think of science and technology governance, the 'timely triumph' response instead merely demands 'sound science' and regulatory 'best-practice'.

The public responses, in part, informed by the media representations briefly discussed above are of course highly complex and, for instance, in my research individual participants, let alone whole groups regularly flickered between these two broad responses

as discussions proceeded and disagreements were voiced. Responses are also regularly ambiguous as they try and get to grips with an emerging issue without scientific expertise or vocabulary on the basis of mediated representations of often incomplete risk-science, and areas of ambiguity, uncertainty and ignorance. With these two points in mind a recent UK poll has suggested that 40% of respondents would welcome fracking in their area, whilst the same number would oppose it (ICM 2013). Publics don't a priori possess definitive, stable, and permanent convictions on such matters of concern, rather public judgements emerge, are challenged, and (temporarily) gain coherence through deliberation. These poll results and others like them do not account for the way deliberation and interaction, as well as a broader framing of the issue might produce a different, more nuanced picture. The poll does however provide a snapshot which suggests a significant proportion of public concern surrounding fracking and the exploitation of unconventionals. Institutional, expert, policy, and industry discourse regularly fails to recognise more concerned responses, informed by and consistent with the 'unnatural disturbance' media representation, as legitimate and deem those who employ it as in need of being informed (Malnick 2013).

2.2 Institutional Discourse

There are eight broad areas of debate in which institutional actors - that is, those actors at the science-policy interface either by virtue of their recognised competence and expertise or by virtue of their status as a spokesperson or representative - tend to respond to fracking and unconventionals. I'll briefly explore each in turn with an emphasis on remaining areas of uncertainty and ignorance in our understanding of the issue and how it may unfold.

2.2.1 Energy Futures

Firstly, responses are usually contextualised and often justified in relation to energy futures. The International Energy Agency's (2012) World Energy Outlook estimated that global energy demand looks set to rise by a third in the period to 2035 (IEA 2012a). Their Golden Age of Gas scenario predicts that "an increase in [gas] production equivalent to about three times the [current] production of Russia will be required simply to meet the growth in gas demand" with unconventional gas expected to meet 'more than 40% of the increase in demand' (IEA 2011: 8). However, as de Rijke (2013) points out, these predictions "appear not to take into account a variety of factors affecting the economics of production, including high gas well depletion rates and associated cost increases, concerns

about climate change and continued reliance on hydrocarbons, and increasing community opposition to technologies such as fracking" (de Rijke 2013: 13).

In the UK, the energy regulator Ofgem's 2013 Electricity Capacity Assessment Report warned that Britain's energy industry "faces an unprecedented challenge to secure supplies due to the global financial crisis, tough environmental targets, increasing gas import dependency, and the closure of ageing power stations" (Ofgem 2013: 2). As a result Ofgem estimate a scenario in which the "probability of a large shortfall requiring the controlled disconnection of customers increases from around 1 in 47 years in winter 2013/14 to 1 in 12 years in 2015/16" (Ofgem 2013: 6). This report and the British Geological Survey's (BGS) resource estimate of the Bowland shale (which lies under large tracts of Northern and Central England) were released on the same day, a potentially crucial day in the development of the UK shale gas debate. Unsurprisingly much of the media coverage treated these two reports as the same story, with the latter posited as a potential solution to the former. The Ofgem report describes an immediate, near-future risk caused by a series of factors, crucially including a likely gap between the closure of old power stations and their replacements becoming operational. There is no expectation of a domestic, large-scale, commercial shale gas industry emerging within this horizon. The IEA's 2011 special report entitled a 'Golden Age of Gas?' suggests that for natural gas (conventional and unconventional) "[t]imely and successful development depends on a complex set of factors including policy choices, technological capability, and market conditions. Once discovered, major gas resources can sometimes take several decades to reach production" (IEA 2011: 7). Deutsche Bank also suggests that the "speed at which high-volume production can be achieved" is likely to mean that "those waiting for a shale-gas 'revolution' outside the US will likely be disappointed" (2011: 7). Finally the 2012 World Energy Outlook notes that 'energy is becoming a thirstier resource' as "[w]ater needs for energy are set to grow at twice the rate of energy demand", and that "[w]ater is growing in importance as a criterion for assessing the viability for energy projects, as population and economic growth intensify competition for water resources" (IEA 2012b: 7).

2.2.2 Resource Estimation

The second area of debate seeks to establish how much shale might be under Britain, how much gas might be caught up in that shale, and how much of that gas we might reasonably expect to be able to "recover". The aforementioned BGS report makes a central 'gas-in-place' resource estimate of 1,329 trillion cubic feet (the low estimate is 822 and the high

2,281). As they stress "these 'gas-in-place' figures refer to an estimate for the entire volume of gas contained in the rock formation, not how much can be recovered" (Andrews 2013: 3). Furthermore they acknowledge that "not enough is yet known to estimate a recovery factor, nor to estimate potential reserves (how much gas may be ultimately produced)", and that to be able to do so would require more 'refined' methodology requiring production data from wells in combination with "non-geological factors such as gas price, operating costs and the scale of development agreed by the local planning system" (Andrews 2013: 3). Nevertheless it has been suggested that if 10% was recoverable this would represent 25 years of UK gas supply (Macalister 2013), and there remain other areas of the UK with possible unconventional fossil fuel "plays". Research is currently under-way to produce a resource estimate for the Weald Basin which sits underneath parts of South-East England.

2.2.3 Potential Benefits

The third area of debate in institutional discourse on fracking and unconventionals concerns the potential benefits of exploitation, which are primarily economic in character, and which often include degrees of extrapolation and speculation. Predicting how this innovation will translate to different places and contexts is the subject of much uncertainty. It demands the acknowledgement of the complexity and heterogeneity of geology, mineral rights laws, regulatory culture, future global and regional gas markets, export infrastructure and capacity, 'social acceptability', planning processes, tax regimes, population density and many other factors. Uncertainties clearly exist over the likelihood of the 'shale gas revolution' being replicated in Europe to the same degree, at the same speed, and without more opposition, than has been the case in the US. For instance, as already noted, Deutsche Bank strike a cautionary note on shale's economic potential when they warn that "[t]hose waiting for a shale gas 'revolution' outside the US will likely be disappointed , in terms of both price and the speed at which high-volume can be achieved" (2011: 7). Their reasoning in the UK context includes uncertainties over recoverable resources, the speed with which the production phase can be reached and likely local and NGO opposition, as well as disadvantages compared to the US over drilling infrastructure, mineral rights laws and population density (Deutsche Bank 2011). The main potential benefits for the UK are widely seen as being limiting future energy price rises, improving energy security, job creation, and generating tax revenue. A series of reports estimate the likelihood and scale of these potential benefits (Lewis & Taylor 2013; Poyry 2011; Poyry 2012; Regeneris Consulting 2011; The Energy and Climate Change Committee 2013), but all rest on a

series of assumptions, predictions, and contingencies surrounding production estimates, production costs, future global and regional prices, and the impact of efficiency and decarbonisation efforts on energy markets.

Despite these uncertainties political discourse has often presented and emphasised unconventionals' potential to lower gas prices, provide employment, stimulate economic growth, provide knock-on and trickle-down effects, bolster energy security and provide benefits for local communities. For instance George Osborne, UK Chancellor of the Exchequer, at the 2012 Conservative Party Conference stated: "we are today consulting on a generous new tax regime for shale so that Britain is not left behind as gas prices tumble on the other side of the Atlantic" (Osborne 8 October). As well as in the 2013 Budget statement to Parliament: "by the summer, new planning guidance will be available alongside specific proposals to allow local communities to benefit. Shale gas is part of the future. And we will make it happen" (HC 2013 Budget, Chancellor's Statement 20 March). The rhetoric in the first quote is well-worn: the notion that we are in a cut-throat, highly competitive, global 'race' for economic survival, whereby social compliance to innovation and "progress" is an essential trade-off for economic growth and wellbeing. For a long time, the mechanisms through which the benefits to local communities, along with the nature of these benefits themselves, talked about in the second quote were also highly vague and have only recently started to be fleshed out. The UK Office of Unconventional Gas and Oil (OUGO), created in December 2012, has as one of it's objectives to "[e]nsure the delivery of a coherent framework to enable local communities to benefit directly from any development of resources in their area" (DECC 2013). These direct community benefits amount to providing "benefits to local communities at the exploration/appraisal stage of £100,000 per well sight where hydraulic fracturing takes place", and providing "a share of proceeds at production stage of 1% of revenues, allocated approximately 2/3rd to the local community and 1/3rd at the county level" (UKOOG Community Engagement Charter 2013: 1). These debates are clearly all highly contingent on the previous area of debate (section 2.2.2) and until the completion of reserve estimates they will continue to be dominated by assumptions and extrapolation from the US experience.

2.2.4 Impacts on Water Resources

The fourth and fifth areas of debate in institutional discourse concern risks that also dominate media representations of fracking, namely impacts on water resources and induced seismicity. In terms of groundwater contamination there is an emerging academic debate taking place in the earth sciences on the precise geophysical mechanisms involved

in the apparent risks associated with the process (Davies 2011; Davies et al 2012, Jackson et al. 2011, Osborn et al. 2011). This is supplemented by an increasing number of large reports and 'grey literature' from regulatory bodies and governing institutions across the Western world (EPA 2012, European Commission 2012a; Royal Society & Royal Academy of Engineering 2012) with a focus on the relationship between fracking and water resources. The US Environmental Protection Agency (EPA) report is a far-reaching assessment of the potential impacts of hydraulic fracturing on water resources; it is however, just a progress report of a national study not expected to release its finding until 2014. Therefore, here, a degree of uncertainty in current knowledge stems from a limited understanding over what has actually happened in the US in the last decade or so, with much of the evidence, for the moment, being anecdotal. Thus, there remains a degree of scientific uncertainty in current knowledge about the relationship between fracking and groundwater contamination, the behaviour of fractures, as well as a general lack of site-specific data. In terms of the risk of groundwater becoming contaminated by hazardous chemicals, there are deemed to be 3 possible mechanisms. Firstly, natural methane migration is one possible mechanism. Its likelihood as a possible mechanism depends on site-specific geology, in particular the depth of the shale and therefore the overlying pressure. In the Marcellus Shale, US, for instance, Osborne et al. (2013) deem natural methane migration unlikely because of the pressures of 1-2km thick overlying geological strata. The Bowland Shale is fairly comparable given that it is located at depths of 1,700 - 3100m, however the need for a better understanding of UK shales and overlying geology is stressed (Royal Society and Royal Academy of Engineers 2012). Secondly, there is the possibility that induced hydraulic fracturing could cause fractures that can extend vertically far enough to reach depths where groundwater is present. Although a theoretical possibility, there is scientific debate about whether there is the evidence to support this "provided that shale gas extraction takes place at depths of many hundreds of metres or several kilometres" (Royal Society and Royal Academy of Engineers 2012), given that the "maximum upward propagation recorded for a stimulated hydraulic fracture to date is ~ 588m" (Davies et al. 2012: 5). However this research is based on the analysis from thousands of fracturing operations across five shale formations in the US. It is acknowledged that data is required from other regions as "different geological conditions may result in unusually short or tall fractures" (Davies et al. 2012: 6). The final possible mechanism is poorly constructed leaky well casings, which much of this literature deems the most likely cause of possible contamination. For example the Royal Society & the Royal Academy of Engineering's report suggested that the "[m]ore likely causes of

possible environmental contamination include faulty wells, and leaks and spills associated with surface operations" (Royal Society & the Royal Academy of Engineering 2012: 4).

The Tyndall Centre are cautious over our ability to determine the precise mechanism responsible and they point out the importance of possible 'cumulative effects' and to the 'scale-up of risks' arising from necessary scale and intensity of operations needed to produce meaningful amounts of gas (Broderick et al 2011). There is, however, also a suggestion that differences in environmental regulatory cultures in the US and EU may mean that certain risks are less likely to occur in the UK due the often assumed likelihood of a more robust regulatory framework. For instance, the Tyndall Centre report claims that "[f]rom a regulatory perspective, many of the problems experienced in the US have been blamed on the US federal Energy Policy Act of 2005 which excluded hydraulic fracturing from the Safe Drinking Water Act" (Broderick et al 2011: 96). This has meant that certain disposal restrictions, liabilities and reporting requirements, and disclosure of the type and quantity of chemicals used did not apply (Royal Society & the Royal Academy of Engineering 2012). Despite not being legally obliged to do so, many US fracking companies do disclose information about the chemicals used in fracking fluids on their websites, though they do so very much on their own terms. Overall then, the potential risk of groundwater contamination associated with hydraulic fracturing is poorly understood. In short any association between hydraulic fracturing and groundwater contamination 'remains unproven' (Davies 2011), as does "[a]ny assertion that hydraulic fracturing is unrelated to contamination" (Jackson et al 2011: 872). Further uncertainty arises from the difficulty of predicting the effect a different regulatory structure will have on this potential risk in the EU and UK.

2.2.5 Seismicity

With regards to seismicity a DECC (2012a) report deals specifically with reviewing Caudrilla's own report about two episodes of relatively low magnitude seismic activity (2.3M L and 1.5M L on the Richter scale respectively) in the Northwest of England largely held to be associated with their exploratory fracking activities in that area. This issue is also dealt with in a number of the aforementioned reports (see, for example, European Commission 2012a; Royal Society & the Royal Academy of Engineering 2012; Broderick et al 2011). The DECC report states that "[t]he observed seismicity in April and May 2011 was induced by the hydraulic fracture treatments at Preese Hall" (DECC 2012a: 11). They go on to report that in "the present state of knowledge it is entirely possible that there are

critically stressed fractures elsewhere in the basin" (2012a: ii). The Tyndall Centre add that "whilst these [seismic events] are unlikely to be of sufficient magnitude to cause structural damage on the surface, structural damage to the wellbore itself (and in all likelihood other wellbores in the vicinity) is possible" (Broderick et al. 2011: 94). Davies et al. (2013) conclude that "after hundreds of thousands of fracturing operations, only three examples of felt seismicity have been documented. The likelihood of inducing felt seismicity by hydraulic fracturing is thus extremely small but cannot be ruled out" (Davies et al. 2013: 18). This claim, of course, presupposes that all instances of felt seismicity have been documented. Overall though it is deemed by DECC and others that this risk can be managed acceptably with sensible and robust regulatory measures. This is based on the assumption that seismic activity is likely to be of comparable if not lower magnitudes than those associated with (largely historical) coal mining activities. However, as the Tyndall Centre point out, more thought needs to be given to the intensity of operations associated with meaningful commercial production and the effect of seismicity on the well and other wells in the vicinity.

In the UK context then, despite the uncertainties discussed above, there is an apparently growing belief that the direct risks can be properly managed through scientifically-driven robust regulation. For example the Royal Society & the Royal Academy of Engineering suggest that the "health, safety and environmental risks associated with hydraulic fracturing (…) as a means to extract shale gas can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation" and add "[t]he UK has 60 years' experience of regulating onshore and offshore oil and gas industries" (2011: 4).

2.2.6 Climate Change Impacts

Whilst much of the literature discussed here acknowledges the need for better understanding of the potential climate change impacts of unconventional gas they do not address these issues in detail themselves. The exceptions to this are the European Commission (2012b) and the Tyndall Centre (Broderick et al. 2011; Broderick & Anderson 2012) all of which deal with potential climate change impacts explicitly and in some detail. The relationship between fracking and the exploitation of unconventionals, and climate change constitutes the sixth area of debate in institutional discourse. Tyndall Centre research suggests that the manageability of certain risks is quite irrelevant if the UK is to fulfil its commitments to reduce GHG emissions. In their words:

> "emissions from a fully developed UK shale gas industry would likely be very substantial in their own right. If the UK Government is to respect its obligations under both the Copenhagen Accord and Low Carbon Transition Plan, shale gas offers no meaningful potential as even a transition fuel. Moreover, any significant and early development of the industry is likely to prove either economically unwise or risk jeopardising the UK's international reputation on climate change. The idea that we need 'transitional' fossil fuels is itself open to question". (Broderick et al. 2011: 7).

Proponents of the exploitation of unconventionals often emphasise their "green" potential. This primarily focuses on their possible role as a 'transitional fuel', as well as occasionally focusing on their prospects as a 'baseload fuel'. The 'transitional fuel' argument rests on the idea that "[s]hale gas subject to best practice extraction and subsequently combusted in high efficiency combined cycle gas turbine (CCGT) powerstations will deliver power at lower emissions per unit of electricity generated than is possible from coal fired generation" (Broderick et al. 2011: 6). And therefore substituting coal with unconventional gas would constitute climate change progress. The Tyndall Centre, however, is quite emphatic in its rejection of this idea; "in the absence of a stringent global emissions cap, large-scale extraction of shale gas cannot be reconciled with the climate change commitments enshrined in the Copenhagen Accord". Due to the short time-scales remaining to mitigate the worst effects of climate change by limiting warming to 2°C, it is argued that, "[i]rrespective of whether UK shale gas substitutes coal, renewables, or imported gas, the industry's latest reserve for just one licence area could account for up to 15% of the UK's emissions budget through to 2050" (Broderick et al. 2011: 7). It should be noted that this estimate was made with the assumption of a 20% recovery rate of a 'gas-in-place' resource of 5,660 billion cubic metres in one license area of the Bowland Shale (approx. 5% in terms of area). As discussed above the most comprehensive and up-to-date resource estimate is the BGS's figure of 1,329 trillion cubic feet, or 37.6 trillion cubic metres, for the Bowland Shale as a whole. In other words, even with a more conservative estimate of the recovery rate, widespread development of the Bowland Shale would likely account for significantly more than 15% of the UK's emissions budget through to 2050. Furthermore the 2012 Tyndall Centre report entitled 'Has US Shale Gas Reduced CO2 Emissions?' suggested that:

> "[t]here has been a substantial increase in coal exports from the US over this time period (2008-2011) and globally, coal consumption has continued to rise… without a meaningful cap on global carbon emissions, the exploitation of shale gas reserves is likely to increase total emissions. For this not to be the case, consumption of displaced fuels must be reduced globally and remain

> suppressed indefinitely; in effect displaced coal must stay in the ground. The availability of shale gas does not guarantee this" (Broderick & Anderson 2012: 2).

The 'baseload' argument too is far from infallible. A 2011 Greenpeace report concludes:

> "Baseload is the concept that there must be minimum, uninterruptable source of power to the grid at all times, traditionally provided by coal or nuclear power. This report challenges that idea by showing how a variety of 'flexible' energy sources combined over a large area can also keep the lights on by being sent to the areas of high demand" (Greenpeace 2011: 4).

The 'green' credentials of unconventionals also rest on levels of 'fugitive emissions', that is, accidental methane leakage during production and transport. There is considerable debate over likely levels of fugitive emissions, methods for robust monitoring, and the extent to which generalisations can be made from site-specific data. EPA figures suggested that 2.4% of total US natural gas production was emitted through leakage in 2009 (see EPA 2011), though that figure has been revised down to 1.65% based on updated EPA figures (see EPA 2013). However isolated case studies have reported much higher levels of fugitive emissions of 4% in Colorado (Petron et al 2012) and even 9% in Utah (see Tollefson 2013), although these higher figures, the methodologies employed, and their broader significance, are disputed (see, for example, Levi 2012).

2.2.7 Regulation, Planning and Engagement

The seventh area of institutional debate concerns the extent which the existing legal and regulatory structure is sufficient to ensure efficient and safe operations, whether any future transition from exploratory to commercial activity would require any further oversight, and how good governance and public engagement should be envisaged. In a written Ministerial Statement in December 2012, the UK Secretary of State for Energy and Climate Change Ed Davey, in line with the Royal Society & the Royal Academy of Engineering's report, suggested that for the 'current phase of exploration operations':

> "I consider that the consistent application of good practice by the industry, supplemented by the additional action to control seismic hazards which I am announcing today, will ensure that there will be no unacceptable damage to the environment, or threat to the health of local residents, or interference with their lives. I also consider that the existing regulatory framework already provides the means to ensure that the industry does apply good practice throughout its operations; and that it will do so consistently" (DECC 2012b).

He added that, again, in line with the Royal Society & the Royal Academy of Engineering's recommendations, an Environmental Risk Assessment (ERA) should be

required for all shale gas operations and that this process should involve local communities and cover risks across the entire lifecycle of shale gas extraction (DECC 2012b). However, "[t]he scope of these assessments would naturally be framed by the operations proposed, so that prospective future production operations would not be in scope for an assessment drawn up for exploration activities" (DECC 2012b).

In terms of the implications for a transition to large-scale commercial activities it is suggested that "it is too early as yet to make any meaningful estimate" (DECC 2012b) of the exploitation of unconventional fossil fuels' impact on the UK's climate change commitments. Furthermore, such an estimation will not be possilbe "[u]ntil more exploration work has been done, a significant number of wells fracked and production patterns established over time" (DECC 2012b). In other words, there is not yet sufficient knowledge to ascertain whether the exploitation of unconventionals can be reconciled with fulfilling climate change commitments, and to produce such knowledge it is necessary to continue and step-up industry lead exploratory operations. It is interesting to note that the Energy and Climate Change Select Committee (ECCSC) have warned that "the unchecked development of gas-fired generation, which the development of shale gas may facilitate, might be incompatible with meeting the UK's climate change obligations" (ECCSC. House of Commons 2013: 77). The report also recommends changes to the EU Emissions Trading System in order to deter the increasing appeal of coal as, say, US gas generation increases and displaced US coal exports rise (ECCSC. House of Commons 2013). The extent to which gas will be used to generate electricity in the long-term will be contingent on the economic viability of carbon capture and storage (CCS) technology. The ECCSC suggest that "there is no sign that an economically viable form of CCS will be available in the next ten years" (ECCSC. House of Commons: 80). Furthermore, unless there is rapid progress in the next three years "it will become impossible to base UK energy policy on the assumption that it will be available in time to help meet the decarbonisation recommendations of the Committee on Climate Change" (ECCSC. House of Commons 2013: 81).

In new planning guidance for onshore oil and gas extraction it is suggested that "[m]ineral planning authorities should not consider demand for, or consider alternatives to, oil and gas resources when determining planning applications" and that "minerals planning authorities should give great weight to the benefits of minerals extraction, including the economy, when determining planning applications" (Department for Communities and Local

Government 2013: 15). Moreover 'local community participation' and 'public engagement' are seen as being an essential part of governance. For instance, in the press release announcing the establishment of OUGO, one of the office's objectives is stated as 'supporting public engagement'. Public engagement is described as a process of "helping people understand the facts about unconventional gas and oil production and what it could mean if it takes place in their area", and of "helping to resolve issues and ensure projects are able to move forward, where appropriate, with the engagement of the local community" (DECC 2013). Furthermore, in his Written Ministerial Statement Ed Davey suggests that risk-assessments "will provide a full picture of the risks and impacts to inform effective engagement with local communities" (DECC 2012b). Here 'public engagement' is envisaged as both a process informed by the facts, and of informing the public of those facts, used instrumentally, "where appropriate", to both smooth the path forward for, and engender public support for, "progress".

Therefore the framing of the governance of potential unconventional exploitation, as currently envisaged, either fails to ask a series of crucial questions, or risks asking them too late. Limiting the scope of ERA's so as to not take into account potential future production operations when assessing exploration activities somewhat 'compartmentalises' the issue. Members of the local community, whom it is suggested will be involved, with concerns over climate change impacts (let alone concerns that go beyond risk and safety) will necessarily be marginalised at the exploration ERA stage. Assurances will need to be given that there will be a requirement for a further ERA at any potential point of transition from exploration/appraisal phases to production phase; that this transition will not be 'streamlined' in any way; and that it will be perfectly possible for a transition to production phase to be rejected, no matter the size of stranded assets or investments involved, particularly if a better (and problematic) understanding of unconventionals potential climate change impact has been reached prior to that point. That, for such a better understanding to be gained, it is necessary for a continuation and stepping-up of industry led exploratory operations may also prove problematic. If, for arguments sake, the recovery rate is as high as the industry hopes, there is the potential for an awkward dilemma between on the one hand, potentially stranded assets, and on the other, an already challenging decarbonisation effort being potentially undermined. The lack of a requirement in the planning guidance to ask questions about demand and alternatives, or to scrutinise uncertainties and contingencies associated with the potential benefits that are to be given "great weight to", poses further questions. Taken together these three examples of the

nascent governance of the exploitation of unconventionals point to a framing geared towards ‘closing down’ debates about technological choice and appraisal.

These framings and questions could potentially be opened up and addressed through an open-ended, deliberative process of public engagement. It is unfortunate, however, that these three texts, the Ministerial Statement, the planning guidance, and the press release, have somewhat pre-empted any public engagement process. Justifying that any such process would indeed be ‘open-ended’ and ‘deliberative’, and therefore deserving of public trust and good-faith, will be a challenge given the way that the institutional discourse presented here, and more besides, frames the issue. The way public engagement is being talked about here, and the way the public role is defined within that process too, does not necessarily inspire confidence that this process will move beyond instrumental, one-way information provision.

2.2.8 Survey Research

The eighth and final contribution to institutional discourse concerning fracking and unconventionals comes from primarily quantitative, social science survey research. The fracking and unconventionals debate has only relatively recently emerged as a key public issue in the UK, spurred on in no small part by the 2010 release of *Gasland*; the two relatively small seismic events near Blackpool in the spring of 2011; and the high-profile protests in Balcombe in the summer of 2013. This nascence is reflected in survey findings. One round of surveys conducted in March 2013 found that 52% of respondents correctly identified shale gas from a list of energy sources on the basis of a short description about where it is found and how it is recovered (O’Hara et al. 2013). Similarly, an industry commissioned October 2012 survey of residents in Blackpool, the Fylde and West Lancashire found that 15% of respondents described themselves as ‘knowing a lot’ about shale gas, with 38% feeling ‘they know a little’. These were the lowest rates for both of these categories relative to other forms of energy included in the survey (Solar, Wind, Oil, Nuclear; see Britain Thinks 2012a). In terms of risk both studies found a strong level of association with earthquakes, whereas the association with water contamination was much less emphatic (Britain Thinks 2012a; O’Hara et al. 2013). In terms of potential benefits, Britain Thinks reported that the most commonly mentioned benefit was an expectation of cheaper energy (23% of those able to offer a benefit), with the next most common being job creation (11%) (Britain Thinks 2012a). On the same subject, O’Hara et al. reported that “[a]n increasing number of respondents able to identify shale gas in our survey consider it

to be a cheap form of energy. In March 2012 this figure stood at just over 40% but it has risen slightly with each survey and in March 2013 was over 53%" (O'Hara et al. 2013: 7). Furthermore "a plurality of respondents stated that they don't know whether shale gas had a positive or negative impact on GHG emissions, with the figure varying between 43% and 48% over the five surveys", however "there has been a subtle shift in people's views… with an increasing proportion of respondents being of the view that shale gas will result in lower GHG emissions" (31% by March 2013, compared to 22% who, in the same month, thought shale gas would result in higher GHG emissions, O'Hara et al. 2013: 8). Finally the Britain Thinks survey found fairly strong support for continued *exploration* (44% strongly agreed or agreed, with 23% opposing or strongly opposing); in March 2013 the O'Hara et al. survey found strong support for allowing *extraction* of natural gas from shale (55% agreeing, 24% against, O'Hara et al. 2013: 9); whilst an ICM poll found public opinion on fracking in Britain polarised (44% in favour, 30% opposed), particularly when respondents were asked about fracking in their local area (41% in favour, 40% opposed, ICM 2013).

In the above section I've given an account of the emerging debates within institutional discourse on hydraulic fracturing and the exploitation of unconventional fossil fuels. I've identified a series of areas of ongoing uncertainty and ignorance in these debates, in the context of which institutional and public positions alike have had to emerge. Those uncertainties included the complex and poorly understood nature of the US example; the present lack of any UK reserve estimates; future global and regional gas prices; the various and complex heterogeneities that complicate the technologies "export" from the US to elsewhere; the potential benefits; a lack of understanding of hydraulic fracturing's role in groundwater contamination and seismic events; a lack of understanding about the implications of 'scaling-up' and 'cumulative effects'; the extent to which the exploitation of unconventionals will be reconcilable with climate change mitigation commitments; the unfolding and often vague situation with regards to legislation and regulation; early attempts to account for public perceptions of the issue; and the nature, scope and framing of public engagement processes. The Royal Society/ Royal Academy of Engineering report, for example, for the most part viewed these uncertainties as scientific and technical in nature, and as being manageable through an almost exclusively risk-assessment style approach. They point to the UK's experience in regulating oil and gas industries and compare the seismic risks of fracking favourably to the UK's historical coal mining industry (Royal Society & the Royal Academy of Engineering 2012). However, social

science scholarship suggests that factors relating to fracking's emerging 'social constitution' – associated with the distinctive values and social assumptions that are embedded within the technologies development and application – may be equally significant in structuring future public responses (see Grove-White et al 2000). 'Social constitution' is defined here as simply the social and economic conditions within which technologies are shaped, and therefore the social meanings and structures they embody. These may include: the nature of the uncertainties associated with the technology, its retrievability under conditions of crisis, the materiality of the technology, the political-regulatory framework, the industry structure, the social distribution of expertise, and consumer and citizen senses of (lack of) agency. Arguably factors associated with the 'social constitution' of fracking in the UK may be critical in shaping public responses to any further development of the technology. Attempting to understand how hydraulic fracturing and unconventional fossil fuels are thought of socially, and why this is so, is clearly a question in which the social sciences will play a role. In the next section I will review both the existing critical social science specifically on this issue, predominantly from anthropology, and a body of inter-disciplinary social science scholarship that can inform a critique of the current, dominant institutional approach to the issue, and further define a critical social science agenda for fracking and unconventionals.

2.3 A Critical Social Science Response?

2.3.1 Anthropology

In her case study of unconventional gas in Queensland, Australia, Kim de Rijke describes a regulatory context in which "substantial state government debt, comparatively limited technical and human resource capacity, and revolving doors through which talented public servants may depart for well-paid industry employment" lead to a "reactionary regime which facilitates unconventional gas extraction" and "allows problems to become apparent before amendments are made" (de Rijke 2013: 15). In Queensland, de Rijke suggests the rapid expansion of the unconventional gas industry has prompted questions about "social power and the rights of individuals and local communities, the role of multinational corporations in politics and rural service provision, as well as related questions regarding fundamental processes of democracy, capitalist economies and social justice" (2013: 15). In his work on (conventional) oil and gas company's in Russia, Rogers suggests the need attend to the materiality of these industries and the resources they extract, and the ways they enter "broader, and heavily politicized, fields of signification" (Rogers 2012: 293). De Rijke sketches out how this might apply to fracking and unconventionals specifically,

emphasising methane's "volatile, highly flammable, odourless, and invisible" qualities, and describing the act of extracting unconventional gas from "relatively stable underground geological formations" as constituting a 'dangerous material boundary crossing', resulting in 'matter out of place' (de Rijke 2013: 17). Finally Cartwright (2013) uses the term 'eco-risk' to describe how risk is experienced at the intersection of a particularly lived understanding of danger; technologies of diagnosis, visualisation, and quantification; and legal standards (Cartwright 2013), as well as suggesting profound levels of ignorance surrounding the highly complex interplay of "existing disease states" and environmental contexts with regard to health, or, 'multi-morbidity' as she terms it (Cartwright 2013: 205).

2.3.2 Science and Technology Studies

Scholarship from the social-scientific-cum-philosophical field of Science and Technology Studies (STS) can aide our understanding of social responses to hydraulic fracturing in four key ways. Firstly, STS's critique of the dominance of risk assessment in science and technology governance suggests that the substance of much of public concern about fracking may be framed out of such debates. Secondly, STS's critical engagement with public engagement processes, now a common practice in the governance of potentially controversial innovations, suggests that these processes may regularly reify tacit norms and assumptions and so reproduce the categories and distinctions that frame-out legitimate public concern. Thirdly through STS engagement with concepts such as 'slowing-down' and the precautionary principle an alternative to the 'learning by doing', 'case-by-case' oversight currently dominant in the regulation of fracking can begin to be sketched out, one that may better acknowledge and account for the nature of lay concern. To be clear, by a 'learning by doing' approach to regulation I mean a regime as described by de Rijke (2013) in the section above (2.3.1) in Australia, which has also been evident in the US, and as pointed out previously (2.2.7) elements of which have been evident in the emerging UK regulatory culture, though possibly not to the same extent as in these other examples. This form of oversight is characterised by a case-by-case, step-by-step, safety-focused approach, which by design or otherwise, closes-down the debate of uninvited broader questions of uncertainties, choice, and values, and addresses problems only once they emerge within established, existing scientific risk knowledge. Finally, STS research on a broad range of technologies with potentially controversial environmental, health, and ethical implications can help us situate public concern expressed over fracking and

unconventionals within broader unease about the direction, speed, and apparent unaccountability of scientific innovation.

The institutionalisation of risk is based on the notion of a clear-cut separation between (risk-) facts and values which secludes the practice of risk assessment from the messy normative questions of economics, ethics, values, interests, and practicalities (which are reserved for the domain of 'risk management'; see Felt et al. 2008). Once sound science and the facts have been established through risk assessment "all that remains to be clarified as grounds for a 'decision' (…) is an evaluation of what constitutes the acceptable 'levels of protection'" (Felt et al. 2008: 50), usually framed predominantly in economic terms (e.g. through cost vs. benefit analyses). For Felt et al. (2008), however, risk assessment inevitably involves normative commitments and assumptions, such as "subjective judgements, influential social values, contestable assumptions and administrative procedures that are open to contingent framings and the tacit or deliberate exercise of power" (Felt et al. 2008: 51). The crucial point here is that "the resulting discouraging of debate on these normative social dimensions of risk assessment science contributes to the high levels of public mistrust in 'risk-governance'" (Felt et al. 2008: 51). In other words, public concern nominally over the 'riskiness' of a technological process such as hydraulic fracturing is not necessarily about risk per se, but about the denial of the deliberation of the values embedded in the development and application of that technology, as well as the future it is working towards. As Wynne (2001) puts it, this is not predominantly an issue of public ignorance or media irresponsibility, as "sceptical public reactions are not reactions to (supposedly misperceived) risks as such, or to media representations of these, but rather are public judgements of dominant scientific and policy institutions and their behaviours, including their representations of the public" (Wynne 2001: 445). This is an issue, then, of '"science"-protected politics', that is the "culturally sedimented, presumptive and in-effect dictatorial habit" (Wynne 2007: 103) of prohibiting non-experts from engaging with social, political, and ethical questions posed by scientific and technological innovation by concealing such issues in the secluded domain of risk-assessment. Therefore, lay concern surrounding, not technical issues, but "public issues involving, but not confined to, technical issues" (Wynne 2007: 106), such as fears over science's "exaggeration of control and predictive capacity; its unaccountable control and direction; its unrealism about or denial of relevant contingencies" (Wynne 2007: 104), are regularly under-emphasised, if not completely framed-out by risk-assessment based institutional responses to emerging instances of scientific controversy. To clarify, according to the work of Wynne (2001;

2007), public concerns over emerging technology are as likely to be about the interaction between publics and institutional actors (for Wynne, primarily 'scientific and policy institutions' but for fracking, much like GMOs, I would add industry actors), the categories and expectations according to which those interactions are organised, and the often consequent under-emphasis of the social, political, and ethical aspects of these episodes.

In recent times, one response to this public mistrust of science and governing institutions has been a turn towards 'public participation in science' or 'public engagement' processes. The aim here is to demonstrate the openness and inclusivity of these institutions and their ability to listen and learn. For Wynne (2007: 106), forms of public engagement on issues of science and innovation need to make a deliberate effort to "address the repertoire (or hegemony) of imagined futures which is being given material influence", and therefore avoid uncritically reifying the tacit normative assumptions and commitments that frame-out significant proportions of public concern. In other words, to intentionally avoid and address the "habit" of prohibiting public engagement with social issues associated with technological innovations – the concealed 'politics' in '"science"-protected politics' (Wynne 2007). STS literature regularly criticises institutional processes of public engagement for failing to avoid doing so and for being motivated by the instrumental desire to produce social acceptance. Wilsdon and Willis (2004) suggest that the aim of public engagement should be to "improve social outcomes in a deeper sense than just improving the reputation of the technology, company, or government involved" (Wilsdon and Willis 2004: 23). Along the same lines Wynne (2006) notes "the intrinsic futility of trying instrumentally to engender public trust in science" whilst the "objective is to manage and control the other's response" (Wynne 2006: 219-20). Instead of employing public engagement process for these instrumental reasons and purposes they may be better utilised if designed and employed for substantive reasons (see Stirling 2008 for a detailed account of three varying approaches to public engagement, namely 'instrumental', 'normative' and 'substantive'). That is to say for governance and oversight to be more attuned to public concerns; and thus for the purposes, directions, and paces of innovation to better reflect public values and priorities. For Stirling (2010) this establishes the purpose of engagement processes as to ensure the "deeper, broader, and richer consideration of relevant options, issues, uncertainties and values" necessary for "more socially robust technology". (Stirling 2010: 10). Many institutional attempts at engagement fail to 'open-up' (see Stirling 2008) debates to this extent and therefore can often, as Felt et al. (2008) point out, tend to exacerbate concerns rather than alleviate them. So "[s]imply having more

participation or communication – as is definitely the case in the early 21st century – does not turn out as a solution to public alienation", especially if the engagement process is either subject to *a priori* decided framings, definitions, and limits; occurs "after entrenched commitments have become virtually irreversible" (Felt et al 2008: 106); or is envisaged as a one-off 'capture' of public views rather than an ongoing emergent process. The extent to emerging participatory processes engaging with the public on fracking and unconventionals avoid these failings or not may go someway to accounting for future levels of public unease, alienation, and mistrust.

The third key insight from STS literature problematises the iterative, 'learning by doing' approach to the oversight of scientific innovation. To reiterate, the 'learning by doing' approach to oversight describes a reactionary regulatory regime, geared towards closing-down debates concerning matters beyond existing scientific risk knowledge (see Kearnes et al. 2006 for an account of the limitations of this sort of approach as evident in the GM controversy). A primary concern here is the danger posed by 'lock-in'. 'Lock-in' refers to the idea of a threshold of economic and political capital, public familiarity, infrastructure investment, and self-fulfilling market expectations over which a restricted subset of potential directions of innovation become institutionalised, and thus alternatives foreclosed (see Stirling 2010). The situation discussed in the previous section whereby the GHG impact of exploiting the UK's unconventionals will be assessed once a reserve estimate is made, which in turn will only be achieved after a period of continuation and intensification of industry-led exploration operations, has the hallmarks of a possible 'lock-in' scenario. If at this point it is decided that the recovery rate is high, and the GHG impact too great, will the methane be left trapped in the shale? Will the government impose controls over the speed and intensity of development, and the volume of production? Will the industry and its investors be compensated for their efforts and expense? What will the legal implications of this be? Will time, efforts, and funding have been diverted away from possible energy alternatives? Will the efforts to secure necessary gas imports have been left too late? Or will all of these awkward questions be used to justify tearing up the Copenhagen Accord? For Wynne (2007) "no major innovation of these kinds should be entertained without a full and serious open-minded process of appraisal of not just risks, but of benefit claims and promises, and of alternatives" (106). This appraisal, of course, is more effective when conducted prior to the 'closing-down' of the debate, whereby lock-in dynamics, or pre-emptive and incumbent normative commitments, determine its results. Furthermore, and to reiterate a point made in the previous paragraph, inviting the public to participate in a

deliberative process in which proximate and powerful political, economic and institutional interests are seen, often justifiably, to have already decided their preferred outcome is only likely to exacerbate concern and alienation. Wynne (2007) suggests, not unreasonably, that whilst this *a priori* appraisal "presents practical difficulties – of time, information, resources, maybe threatened investments already made", "these latter threats cannot always be allowed to rule indiscriminately in the face of reasonable questioning" (pg. 107).

A second and related concern with regards to the 'learning by doing' approach to oversight is the long-standing public suspicion that the speed of innovation regularly exceeds our scope for regulatory and ethical oversight. Consequently reactive regulation seems destined to always be at least one step behind processes of research, development and innovation. One issue here is that the perception that the speed of innovation is both driven by and for the benefit of commercial interests, possibly at the expense of safety or the achievement of genuine social benefits. A second issue is the sense that speed works to the detriment of deliberations of the purpose of science. In other words, innovation advancing forwards at such a rate may mean that by the time such discussions take place, certain options may appear foreclosed, or the preferred outcome of powerful actors, and therefore the time for effective and open deliberation may have been missed (see Macnaghten & Chilvers 2013). A final concern about the 'learning by doing' approach to oversight involves its tendency to assess an issue like fracking and the exploitation of unconventionals as a series of separate, constituent parts, on a case-by-case basis, say a planning application to drill a well, or an application to use a specific chemical in the fracturing fluid (see Jasanoff 2005; Kearnes et al. 2006, for a detailed account of this argument in the context of GMO's). Along with the dominance of risk-assessment discussed at the beginning of this section, this approach can tend to eschew legitimate social and ethical concerns of a much broader character based on more holistic judgements.

Attempts to envisage how to address these awkward issues in a governance and regulatory context within the STS literature often employ concepts such as 'slowing-down', and the precautionary principle (for example Bingham 2008; Felt et al 2008). 'Slowing-down' does not constitute a rejection of progress, just the acknowledgement that moving forward is highly complex. For Stengers, one of the conditions of capitalism is "that no one can take the time to seriously ask about the consequences of what it invents, beyond profit-making. It is always about speed, being faster than others…" (Stengers with Zournazi 2002: 251). Speed and *direction*, or perhaps *possibility*, are closely linked in the concept of 'slowing-

down'. The better one resists the speed imperative, the more attention can be paid to "all those other things, other stories, other trajectories…" (Bingham 2008: 115). Slowing-down, then, amounts to an enrichment of space as "the sphere of the possibility of the existence of multiplicity" (i.e. options, choices, competing visions, politics, uncertainty, an open future – see Massey 2005: 9). In so doing, slowing-down renders a greater extent of that multiplicity explicit and sensible, including, for instance, concerned publics who emerge through and coalesce around issues like fracking. Concerned publics who demand the disclosure of uncertainties and ignorance, as well as an inventory of alternatives, in the face of highly complex consequences.

The closely related precautionary principle, as Felt et al (2008) point out, has been influential in European governance for some time now. The precautionary principle is at odds with what I have presented here as the 'learning by doing' approach on an ontological level. Whilst the latter does not recognise the existence of issues until they are established within present scientific risk knowledge, the former counts the very claim of the possible existence of an issue as the legitimate basis to open-up questioning and scrutiny on a broad range of issue, and from a plural range of actors. However the principle has, they suggest, often been conceived as applicable to risk management and not risk assessment in institutional contexts, thus marginalising precautions full potential to "command serious and scientifically rigorous attention to uncertainty, ambiguity, ignorance and indeterminacy as well as risk" (Felt et al 2008: 63). For Stirling precaution goes beyond questions of the state of knowledge to also include consideration of values and interests:

> "Precaution constitutes a general discipline in technological choice, under which environmental and human values are rendered more explicit and transparent and the intensity and orientation of commitments become a matter for deliberate political engagement" (Stirling 2010: 8).

Therefore the precautionary principle provides:

> "a framework under which to broaden out the processes through which societies come to understand the implications of our possible technological choices. By focusing policy attention on uncertainties of a kind that are otherwise neglected or denied, precaution acts to help extend and enrich the ranges of issues, the arrays of options, the varieties of scenarios, the palettes of methods, and the pluralities of perspectives that are engaged in the social appraisal of alternative technological pathways" (Stirling 2010: 8).

The final crucial STS insight for the fracking and unconventionals debate details the nature of public concern over a variety of recent controversial innovations across the domains of

medicine, energy, health, and the environment. These accounts provide a broad picture of general lay concern over science and innovation which provide an important context for the emerging controversy surrounding fracking and unconventionals. Macnaghten & Chilvers (2013) conducted a meta-analysis of 17 Sciencewise-ERC dialogue events on a range of innovations at various stages of their development. They identified 5 cross-cutting themes that were seen as crucial in structuring public responses to scientific and technological innovations. Firstly perceptions of the purpose of science and the motivations of those involved are seen as key factors in shaping the publics attitudes towards innovations. The condition that an innovation is driven by good purposes and not solely for commercial interests helps to define 'public acceptability' (Macnaghten & Chilvers 2013). The second cross-cutting theme structuring public responses to innovation was trust, as they put it "people rarely trusted the motives of Government to act in the public interest" (Macnaghten & Chilvers 2013: 6). A recurring fear here is that "science was seen as in danger of being overly directed by private rather than public interests" (Macnaghten & Chilvers 2013: 6). The third factor structuring public attitudes to science and technology involves public senses of powerlessness and alienation. This is based on the judgement, that despite increasing rhetoric and attempts to foster 'participation' and 'inclusiveness', science remains a closed and secluded domain, "where it was believed there was a cultural resistance to opening up science to the views and values of the public" (Macnaghten & Chilvers 2013: 7). As Macnaghten & Chilvers (2013) point out these judgements are often awkward and dilemmatic for publics, as they feel both "compelled to trust scientists", yet ultimately "powerless to have any control" (Macnaghten & Chilvers 2013: 7). The fourth cross-cutting area of public concern structuring responses to innovation, as already suggested in the critique of the 'learning by doing' approach, is the suspicion that the pace of innovation outstrips our abilities to ensure sufficient regulatory and ethical oversight. The relationship between speed and direction has been noted above, and a crucial distinction here is that the concern is not only that the speed of innovation may lead to rushed risk-assessment and regulation, but that it also may eschew the possibility of the deliberation of broader social and ethical questions, for instance "concerns over unforeseen consequences including controllability and reversibility (…), impacts on perceived naturalness (…); and impacts in terms of fairness and equity…" (Macnaghten & Chilvers 2013: 7). The final form of concern structuring public responses to scientific and technological innovation centres on the extent to which the achievement of genuine social benefits is perceived to be likely. Macnaghten & Chilvers (2013) suggest

that the public were prepared to accept ‘higher trade-offs’, in terms of risk or ethics, if there is a strong sense of a genuine social benefit.

I began this section by describing the emerging application of insights from the anthropology of energy specifically to hydraulic fracturing and the exploitation of unconventional fossil fuels. Questions of regulatory culture, discourse, materiality, embodied understandings of risk, medical social science, and many more are beginning to be asked in relation to the fracking debate. I then used STS literature to put forward critiques of the dominance of risk-assessment analysis, instrumental public engagement, and ‘learning by doing’ reactive regulation within the institutional response to fracking and the exploitation of unconventionals. Here it was suggested that the narrow-framing of risk-assessment and ‘reactive regulation’, and the inability or unwillingness of engagement processes to challenge these narrow-framings, are together likely to exacerbate rather than alleviate public unease. Consequently I put forward the concept of slowing-down and the precautionary principle as potentially capable, if not watered-down, of better acknowledging public concerns, and providing a framework to involve public concerns, values, and priorities in more explicit processes of technological appraisal. Finally I used Macnaghten and Chilvers (2013) account of cross-cutting themes structuring public concern over scientific and technological innovation to situate the emerging controversy over fracking within a broader context of public unease around questions of innovation and “progress”.

3. Methodology

3.1 Research Questions

The two overarching research questions were:

RQ1: What are the crucial underlying factors structuring public responses to hydraulic fracturing and the potential exploitation of unconventional fossil fuels in the North of England?

RQ2: Under what sorts of conditions might the prospect of exploiting unconventional fossil fuels, including the use of hydraulic fracturing, be 'acceptable' to the public?

3.2 Deliberative Focus Groups

Deliberative focus group methodology was employed in an attempt to create a space in which non-expert views on hydraulic fracturing could be expressed and discussed, including public issue definitions and the formulation of questions that are regarded as salient by 'laypeople'. This process aims to open up some of the 'science'-protected politics (Wynne 2007) that accompany the technical issues in constituting the fracking and unconventionals debate in the UK. To reiterate, that is to say the unquestioned normative visions, values, and assumptions guiding science, yet concealed from public scrutiny through either a failure to acknowledge them or their mis-categorization as ostensibly technical issues. The process of methodological design was informed by examples of good practice and guidance in using 'upstream' deliberative methodology to research public concern over controversial technological innovation (Callon et al 2009; Davies et al 2009; Macnaghten & Szeszynski 2013; Sciencewise-ERC 2010; Wilsdon & Willis 2004), and influenced by critical social science debates on public engagement practices and processes (Chilvers 2008; Felt et al 2008; Stirling 2008; Stirling 2010; Whatmore 2009; Whatmore et al 2011; Wynne 2007).

In the pursuit of these aims, a focus group methodology was chosen over other possible methods. Surveys or questionnaires would have provided breadth, possibly at the expense of depth. In a study looking into public discourse on geoengineering, Macnaghten and Szerszynski (2013) found that their results differed slightly but crucially from the findings of a previous study based on survey methodology. Macnaghten and Szerszynski speculated that the more sceptical positions expressed in their research may be due to the fact that "the

deliberative method gave participants a collective opportunity to explore the issue, to think through its implications more fully, and to arrive at what are arguably more considered positions" (Macnaghten and Szerszynski 2013: 13). Among the aims of this research was to create a space in which members of the public could formulate questions that they deemed important and thus challenge received notions of what might be salient knowledge. In surveys the only questions that can be answered are the ones that have been set. But further still the context in which these questions are addressed is crucial; otherwise conducting a focus group to set the questions for a survey would offer the best of both worlds. The dynamic, unfolding interactions possible in a focus group allow the introduction of different framings of the topic gradually and sequentially, allowing for reflection on the reductive and exclusionary nature of any one framing becoming dominant. The interactive character of focus groups also allows for "observations of how and why individuals accept or reject others' ideas" (Stewart et al. 2007: 10), and increases the possibility of the discussion taking an unanticipated turn, and this is surely a mark of the researcher successfully avoiding excessively imposing tacit definitions and parameters. In comparison to deliberative focus groups one-on-one interviews also lack these generative capacities of group interaction. In addition, for laypeople, whose views the project was concerned with, group discussion may seem less daunting than a one on one interview with a researcher.

Focus groups are seen as having the potential to provide 'in-depth data' (Stewart et al. 2007), based on the "belief that live encounters with groups of people will yield incremental answers to behavioural questions that go beyond the level of surface explanation" (Stewart et al. 2007: 11), but this potential can be squandered by the temptation (or commercial pressure) to ask too many questions at the expense of interactive discussion, or to overly structure the group at the expense of participant-led processes of formulating and deliberating priorities, issue-definitions, and hermeneutic judgements. The topic guide went through a process of development and refinement with the help of advice from a supervisor with experience of moderating focus groups with non-experts on technical issues, as well as a pilot focus group. The quantity of questions, their ability to stimulate interaction and debate, and the flexibility of follow-up questions were all areas of focus and refinement in order to try and avoid the pitfalls described above. The pilot focus group was also an opportunity to practice a moderation style focused on encouraging interaction, respectful disagreement, and participant-led issue-definition. A further challenge in using focus group methodology is that it can tend to over-emphasise

consensus and that more passive members of the group can go along with the opinions of more vocal participants. The design of the topic guide and focus of the moderation were used to foster debate and provide regular opportunities for the expression of disagreement. The aim of the groups, in line with recent focus group research on an emerging and controversial technology (Macnaghten & Szerszynski 2013), was not to elicit consensus over the 'acceptability' of fracking but to arrive at shared issue-definitions through collective discussion.

Another common criticism concerns the difficulty of extrapolating individuals' views from the highly contextualised interaction within which they are expressed. As Barbour (2007) points out "[t]his is only a problem if one views attitudes as fixed. Focus groups excel at allowing us to study the process of attitude formation and the mechanisms involved in interrogating and modifying views" (Barbour 2007: 30). A similar concern involves the idea that focus groups' comparatively small sample sizes and highly-specific context prevent findings from being used to extrapolate generalised conclusions from. This is not a weakness per se, rather a question of purpose. The purpose of focus groups is not to provide findings that are statistically representative. It is at least debatable whether survey methodologies unproblematically allow for such generalisations. Rather, the purpose of the focus group methodology used in this project was to harness the direct, interactive, and emergent qualities of a focus group situation to allow for the deliberations, negotiation, and refinement of non-expert responses to fracking and the exploitation of unconventionals. The findings are therefore contingent of the specific context in which they were uttered, however they do still allow for "theoretical generalizations" (Mason 1996: 153). The findings and conclusions of this research should of course not be seen as the finished and definitive truth of public response to fracking and unconvetionals in the North of England. However the factors structuring public responses suggested by this research should be seen as more broadly indicative of general responses and thus have resonance beyond the sample. This is justifiable due, firstly, to this research's sampling (discussed more fully below) which ensured a diversity within groups beyond the topic relevant characteristic (gender; age; socioeconomic status); and the avoidance of groups with existing agendas, incumbent interests, and committed views. Secondly, the parallels in theoretical underpinnings, method, analysis, and indeed findings with established norms in participatory research into public responses on emerging controversial technologies; and the rigour of analysis and interpretation built on both well established, substantive theory (eg Callon et al 2009; Grove-White et al 2000 etc) and accepted general good practice in

qualitative analysis (Barbour 2007; Mason 1996 etc), also contribute to the broader relevance of this research. The interactive nature of focus groups, through follow-up questions and reactions to other participants' judgements, allow for responses to be clarified, probed, qualified, and for participants to articulate contingencies and nuances in expression and meaning that may elude other methodologies (Stewart et al 2007). In this way elements of the group's "working-out", the process of attitude formation, the acceptance or rejection of framings, assumptions, and meanings, are rendered explicit allowing not for an account of what the public deem acceptable or not, but an attempt to suggest why public unease exists and to identify the underlying factors structuring public responses to fracking and unconventionals.

3.3 Sampling

Sampling was primarily theoretically driven, although this was naturally tempered by what was feasible and what could be achieved within budget. In that spirit, six groups of eight were held across three geographical locations, with two groups in each locality. Those places were Newcastle, Nottingham and Lancashire (Chorley, then Oldham). There were theoretical reasons for each of these choices, as set out below. Lancashire is seen as central to the 'fracking' debate: firstly as it is the location for Cuadrilla's most advanced exploratory operations; and secondly it is the scene of some of the most controversial episodes in hydraulic fracturing's short history in the UK. Fracking is therefore high on the local agenda in Lancashire. Newcastle, in contrast, is held to be fairly remote from the debate given that there are currently only a couple of small onshore drilling licenses held in the North-East and the overwhelming focus on potential UK unconventional fossil fuel resources are centred on the Bowland Shale and Weald Basin (see Fig. 1, pp.1). Focusing on Newcastle therefore allowed for an analysis of the importance of perceived proximity, without risking indifference due to the North-East's considerable ties to coal mining and other extractive activities. Finally Nottinghamshire is an area that has potential shale gas, shale oil and coal bed methane resources and whilst activity up until now has been fairly low key in comparison to Lancashire, this has the potential to change with large areas of the county already licensed to various onshore operators. This suggests that whilst hydraulic fracturing does not yet have the same profile as in Lancashire; this is an issue that is likely to move up the local agenda. This scenario provides an interesting counterpoint to the relationships to the topic in both Newcastle and the North-West. Since this research was designed and conducted there was been increased attention on the prospect of fracking in the South of England, particularly in Balcombe, West Sussex.

Processes of exploration and research by Acedemic and Industry actors alike were and remain more advanced in the Bowland Shale, than, say, the Weald Basin. Media attention, too, at the time of conducting the research had been overwhelmingly focused on Lancashire. Since then protests at the site of a proposed exploratory well for shale oil, near Balcombe have shifted a great deal of public attention to the South-East of England and a series of attendant political sensitivities. Some commentators have suggested (rather clumsily at times) that there are various geographical differences that make fracking a more acceptable prospect in "the North". It would certainly be interesting to see if similar sorts of hopes and fears are expressed, and similar sorts of underpinning values and narratives are found in the South compared to the locations this research has focused on. However, the focus of this research on locations in and around the Bowland Shale in the North of England was and remains theoretically sound.

Each group shared some common topic relevant characteristic. There are three main reasons for this. First, theoretically, this allows the degree to which these common characteristics structure responses to be explored and allowed for interesting inter-group, as well as intra-group analysis. Secondly, on a more practical level, shared characteristics and experiences within each group eased tensions and nervousness and helped the debate to flow; Thirdly, and related to the previous point, there were also ethical reasons for these common topic relevant characteristics. Populating focus groups with participants with some common characteristic did not ensure consensus, nor would that necessarily have been desirable. However it did arguably create an environment more conducive to productive and supportive discussion, whilst decreasing the likelihood of pitting participants with staunchly oppositional views against each other. When devising the characteristics of the groups care has been taken to avoid groups that are too far removed from the topic, and so risk encountering indifference, or too close to the topic, in the sense that they might be aligned with some already decided agenda or see themselves as representing an embroiled institution.

Above I suggested that the research's primary concern was exploring the factors structuring public responses to fracking and unconventionals, and possible conditions of 'acceptance'. Inter-group comparison, therefore, is not a principle focus, nor is geographical comparison. Furthermore, as discussed above the research has not been designed to be representative in any formal positivistic or statistical sense. The reason then for varying locations *and* topic relevant characteristics was not to provide the opportunity

to draw concrete conclusions about the role of geography and variant characteristics in shaping responses, though striking differences between groups or places have prompted tentative suggestions and propositions for further research. Rather, it was to provide a greater breadth and diversity to the 'deep-data' on this emerging issue; to recruit participants whose relationship with the topic gave them an interesting perspective; and aide the justification (discussed above, 3.2) of the ability to make 'theoretical generalisations' from the findings of this research.

One central theme from which groups were drawn was those who have some kind of strong relationship with "the Earth". In many ways hydraulic fracturing concerns an inference into "the Earth", both the generally rarely considered subterranean environment, and the world on the surface, as well as the complex relationship between the two. The groups that shared this strong relationship with "the Earth" were allotment owners (Newcastle), ex-miners (Nottingham), and associates and employees of the Lancashire Wildlife Trust (Chorley, Lancs.). The NGO associates and employees group did risk breaking the rule about not using participants who represent an institution with a close interest in the topic. There were two reasons why this was not deemed to be the case. Firstly they weren't engaged with in their capacity as representatives of the Lancashire Wildlife Trust, but rather as individuals. An interesting tension that was likely to arise was between their own personal views and the commitment of the NGO to follow a "science-based approach". This tension points towards the complex nature of their subjectivities which muddy the waters of a rigid and straightforward expert/lay divide. Secondly many of the associates and employees spoke of unease about the possible contradictions in the Trusts positions towards energy which saw them broadly support moves towards renewable and lower-carbon energy sources, but regularly in opposition to the development of those sorts of projects on the grounds of more localised environmental and wildlife concerns. This uneasiness suggests these participants were well-placed to appreciate the dilemmatic and relational qualities of issues related to energy and the environment.

A second theme relating to hydraulic fracturing from which groups were drawn was 'the Future'. Hydraulic fracturing is also about energy and environmental futures and their ambiguities. The groups related to this theme were parents of university students (Oldham), and members of local history societies (Nottingham), and mothers with young children (Newcastle). Members of local history societies with particular interests in local

mining and industrial history were recruited for their potential to provide interesting perspectives on the notions of 'progress' and development relating to the debate, and on our historical and continuing relationship with fossil fuels. The group of parents of university students from the Oldham was selected to see whether hopes about possible positive economic impacts on the region; and fears, aspirations, and anxieties over their children's future's (who would be graduating in the near-future), would play a role in thinking through dilemmas and conditionalities. Mothers with young children were seen as likely to have a keenly felt stake in "the future" through thinking about what kind of world they want to bestow to the next generation. This disposition towards the future could be manifest in a strong sense of responsibility to foster and maintain a healthy and safe environment, an anxiety about economic vitality and prospects, or a combination of both expressed in dilemmatic terms. This group potentially embodied many of the tensions at the heart of debates about fracking and unconventionals.

Recruitment was (specific)topic-blind. Participants were told they were being recruited to take part in a discussion about technology, energy, and the environment. With the exception of one group, participants were recruited by a professional recruitment agency. That one exception was group 5 (Lancashire Wildlife Trust group) which was self-recruited through a personal link with a 'gatekeeper'. Nevertheless all groups were comprised of a diverse range of backgrounds and demographics (age, gender, socio-economic class), except where groups were by definition single-sex (Mothers with young children and Ex-miners). These groups also unavoidably involved a more restricted age range, although socio-economic class in both groups was as varied as in all other groups.

3.4 Materials and Process

All of the groups were self-moderated. Semi-structured focus groups, by definition, are not fully controlled or determined, but driven by the interaction between and amongst the participants and the moderator. This focus on interaction not only provides rich detail on peoples beliefs, attitudes, and experiences, but also provides an environment in which participants can learn from each other possibly 'reconsidering and re-evaluating their own understandings and experiences' as a result (Litosseliti 2003). The role of the researcher in this context is to moderate and guide discussion using carefully planned and developed open-ended questions and stimulus materials. Both a topic guide (list of questions, appendix 1) and a series concept boards (large A1 boards consisting of pictures, diagrams of the fracking process, newspaper headlines, political rhetoric, facts and figures from the

scientific literature, and so on, used to aide and stimulate debate) were developed and refined through advice from a supervisor with expertise in deliberative public engagement on controversial technological innovations, and through being trialled in a pilot focus group.

Sessions were started with an open-ended and broad discussion about 'energy', the grounded ways in which people experience and think about energy, the hopes and fears they attach to it, the way they see their relationship with energy, and impressions they get from stories about energy in the media. This then led on to a slightly more focused discussion about sources of energy with questions about consumption and preferred sources with a particular focus on the factors that were seen as important to privilege when discussing energy futures. There then followed a supposedly hypothetical question about the prospect of a vast new fossil fuel energy source being discovered beneath our feet tomorrow and participants were asked to express their initial reactions, the questions that they would want to ask, and any optimism or concern that this prospect might prompt. The purpose of these early discussions was to provide a context for later debates specifically focused on fracking and the exploitation of unconventionals by both easing participants into thinking about and discussing relevant issues in fairly familiar terms, and by beginning to sketch out a more or less collective set of criteria, priorities, and conditions against which fracking and unconventionals could be assessed. At this point hydraulic fracturing was introduced for the first time with a concept board (appendix 2.1) setting out the basics of the technique. This concept board used diagrams, pictures, definitions and quotes taken from industry websites and DECC. The next board (appendix 2.2) which borrowed the IEA's special report title 'A Golden Age of Gas?', framed fracking and unconventionals as constituting a possible solution to anxieties about energy futures that were always expressed in the previous sections, and as an innovation with the potential to benefit consumers (e.g. price) and citizens (e.g. security, employment, etc.) alike. This board used information from the industry, the IEA, and the US Energy Information Administration (EIA) on the prospects of unconventionals, as well as positive media headlines and statements from UK politicians. The following board (appendix 2.3) set out fracking as a risk-issue using media headlines about the potential risks and a summary of the technical debate over seismicity and water contamination using information from DECC, the Tyndall Centre, and other academic sources (Davies et al. 2012; Jackson et al. 2011). The purpose of this section was to use the established framing from the science-policy community that would then be challenged on both an *oppositional* (from within the frame)

and *alternative* (rejecting the very framing of the debate, the questions that are or aren't being asked, not the answers to those questions) basis in the final section. This final discussion was aided by a board (appendix 2.4) that, firstly, presented oppositional voices from climate change science, and NGO and other civil society actors. Secondly, this board presented material that prompted reflections about the limits of the institutional frame and consideration of alternative frames by emphasising questions of ambiguity, uncertainty and ignorance; and power, purpose, direction, and speed. This including material on climate change from the Tyndall Centre and Greenpeace; media stories about fears over lobbying and regulatory integrity; examples of regulatory failure and concerns over profits and competition in the energy industry; and caution over the potential benefits of unconventionals in Europe from Deutsche Bank. These materials and the style of moderation were designed to invite interaction and deliberation over personally and collectively salient questions, issue definitions, concerns, and narratives. The aim was to create a space in which non-expert views could be expressed and deliberated, and where 'science'-protected politics could be opened up to (limited, small-scale) public scrutiny. A space "in which those whose experience makes them sensible and knowledgeable collaborate in interrogating environmental expertise, 'slowing down' reasoning and making a difference in the framing of environmental problems" (Whatmore 2009: 596).

3.5 Analysis

Audio recordings of each focus group were professionally transcribed which in turn were analysed, both in accordance with agreed norms on qualitative data analysis (Barbour 2007; Mason 1996; Potter & Whetherell 1987), and influenced by established themes and narratives identified in public engagement processes concerning controversial innovations (Davies & Macnaghten 2010; Macnaghten & Chilvers 2013). For Barbour (2007) "[k]ey to systematic analysis is the identification of patterning in the data (…) and then seeking to formulate explanations for these patterns…" (Barbour 2007: 142). This involved an iterative process of comparison between groups and individual participants within groups. This search for patterns involved looking for both 'variability' and 'consistency' (Potter and Wetherell 1987). A second phase of analysis involved an interpretation of the "functions and effects" of the comments in relation to these patterns (Potter and Wetherell 1987: 168), resulting in a series of themes that are both coherent with, and derived from the transcripts and highlight a degree of variability and consistency within and between groups. These themes and the sub-themes within them were devised from the data itself, as well as being compared with existing thematic analysis of public responses to emerging

controversial technologies (see Macnaghten and Chilvers 2013). The ‘representativeness’ of these themes in relation to the original transcript was validated by the existence of ‘in-vivo’ (Barbour 2007) sub-themes (for instance the phrase “dash for cash”) and was tested and refined to produce a set of distinct but related findings that represented the complexity and tone of the group discussions without merely impressionistically describing the interaction. During this process particular care was taken to focus as much as possible on group interaction rather than simply extracting individuals’ comments (Barbour 2007); to accurately portray the complexity of interaction and avoid overly simplistic representations of consensus; and to critically approach the use of language, metaphor and narrative, and the often multivalent and multilevel nature of discussion in order to avoid a superficial analysis.

To summarise, a deliberative focus group methodology was employed due to its focus on interaction and its ability to generate rich qualitative material. The sampling was designed to ensure a breadth and diversity of voices and to be representative of broader judgements and responses beyond the research sample in a theoretical sense, rather in any positivistic or statistical sense. This diverse interaction was driven by questions and visual stimulants designed to open up the discussion and get the participants to elaborate on their feelings, reasoning, judgements, and questions. The rich qualitative material generated allowed for analysis of lay issue definitions, salient questions, hopes and concerns, and the narratives employed in relation to the topic. This allowed for an attempt to articulate both the underlying factors structuring public responses to fracking and unconventionals and a series of possible conditions upon which the public acceptance of exploitation may rest.

4. Findings

4.1 Trust

Trust is a theme that emerged across the focus group discussions both in early discussions about energy futures and as a central theme in discussions about the acceptability of hydraulic fracturing. There was prevalent lack of trust in 'the industry' (often broadly defined by participant as the Energy industry, not just the Fracking industry), centred on the perceptions that greed, profit and short-termism have guided, and will continue to guide, its thinking and decision-making processes. Lack of trust in the industry is a crucial and under-acknowledged aspect of the current policy debate. Beyond energy security, the arguments used by proponents of fracking and unconventional fossil fuels tend to be largely economic in character. Public responses to the arguments in favour of fracking are always going to be mediated by judgments about 'the industry', as the industry is seen as the primary vessel through which these benefits will (or will not) be delivered. People's lack of trust in 'science' and 'government' stemmed in no small part from what was seen as the corrupting influence of 'industry' and the pursuit of profit. These comments perceived both science and government as being too beholden to industry, and therefore old-fashioned assumptions that the actions of these institutions are driven by a desire to achieve genuine social benefits, were rendered problematic. These findings are broadly consistent with well-established social science findings on public perceptions of technology, health, and environment. For instance, Macnaghten et al. (1995) suggested that people's perceptions on such matters are 'influenced strongly' by the degree of trust they have in sources of information, as well as whether they "feel a capacity to influence events associated with that information" (sense of agency) (Macnaghten et al. 1995: 2). The close relationship between 'trust' and 'agency' will be discussed later. First, however, I set out and discuss a selection of extracts from focus group participants, expressing how issues of trust affect their views on energy, fracking and unconventionals.

Anthony: It makes you think there's a, sort of, **cartel** going on? ... **Price fixing**.
(History society member, Nottingham, pg208)

Darren: You don't really understand what you read and shell out for, do you know what I mean? You'd have to be a…
Jason: Well, they're supposed to be simplifying it, aren't they? This cheaper tariff, it could be…
Darren: I just don't understand it all. I never have. The bill comes and you pay it.
Damien: But the trouble is with that, you change to another supplier, and then within three months the one you've just left has probably gone cheaper than that one. So you're forever bloody changing companies.
Darren: They're like the **con men**, just confuse you…

(Ex-miners, Nottingham, pg250)

Emily: Surely it costs an amount to give you so much electricity. Why is it different rates?…
Marilyn: Just going back to **greed** again.
Emily: Yeah. Because they can do it.
(Mothers with young children, Newcastle, pg165)

Joe: I think the energy companies are happy, aren't they, because they're making billions. No one's ruffling their feathers.
Shaun: Absolutely.
Joe: The government don't seem to be giving them any grief, they just…
Jack: Because half of them are directors of those companies.
Joe: Well, yeah, they're all turning each other's…
Jack: **They're all in it together**, aren't they?
(Ex-miners, Nottingham, pg252)

Alex: There's quite a lot of factors, really, but I do worry about what Sam is saying, how do you get to a point where you've got the stick and the carrots in the right formula because we are dealing with what is a free market – free in many ways – and **I don't think companies act with any sort of moral standards**. They, basically, are free agents, and unless somebody is restraining them they just go for profit because they don't have a collective conscience. As individuals they might have, but as companies they just don't act that way, they are duty bound to make as much money as they can for the shareholders.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg300)

Trevor: I still believe it should be, I don't, I think, I don't think it'll ever be fixed unless it's **nationalised again** and then you have one policy around making it green. I think asking 20 companies to all do the same thing is just, they'll be so many profits that they're not, that's not really their intention…
Alan: Aren't they, that's all they're after.
Trevor: Yeah. They're all about the shares, this year's financial dividends and not what's going to happen in ten and 20 and 30 years' time.
(Parents of university students, Oldham, pg330)

In these comments judgements about the trustworthiness and intentions of associated actors in the energy system, whether researchers, regulators, or exploiters, play an important role in mediating subsequent responses to fracking and unconventionals. Recent news stories about price-fixing investigations (Macalister 2012), energy company profits (Gammell 2013), and the drive to simplify energy tariffs (BBC News 2013b) were often at the forefront of participants minds. Anthony, for instance, was not alone in suspecting "cartel"-like behaviour from energy suppliers. The following exchange about the complexity of prices concludes that this constitutes wilful complexity designed to confuse and prevent customers from getting the best deal, a practice which until very recently has been perceived as having the tacit approval of government. Again this was far from the only occasion when these sorts of assumptions and fears were expressed. The following comment describes a perceived lack of accountability whereby companies seem to be allowed to do what they want. This idea is expanded on in the next comment which

implicates the government, whom these participants perceive as being at least partly culpable through passivity. Jack's quip "They're all in it together, aren't they?" represents public suspicions of a certain 'clubbiness' between government and industry. The final two comments both express severe doubts that 'industry' left to its own devices has either the ability or intention of acting in the public interest or achieving genuine social goods. Further, Alex suggests the need for a better 'formula' of incentives and constraints ('carrots' and 'sticks') to impose a set of "moral" values and temper the apparently dangerous desire for profit. Trevor goes further by suggesting 'nationalisation' as a policy option to guard against short-termism, the social-ills perceived to stem from the drive for profit, and to ensure coherent responses to future energy challenges guided by public values. Trevor was, once again, far from alone in raising the spectre of nationalisation which was invoked regularly either nostalgically as a squandered ideal or in more substantive terms as a response to issues like trust, purpose (of science, technologies, innovation), and achieving genuine social benefits. This is indicative of a broader theme across the groups whereby participants often expressed anxiety about the idea of energy as a commodity that ought to be owned and traded. These comments will be discussed in detail in the 'exploitation' theme below (section 4.3), but suffice to say there are close links between the trustworthiness of actors associated with the development, approval, and operation of fracking and the exploitation of unconventionals and the perceived likely, or even inevitable, 'culture of exploitation'. By the 'culture of exploitation' I mean the perceived likely grounded practices of the energy industry, the assumed values and motivations informing and embedded in those practices, and the association with inequality as both indicative of today's inequalities and a possible source of tomorrow's.

Beyond expressions of mistrust in individuals and institutions seen as being implicated in the story of fracking, there were also expressions regarding trust, or perhaps more accurately optimism or scepticism, relating to the integrity and solution-finding capabilities of scientific research and market forces. For instance:

Lauren:	It's also... are they being properly incentivised somehow to develop that research? Do they think, well... are companies thinking, well, that's a lucrative market we need to plug into, let's put more money into that? I don't know if that's happening.
Moderator:	So you have a suspicion that maybe market forces and the motivation of profit are playing a role in the way science is going, the direction of science?
Lauren:	I think it probably is – very cynical of me – but yes.
Moderator:	Is that something... other people see, or...?
Karl:	Ultimately, it's going to drive everything, isn't it, because companies aren't going to invest in a certain area of science unless, at some point, it's going to give something back to them. With the best will in the world, big businesses – a bit like

> we were saying about the power companies – they don't operate on philanthropic terms, do they? They only really invest in things that are going to give them a return. They're not going to invest in a particular technology or invest in research towards particular technology unless there's something in it for them.
> (History society members, Nottingham, pg212)

Here assumptions of 'science' as a site for the production of solutions and social goods are rendered problematic by the assumed corrupting influence of commercial imperatives and the drive for profit. These epistemological judgements highlight oft-cited concerns and uneasiness about private funding for the production of knowledge and attendant issues of the trustworthiness of that resulting knowledge. Scepticism and optimism about scientific research went beyond the perceived integrity of the conditions of its production towards comments about the possibility of scientific certainty and foreseeability, and limits of scientific knowledge:

> Charlie: If you look at the 20th century then you could say there's been a massive leap in the standard of living, for example, and if you look back you can see that most things have evolved and many issues with everyday living have been solved – I mean, at what cost I'm not sure. But it gives you a, sort of, optimism that there's that progression in human endeavour and that we are capable of anything, when you compare the current information age to how we were living pre-computers. A massive sea change. So, for me, there's that element of, yes, as Robert says, there's an underlying thought that human will and intelligence will provide the answers. But, I think, also, underlying that, there is the feeling in most people, I imagine, that the clock is ticking somehow and that perhaps we are going to come a cropper at some point.
> (History society members, Nottingham, pg211-12)

In this example of such thinking the participant begins by echoing a still popular idea, that through scientific research, technical solutions to nominally social issues will be found, as they seem to always have been, and "save us all" (Paula, Parents of university students: 326). This epistemic optimism assumes that through research uncertainty will inevitably reduce and that the material world is essentially knowable and can be manipulated to our own ends. To be clear, 'epistemological optimism' refers to a proclivity to view the nature and scope of knowledge as essentially attainable and potentially unlimited respectively, to assume that uncertainty necessarily decreases as knowledge increases, and often to believe in a singular, definitive truth waiting to be discovered (especially in matters of the 'natural world'). These assumptions are accompanied by a technological optimism which in turn assumes that through knowing and manipulating the material world we can devise technologies and practices to provide solutions to social and environmental problems. Again, to be clear, 'technological optimism' refers to a proclivity, stemming from epistemological optimism, to show a residual faith in the solution-finding capabilities of

introducing new technologies into the world. This optimism is bound up with notions of 'progress', and more recently 'innovation', and in it's focus on the technical 'fix' can under-emphasise, or encourage a blind-spot for, both the social values embedded within a particular technology, and the social adaption necessary to accommodate a new technologies. Charlie, however, adds two crucial caveats to his optimism. Firstly that these processes may have come at a cost – to the environment, to existing patterns of social life; and secondly that there is a sense of looming crisis for these assumptions of epistemic and technological optimism – that more knowledge may not necessarily lead to less uncertainty, that knowledge of the material world may be limited or partial, that manipulating the material world may increasingly be leading unacceptable risk and ethical dilemmas, that technologies and practices devised as today's solutions may become tomorrow's problems, that science may be a site of the production of risks and problems as much as solutions and benefits. In other words, a sense of epistemic humility and technological scepticism.

The market, as well as science, was often problematised as a site for the production of solutions. Firstly, the energy industry was characterised as at least a peculiar, or at most a downright malfunctioning marketplace:

Jason: Is there competition in the energy companies like there is in supermarkets… There doesn't seem to be any competition, they just seem to be able to charge what they like…. They just seem to charge whatever they want to.
Pete: But competition does bring the price down, doesn't it?
Jason: It does, doesn't it, yeah, but it doesn't seem like there's any of that to me.
(Ex-miners, Nottingham, pg249)

Charlie: And the other thing is, also, that you're paying different amounts for what's obviously the same product; you don't get a better quality of electricity from British Gas. Your telly doesn't look any better! (Laughing). It doesn't make your house any warmer, does it? You're paying for the same product, just paying a different amount to different people.
(History society members, Nottingham, pg208)

In these comments the consumer-friendliness of energy providers is queried and compared unfavourably to supermarkets. Again the positive effects of privatisation and "choice" are questioned, as well as the truism 'competition brings the price down'. Supermarkets were often talked about as offering convenience, choice and competition, as well as being responsive to consumer pressure. There was a sense that 'competition' between supermarkets seemed to work better when compared to the energy suppliers (e.g. Jason, Ex-miners, pg249), and that the ability to choose whether to pay extra for an "ethical product" (e.g. a free range chicken) or to choose purely according to price was seen as

being in stark contrast to confusing and inflexible energy tariffs (e.g. Emily, Mothers with young children, pg175). These judgements were confounded by negative media attention surrounding rising prices, profits, and alleged price fixing (e.g. 'Gas prices: FSA examines whistleblower's claims of 'Libor-like' manipulation', Macalister 2012 & 'Energy giants that profit from our pain', Gammell 2013). Energy company profits are regularly criticised, particularly in the context of fuel poverty (e.g. Neate and Moulds 2013), whilst similar points are rarely made as vociferously about supermarket profits in the context of increasing reliance on food banks. Participants old enough to remember often brought up nationalisation, exclusively in nostalgic and positive terms, and even suggested a lingering unease in accepting (particularly large) private profit from energy, defined as a necessity, or a right even, rather than a commodity (eg Trevor, Parents of university students, pg330). Although not the purpose of this research, it is an interesting question as to whether the same anxiety exists when talking about food, another necessity, but one whose production and supply has never been nationalised in the same sense as energy. The important point here with regards this research is that the energy industry's history as well as present day institutional behaviour engenders a particular 'social constitution' in the minds of the public, a largely negative one. To reiterate, 'social constitution' refers to the social and economic conditions within which technologies are shaped, including industry behaviour and structure, and therefore the social meanings and structures they embody. These sorts of judgements about actors associated with fracking and the exploitation of unconventionals may play an important role in structuring public responses.

Secondly, and as already discussed above, there was regularly profound mistrust of 'the market's' propensity to work towards genuine social benefits without intervention and the imposition of constraints. Participants were regularly split as to whether they should trust current and likely future regulatory regimes ability to achieve the right 'formula of carrots and sticks' on issues of energy and climate futures generally and fracking and unconventionals specifically:

> Simon: I was going to say, I've got confidence in regulation generally, but not in that particular area [financial services]. (Laughing). Yeah, so in terms of technical regulation, rather than financial services, I would say I have faith in our country's technical regulation. Whether that's misplaced, I don't know.
>
> Karl: There'll always be people taking the cynical view, however, that where there is profit to be pursued, there is the possibility of people cutting corners. This is perhaps an over-cynical view, but....
>
> (History society members, Nottingham, pg232)

Sam: Well, it's certainly tightened up since… I would have thought it's tightened up since the tremors, because I remember seeing the report on North West Tonight that they were going to tighten up, which is a natural response, isn't it? But what that actually equates to I don't know, and whether that will be adequate I have no idea.

Karen: I think we've alluded to it already, but we're going to see the regulators be emasculated so that this thing can be driven along.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg318)

Participants seem fairly willing to place trust in regulators in these comments. The first compares 'technical regulation' favourably with 'financial services' regulation and whilst a risk of corners being cut is acknowledged it is blamed on industry, greed, and the drive for profit rather than regulatory incompetence. The second is willing to assume a tightening up of practice and regulations is in the pipe-line following the 2011 seismic events near Blackpool, Lancashire, before expressing a fear that government may water-down regulatory power in order to "steam-roll" fracking in. Again, the good intentions of regulators are assumed and issues are expected to be caused by interference from outside.

In summary, these comments point to serious issues relating to public trust in actors associated with the research, decision-making, and exploitation of energy broadly and fracking and unconventionals specifically. The energy industry in general is viewed in highly problematic terms: greed, short-termism, and self-interest are all seen as being central characteristics to its intentions and actions. I have suggested that there is a particularly problematic 'social constitution' of the energy industry that may in part be influenced by its previous nationalised status in living memory. This may in part explain why participants often contrasted the energy industry to the food industry, although there will be other key factors and this theory requires further research. The perceived corrupting influence of the drive for profit on 'science' and 'governance' should also not be underestimated in structuring people's views on the debate. Whilst there remains residual faith in the solution finding capabilities of scientific research and market innovation this is often tempered by critical acknowledgments of their propensity to create risk and new social issues as accompaniments to such solutions.

Trust, at present, is an under-acknowledged element of current policy debates on fracking and the exploitation of unconventionals. In their near silence on the issue, this under-acknowledgement in institutional discourse may have the effect of exacerbating the extent to which judgements of trustworthiness play in structuring public responses. Public trust discourse reveals an anxiety about the ability and willingness of actors in positions of

authority to put public interest, values and genuine social goods at the heart of policy and practice on this issue. If we establish this desire as a condition of representation upon which 'public acceptance' depends, then that acceptance is currently far from being realised. Here representation would be conceived as an ongoing process of dialogue between citizen and representative, rather than passive delegation or deference to "sound science". So what precisely constitutes a genuine social good and what are public interests and values in relation to fracking? Notions of the constitution of social goods in relation to fracking and unconventionals and even energy more broadly are barely articulated or acknowledged let alone instilled at the heart of policy and science culture. This is why trust is so elusive. For Callon et al. (2009) representation 'is the cornerstone of democracy'; it is within the interaction between representatives and the represented which the constitution of genuine social goods and public values and interests are fashioned and re-fashioned. The precise constitution of public values and social goods on this matter will remain vague until there is some sort of concerted and deliberative interaction between representative and represented. Public engagement processes have the potential to achieve this, though only if their purpose, design, and capacity to influence are explicitly geared towards doing so. Trust that policy and innovation will represent a general will cannot be expected when the spaces and processes in and through which such a will is established and voiced are in need of invigoration or 'democratisation' (see Callon et al. 2009).

These findings are somewhat at odds with survey research commissioned by the industry which found that 23% of respondents deemed Cuadrilla Resources as either a very trustworthy or quite a trustworthy source of information about fracking, whilst 12% deemed them very untrustworthy (Britain Thinks 2012b). A trustworthy source of information is obviously quite different from being a trustworthy exploiter or a trustworthy guardian of the public good, and such debates about the purpose of and intentions behind exploitation are framed-out by the survey question. Similarly scientists and academics are seen as the most trustworthy source of information (73% net trustworthiness) but discussions about the purpose and direction of research and innovation are closed-down again by the narrow focus of the survey question (Britain Thinks 2012b).

4.2 Alienation

The alienation theme includes comments made by participants both generally about energy futures and specifically about hydraulic fracturing that express a lack of agency, often accompanied by a sense of injustice, frustration, or dismissiveness. Michel Callon and

colleagues describe "two great typical divisions of our Western societies" (2009: 35) between experts and laypeople, and between citizens and representatives. Socio-technological controversies regularly bring these divisions into sharp focus. In the context of the discussion of the previous theme, where a scepticism about the likelihood of public values informing thinking and action on issues related to fracking was expressed, senses of a lack of agency, powerlessness and dependency are obviously highly problematic. In other words, the apparent lack of trust in actors in positions of authority to represent public values, coupled with senses of powerlessness and alienation in relation to being able to voice those values and have them taken seriously, would seem to spiral toward apathy or resentment. Lack of trust and lack of agency would seem to exacerbate each other. One-way pedagogical information provision won't bridge the gap between non-expert and expert precisely because it fails to challenge that gap. The model of secluded, sound science informing good policy bypasses public debate, and it is through that debate that public values, interests and goods are proposed, negotiated, established, problematised and adapted in an ongoing process. These values and interests can obviously only be represented once they are established, negotiated and achieve a degree of consensus. Public opinion is not held a priori but emerges through interaction and dialogue. As Callon et al. put it, controversies, or in their vocabulary 'hybrid forums':

> "obviously express… a criticism of the procedures on which representation is usually based. What they demonstrate in practice is a desire for public debate, a demand that groups which are ignored, excluded, and often reduced to silence, or whose voice is disqualified, have the right to express themselves, to be heard, to be listened to, and to take part in the discussion" (Callon et al 2009: 118).

This sentiment is echoed in the comments from participants below:

Janet: Yeah, well, if I probably wanted to have more of a say I don't know whether there's somebody there who would listen anyway, but maybe we're just taken over by the whole day-to-day running of things and we don't make our views… we're not able to…
(Mothers with young children, Newcastle, pg177)

Moderator: So when you talk about consumer power to change things, do you see that being possible in the energy market?
Jack: No, because they'd stamp on you like they did the striking miners.
Gordon: It always comes back to that.
Jack: No, but people like us haven't got a voice anymore in this country…You need them more than they need you, so you haven't got the power to… I don't think so, anyway.
(Ex-miners, Nottingham, pg250-51)

Damien: Yeah, energy is a must have, isn't it, a need? Yes, it's a need, isn't it? You haven't got any choice, you've got to have it. Not like the luxury item stuff.

(Ex-miners, Nottingham, pg261)

The above comments deal with issues of alienation and lack of agency in terms of energy generally. The first is concerned about the ability of non-expert publics to have a say and experts and decision-makers willingness to listen. There's also an acknowledgement that 'the average person' often struggles to understand and form opinions on such complicated issues as they get "taken over by the whole day-to-day running of things". This was a fairly common sentiment across all groups whereby participants expressed regret, guilt even, that they ought to know more about 'these sorts of things' but find, inconveniently, that their lives tend to get in the way of doing so. This comment is more insightful than this fairly well recognised issue concerning time-poor publics engaging with complex issues. There is also a sense of dissatisfaction with a theoretical error regularly committed by politicians, political commentators, academics, and publics themselves, amongst many other actors regarding political subjectivity. Public views and values are too often conceptualised as overly rationalistic and as being held a priori on a given issue. Callon et al., again:

> "[W]e should resist the idea that the people is made up of individual citizens each of whom knows exactly what he or she wants on every subject and is endowed with preferences that are fixed once and for all." (Callon et al. 2009: 115)

Instead, they suggests:

> "The person represented does not always know what he wants; it is in the debate preceding the choice of his representative, in discussion with him, that he gradually learns what his preferences are and his will is gradually formed." (Callon et al. 2009: 116)

Public opinion, and 'public acceptability', then, emerge through debate. As discussed in the literature review, the dominance (or 'tyranny' even, see Wilsdon & Willis 2004) of risk discourse not only eschews the possibility of public sentiment influencing decision-making but in closing-down debate and policing who can speak with salience it prevents the collective exploration of the issue, those involved, and possible solutions. As Wilsdon & Willis (2004) put it "the danger is that risk assessment — however participatory — merely digs us deeper into the hole that we are trying to escape from. It avoids our real predicament, which is one of ignorance and ambiguity" (pg 15). The comment not only asks 'if I wanted to speak would anybody listen?' but also 'how do I know what I think if I'm excluded from the debate?' The second comment reflects a general sense of powerlessness, of unequal power relations, and of the limits of 'the consumer'. The 'limits of the consumer' refers to how framing public concern as that of consumers, as opposed to

say citizens, tends to miscategorise deep ethical and political responses to "wider social implications and unknowns" (Grove-White et al 2000: 32) as more superficial 'product-by-product' assessments of ostensibly 'market issues'. The third comment reiterates the uneasiness about defining energy as a product, or a commodity previously expressed in the trust theme. It prompts the question about how else we might talk about energy and how this might reconfigure the relationship between the public, government, science, and industry in ways that address the sense of alienation regularly expressed in the groups. The remaining comments deal with issues of alienation and agency specifically in relation to fracking and unconventionals.

Moderator: So you think it's inevitable. Do others think it's inevitable?
Jason: Yeah. Definitely.
Moderator: And do you like the fact that it's inevitable? Is there anything there that worries you?
Jason: Well, they're going to be making all the money again, aren't they?
Damien: It's going to be the same, isn't it? Prices aren't going to go down, are they?
Pete: Equity backed… from a big US corporation just says profit, and little will go into this country. You'll pay the corporation tax, but profits will just go out to wherever they go to in equity [in reference to Riverstone Holdings investment in Cuadrilla Resources].
(Ex-miners, Nottingham, pg269-70)

Joe: I just think if there's a profit to be made I don't think it would really make a difference what we think, I think they'll just go ahead and do it anyway. They're too powerful nowadays…
Jason: Because it's just like big multi-national industries are just too powerful, they do what they like….
Moderator: So does everybody agree that it seems inevitable that certain people want it to happen so it just will happen, regardless of what local people will say?
Joe: It's the nature of things, isn't it?
Jack: It's like, money controls it.
(Ex-miners, Nottingham, pg280-81)

Dan: I think it's going to be steamed on and in. In many ways I think the discussion is a good idea, but we've missed the boat, really, because it is clear that… it was announced in the budget, it's happening. It was announced today, the guidelines will be here in two or three months' time. It's happening, and so the local communities had better brace themselves, and it's very much going to be fighting a rear guard action to protect local communities interests, and trying to make sure that the environment agency do do the job that they are there to do, and do it properly. So it think that's what the battle will be about. About getting effective regulation in.
(Lancashire Wildlife Trust group, Chorely, Lancs, pg311)

Paula: Bound to be, like you say **guinea pigs**. Why should we be guinea pigs for France and this that and the other. Why, you know, they've said no to it. So why should we test it?
(Parents of university students, Oldham, pg362)

Trevor: My concern is the government might even just **decide it without consulting us…**
Alan: The government will fiddle this all somehow.

> Paula: They've said, what a good idea and no matter what we think, they'll just go ahead. But we now know the risks and that's the frightening thing.
> (Parents of university students, Oldham, pg368)

The first three comments share a sense of inevitability. The first brings the discussion back to the drive for profits and the distribution of benefits. Here we see the close relationship between trust and alienation. People feel alienated because they can't see a place for public views and values in 'high-level' discussions which further strains and exacerbates the trust issues with regards government, industry and science. Again we see why information alone is not enough to engender trust and counter alienation. It is the debate where the nature of the issue, the involved parties, and 'feasible' solutions are set which publics must feel they can influence. The second comment is again testament to the widely perceived corrupting influence of greed and the drive for profits which are seen as undermining public values and democratic procedures. The third comment strikes a fatalistic note on the question of whether fracking should be used and unconventionals exploited, but suggests there's still a crucial debate to be had about how they are used and exploited. This invokes an often-expressed concern that the speed of innovation exceeds the scope for public deliberation, or ethical and regulatory oversight (Macnaghten and Chilvers 2013). The fourth comment introduces the powerful metaphor of being guinea pigs. On one level this is a fairly unremarkable comment about more cautious regimes (e.g. France) watching early proponents carefully as part of a more cautious approach. On another level, and in the context of powerlessness and a lack of agency, the idea of being experimented on by overarching powers is an emotive expression of alienation. The final comment was in response to a question asking participants to sum up the main thing they'd take away from the focus group. Crucially, the "frightening thing" is not 'the risks', at least not the risks alone. The "frightening thing" is precisely the combination of being aware of the potential of an emerging technology to pose a risk to something you value, and the perception of having very little power or possibility to influence whether at all, are along what lines, the technology is used. Questions of agency and alienation were often seen as being of equal importance to, and entangled with, questions of risk.

In summary, comments expressing powerlessness, exclusion and fatalism were common across all groups. These comments reflect a sense of alienation and judgements about agency (or lack thereof) caused by the divisions between expert and layperson, and citizen and representative. Risk discourse and the deficit model of public understanding contribute to these divisions, and therefore public concern about alienation. Firstly the near monopoly of risk discourse over the production of knowledge "confines debate on the state of

knowledge to professional researchers" (Callon et al. 2009: 121) and attempts to purge the production and application of that knowledge of uncertainty, politics and therefore public values. Secondly the deficit model of public understanding regularly (mis)frames public discourse expressing doubts about social, political, and ethical aspects of an emerging technology as naïve and misinformed technical assessments to be remedied by information and "communication". Participants often felt an inability to have their voices heard and to have an influence, whether through consumer action, or invited or uninvited interventions on the debate. There was also a sense of a game weighted in the favour of big business, of unequal power relations and of an unsatisfactory inevitability – a story that they had seen before and they knew the ending of. The main fear contributing to the sense of alienation was perhaps that of being by-passed, of decisions being made on your behalf without being given the possibility to engage, to practice citizenship, and to form judgements through debate. In other words alienation produced by decision-makers and experts wanting "the people's happiness, without letting them say a single word and without inviting them to sit around a table to discuss and negotiate" (Callon et al. 2009: 108).

Alienation or the need for deep, meaningful, and inclusive engagement or dialogue is an under-acknowledged issue in relation to fracking and unconventionals. Survey research in the UK has so far not recognised or engaged with this factor underlying public concern. Instead the public are described as have an "appetite for further information on the potential benefits and potential disadvantages" of fracking (Britain Thinks 2012: 6). There is a strong conviction in the critical social sciences that 'one-way' information provision, or 'education', will if anything only exacerbate public alienation. Firstly, because to provide information, usually entails communicating "the facts", and not communicating areas of uncertainty or ignorance (Grove-White et al 2000). Failing to acknowledge uncertainty appears institutionally arrogant and complacent. Secondly, through this one-way 'dictatorial habit' "publics are afforded no capacity and no right to become involved in the privileged normative social agenda which are pursued unaccountably through science" (Wynne 2007: 103), which is to say the social, political and ethical assumptions and 'taken-for-granted's' embedded in the practices of scientific inquiry, technological innovation, and risk-assessment determined regulation. Survey findings from the US about respondents concerns over 'citizen/stakeholder engagement', again, narrowly frame these issues as "a lack of adequate communication between industry operators and local residents" (Wynveen 2011: 22).

Alienation is the result of the remoteness of the layperson or citizen from the production of knowledge and the formulation of policy. The condition of representation (section 4.1) in its demand for the invigoration of the practice of representation is a partial answer, but the gap between expert and layperson needs to be addressed too. If public acceptance rather then resignation is truly sought then the expert monopoly over the production of knowledge needs to be challenged. A condition of the redistribution of expertise would fulfil this need. This condition would demand the creation of forums and processes to bring experts and publics together, preferably at an upstream stage where questions of purpose and direction are still open, but also at the "risk assessment" and "risk management" stages where questions of framing, assumptions, and the limits of existing knowledge can be brought into focus (see Whatmore et al. 2011).

4.3 'Culture of Exploitation'

This theme includes comments about the perceived likely *de facto* practice of fracking and the perceived likely ethos informing exploitation, as well as reflections on the equity of economic and power relations seen as embedded in and stemming from the exploitation of unconventionals as currently configured. Many participants closely associated fracking and unconventionals with inequality – both as an example of today's inequalities and a likely source of future inequality:

> Darren: And the directors are being paid about, what, 5 million a year, 10 million a year, so that's disgusting.
> Jason: You get was it £200 or something? Winter bonus or something? Look at us it's now, it's spring and it's still freezing.
> (Ex-miners, Nottingham, pg254)

> Alan: They're just in it for a quick profit… they'll have their money and good, they're off with the money, aren't they? **It's like the bankers**.
> (Parents of university students, Oldham, pg331)

Regardless of the accuracy of the quoted figures the judgement is clear: the gap between presumed executive pay in the energy industry and energy related welfare is unhealthy. The following comment makes the comparison with "the bankers". The narratives most popular with the UK public on "the bankers" and the financial crisis usually implicate a combination of individual moral failings, a pervasive 'culture of greed', at best passive and weak, or at worst colluding politicians, and regulatory failure of catastrophic proportions, varyingly emphasised (see Castree 2009). In other words there could scarcely be a more damning judgement than 'it's like the bankers' of the 'culture of exploitation' deemed probable to surround and infuse fracking operations. These sorts of judgements led one

participant to adapt the oft muttered phrase ‘dash for gas’ used to describe the rapid proliferation of interest, investment and exploratory and commercial practices associated with natural gas, as well as to evoke a sense of the irresistible forward and rapid march of progress:

> Tom: You want to believe that it gives us some options that we don’t really have at the moment to actually phasing a better future, but I just can’t help seeing it’s a **dash for the cash**.
> (Lancashire Wildlife Trust group, Chorley, Lancs, pg313)

A ‘dash for cash’ is a good approximation of a significant proportion of public sentiment on the perceived likely ‘culture of exploitation’ – the day-to-day practices of the energy industry, the assumed values and motivations informing and embedded in those practices, and the association with inequality as both indicative of today’s inequalities and a possible source of tomorrow’s. There were also reflections on the likely distribution of risks and benefits. In short, it was widely believed that those who stood to gain the most from fracking and unconventionals would be distinct and remote from those who would shoulder the majority of the risk. The repost that:

> Alan: George Osborne doesn’t live in Blackpool where they’ve done that, believe me, you know, most people are not going to be anywhere near that to make these decisions are they? And that’s the thing.
> (Parents of university students, Oldham, pg364)

Some participants went further in their critique of the ‘culture of exploitation’, problematising, on an ontological level, the very basis on which subterranean molecules of methane trapped in relatively stable geological formations come to be understood as a resource, a commodity, or an investment opportunity:

> Trevor: And whether we’ve got the money or not, and I think that’s one of the issues is, you know, all those pensioners who can’t afford to heat their homes and things like that, are obviously, I mean, we’ve said haven’t we, last week there’s so many thousands of people died in March because of the snow… likewise low income families and people on benefit, it’s, **it’s a necessity and actually, and as well, it’s not, not anybody’s is it?** …why should they make money on that?
> (Parents of university students, Oldham, pg331)

Once again uneasiness over ownership, profit, and inequality is apparent in public discourse. In terms of inequality and exploitation the general consensus of the participants was most closely akin to the Rawlsian theory of justice which contends that inequalities are legitimate only to the extent that they are used instrumentally to “increase the wellbeing of the most disadvantaged” (Dupuy 2010: 164). In so doing the “disruptive passions” of “envy, jealously, resentment, or hatred” are countered (Dupuy 2010: 165). Therefore,

inequality is not the issue per se, but inequality that is not put to work in the task of creating a more just society and therefore risks social cohesion and stability.

> Jack: If I got the option of cheaper gas under those conditions I would say no, I'll pay what I'm paying now, because I'm just very anti that, very strongly. I don't think that's worth just saving a few, £10, £20 a month on your fuel. Because I think the potential of that could be quite bad, personally.
>
> Pete: I think if the risks are minimal, then I think it should go because it's creating jobs… And, obviously, as long as the [company] seem to be reinvesting in the community with the parts of this corporate social responsibility it should go ahead.
>
> (Ex-miners, Nottingham, pg276)

For those for whom the risks, uncertainties and potential climate impacts are not ultimately prohibitive, the use of fracking to exploit unconventionals could be 'acceptable' under a series of conditions. Firstly, as we saw in the trust and alienation themes, that the potential benefits were scrutinised and that there had been the possibility of public discourse and values informing the debate. Then, that the 'culture of exploitation' was one in which, to some extent, the profits and inequalities produced were instrumentally used to the benefit of the least well off generally, but also specifically those shouldering the greatest risk-burdens. This, for many, would constitute a genuine social benefit. The issue then is not the wealth creating potential of the fracking industry or the energy industry more generally, but the suspicion that the 'culture of exploitation' will stand in stark contrast to the Rawlsian theory of justice. For example:

> Moderator: That's interesting that you raised that story because often people are, in the medical context, people are little bit more, maybe a little bit more trusting. Is that something you'd go along with?
>
> Diane: I do, yeah. Definitely.
>
> Moderator: So, what is it about… because there are sometimes risks in new medicines that we develop…
>
> Trevor: The big one for me… it's not usually done for profit. You know, you don't obviously put that ulterior motive into effect. I know you can do in the pharmaceutical bit of the drug, but certainly, if it's about your heart and your body and some kind of cure for cancer or whatever, **you tend to think, they're not doing it to make money**. That's not one of the factors that's going into you making your decision, it's purely based on getting somebody better, so, **and this is all about money, isn't it?**
>
> (Parents of University students, Oldham, pg363)

Here the likelihood of the perceived 'culture of exploitation' in the energy industry is compared unfavourably to the medical sciences context. Whilst the caveat of the potentially problematic nature of the pharmaceutical industry is added, the distinction rests on the imagined motivations informing on the one hand the desire to develop new drugs and medicines and on the other the will to exploit unconventionals. This comment adds further weight to my argument about the 'social constitution' of the energy industry

(section 4.1). It remains socially problematic in the UK to define medicine and care as commodities, accessed (or not) through private wealth. The free at the point of use model of the NHS seems to be framing Trevor's perceptions of the motivations of actors in the medical context as opposed to the energy context, despite lingering doubts about the broader industrial structure beyond the NHS. Stemming from this widely perceived distinction is the belief that the former is as a result more likely to produce genuine social goods than the latter. This is consistent with a meta-analysis of public concern over the governance of science and technology whereby the public are often more willing to accept higher 'trade-offs', in terms of risk or ethics, if there is deemed to be 'a sense of genuine social benefit' (Macnaghten & Chilvers 2013). The suspicion is that the 'dash for cash' is informed by problematic motivations and priorities that will run counter to public values; is in danger of being rushed through without adequate appraisal, engagement, and oversight; and thus lead to bad decisions for bad reasons:

Karen: I think with such a precarious situation with energy security they are just looking at anything that might offer a fairly **short-term solution** and I just fear that some very bad decisions will be made because we've not had a properly thought out energy strategy.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg313)

Emily: It must obviously be a massive amount of it and it must have massive potential. One of them said, what was it, five to six billion in corporation tax, there must be an absolute mountain of the stuff there and they're just being greedy.
Kirsty: Yeah.
Caroline: Yeah.
Kirsty: It's for them.
Caroline: Yeah.
Kirsty: **A quick fix**. .
(Mothers with young children, Newcastle, pg192-93)

Dan: I think the best you could say about fracking is that it's effectively – because decisions haven't been made on anything else that actually provides a long-term solution – it just buys us a bit more time. But, of course, in the process it develops a new fossil fuel with all the accompanying emissions. So if we really want to reduce carbon emissions why are we going down that road? But the answer is probably because there isn't anything else on the table. So they're **desperate**, and this is the only thing on the table at absolutely the last minute – and it probably will be at least five years – but that might be just enough time with bringing in other things to get us off the hook and keep the politicians happy and **avoid making a decision** on anything controversial.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg306-07)

Dan: I think they'd know about them if they were that horrendous problems. There clearly have been very badly organised operations in the past, and I think we know it is possible to manage them a lot better. But I do agree with Karen, I think it's going to be rushed in and then we will get the consequences of things being **rushed**, and there will be bad decisions made and especially we, as a country and we as a local community, we'll all suffer the consequences of those bad decisions.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg314)

The above comments judge the motivations behind the will to exploit and informing the likely 'culture of exploitation' as by turn: short-term, a quick fix, desperate, rushed, and the avoidance of controversial or difficult decisions. Here the 'dash for gas' is characterised as a 'dash' rather than a careful process of deliberation. Secondly it is characterised as being 'for cash' which casts doubt on the motivations behind the will to exploit, particularly the extent to which they are likely to represent public values, including ideas about justice. Key to these issues of motivations and social benefits, as we saw in the trust theme, is the dominance of economic factors in the will to exploit:

> Anthony: But it'll be sold on... cheapest price and everybody is susceptible. We're very easily **seduced** by that. If somebody says, your gas bill is going to be cut by two thirds…
> (History society members, Nottingham, pg234)

This comment highlights public uneasiness about the apparent dominance of economic factors in political decision making, public desire, and, unsurprisingly, guiding industry thought and action. The use of the word "seduced" is crucial here. Cheap energy is cast as the object of our desire, but the uneasy, almost resigned tone of the exchange suggests that we should 'be careful what we wish for'. This notion was identified as a narrative publics used to articulate concern about emerging nanotechnologies expressing a sense "that getting exactly what you want may not ultimately be good for you" (Davies & Macnaghten 2010: 147). Added to previous judgements about greed and trust a picture is painted that casts severe doubt about whether the 'culture of exploitation' will be one that is either seen as able to achieve genuine social benefits, or is, to any serious extent, able to embody the public ideal of Rawlsian justice.

In summary, participants saw fracking and the exploitation of unconventionals as a potential source of inequality and as indicative of current patterns of inequality, which if not used instrumentally to help and protect the most vulnerable in society, may be seen as unjust, or at least socially problematic. The will to exploit was seen as a 'dash for cash' informed overwhelmingly by an economic rationale that was seen as being short-term, as unlikely to benefit those who would have to live with its risks, and as likely to be dangerously seductive to policy-makers, industry actors and publics alike. Fracking was also suspected as being likely to unfold within a 'culture of exploitation' unresponsive to public sentiment and therefore unable or unwilling to deliver genuine social benefits. These concerns and judgements could form the basis of a 'condition of justice' whereby acceptance is conditional on the extent to which policy-makers and industry actors are able

to discern and represent public values, foster an alternative ‘culture of exploitation’, and deliver genuine social benefits. Of course this condition would be highly contingent on the dialogues necessary to satisfy the condition of representation, where a sense of what might constitute justice or a genuine social benefit in this specific case would be deliberated. Here I have suggested that wealth creation per se say is generally not an issue so long as it is used instrumentally, to some extent, to benefit the local community, particularly the most vulnerable and those shouldering the greatest risk, or to fund energy projects of a more long-term and sustainable nature. The definition of this proper and fair ‘extent’ is obviously a crucial question on which the public might be engaged. Once again, there is at the moment very little consideration of the motivations behind the will to exploit, the perceived likelihood of fracking’s ability to achieve genuine social benefits, or even what might constitute a genuine social benefit, either in institutional discourse or existing survey research.

4.4 Uncertainty & Ignorance

Participant comments about uncertainty include comments that identify the limits of present knowledge. Both in terms of ‘what we know we don’t know’ (uncertainty) and about unknown unknowns and the possibility of surprise (ignorance). Furthermore comments presented here discuss strategies for decision-making in such conditions. These discussions don’t draw any clear conclusions about how to make decisions in conditions of uncertainty and ignorance though on balance most groups ‘err on the side of precaution’, at least at the current state of understanding. However, given the not insignificant amount of epistemic and technological optimism, many comments assumed “the facts” would not always elude us. This feeds into the commonly expressed sentiment that there is a risk of rushing these decisions, implying the expectation that at some point in the future there will be the technical understanding to inform a more sound decision. Some respondents found it difficult to form concrete judgements without better details of possible structures of taxation and regulation, and less ambiguity about potential benefits. Participants invariably saw the state of (technical) knowledge on fracking and unconventionals as inadequate and unfinished. Most saw this as a temporary condition, expressing epistemic optimism that greater degrees of certainly would not always elude us. There was, however, also some sentiment speculating about whether aspects of the fracking and unconventionals story would ever yield to scientific enquiry. In other words, these comments wandered whether the degrees of ambiguity and ignorance present (if under-acknowledged) in the debate where necessarily a temporary condition. Under such conditions opinions differed over

how to form judgments and make decisions. Some yearned for certainty. Others wondered how a cost-benefit style analysis could be formulated with so many pieces of the puzzle missing. Others still turned to concepts like the precautionary principle as a way forward, or perhaps more accurately as a way to slow down or changing direction altogether. The sense of an issue-in-the-making is captured well in the quote below:

Marilyn: There's no guarantees and I think it's an **era of experiments**, and there's no factual at the end of it.
(Mothers with young children, Newcastle, pg162)

There is ambiguity and speculation in much of what is uttered about fracking and unconvetionals, even by experts, but this comment taps into something more fundamental about the changing relationship between knowledge and certainty. Where once we might have assumed that an increase in knowledge would decrease our ignorance, now in various areas of inquiry the inverse seems increasingly true (Stirling 2010). In that context, assuming the condition of a lack of fully-formed facts and certainty to be a temporary one, on the cusp of being remedied by a research drive appears a dangerous assumption. In such conditions of uncertainty, confusion and manipulation reign:

> "Downplaying and overstating the dangers of the fracking chemicals is evident in local, national, and international media. The manipulations engaged in by the energy industry, citizen interest groups, and the media to (mis)represent the possible dangers show how both sides create discourses of justification. The flexibility of the topic of fracking lies in its ambiguous nature. There is much we do not know yet about how the chemicals used in this process will affect human, animal, and plant life. The scale of the possible effects of fracking is enormous; existing monitoring technologies may well be inadequate to describe the effects of this process on biological systems. It is difficult to assess the risk of fracking" (Cartwright 2013:203).

Participants' reflections on uncertainty focused less on the immediate technique and its attendant risks but on contingencies such as the regulatory and tax frameworks within which it would operate and the extent to which much vaunted benefits would be realised.

Moderator: Okay, so you'd be sceptical about price here? What about this idea that you know, prices have fallen in America where this has gone on?
Martin: Nearly everything's cheaper in America.
Verity: Yeah. It's the tax issue.
Martin: It's the British tax that hits us. American folks… you pay gas, oil, you name it, it's a lot cheaper in America.
Moderator: So you think…
Martin: So them getting it cheaper across there doesn't necessarily say we're going to get it cheaper over here.
Moderator: So you'd expect that the various differences between America and Europe?
Martin: I just, they'll be a huge difference.
(Allotment owners, Newcastle, pg129-30)

Jack: Our bills will never go down. Not in this country.
Damien: It's a mistrust in politics and the government.
Jack: You can't believe a word they say.
Pete: If Centrica have got it cheaper, Centrica's your gas company, they're going to sell it at the same price.
Jack: They're not going to go, "Oh, we'll knock £50 off your gas bills."
Pete: They'll [Centrica] get it cheaper. They'll make a bigger profit on it.
Damien: But is it the companies or is it the government?
Jack: Everybody's benefiting except the guy who's having to pay his bill.
Gordon: Except for me. (Laughing)
(Ex-miners, Nottingham, pg266)

Caroline: Yeah. Because I mean America, they can probably handle it because there's vast areas of nothing, isn't there? There's not that much left in our country.
(Mothers with young children, Newcastle, pg196)

Moderator: So the board before with the benefits on it, do people think those benefits seem worth these risks?
Pete: What sort of jobs does it create?
Moderator: That's a question you'd have. What's the thought behind that question?
Pete: There's obviously going to be a small risk, but I think for that small risk, I think the benefits outweigh the risks.
Jason: It's not very labour intensive, is it? There's not going to be thousands of jobs with that. Extraction and building it…
Pete: Be a drilling team, won't it, or something?
Darren: And the people that make the tools and things, so there is a bit of a knock-on effect. Transport them and things like that…
Jack: What about stuff to do with the kind of company and how many jobs there might be and whether they're high paid jobs will just be Americans come over and do them?
(Ex-miners, Nottingham, pg277-78)

Dan: I think it will be much more the countryside will be changed. The opportunities that there might have been to, I don't know, make the thing invisible won't be taken… If you just get £5,000 per 400 installations to do something good with. There are issues around this and that's what I would call making the best of a bad job.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg314)

Sam: And then what subsequent testing after that? Do they have to… get them through any…?
Louise: We don't know yet.
Karen: We don't have any knowledge about what they're going to do about that.
Sam: Is it required? Samples of groundwater or whatever?
(Lancashire Wildlife Trust group, Chorley, Lancs, pg308-09)

The first three comments focus on the uncertainty of translating or importing the process from one place, one regulatory and tax regime, to another, for replicating benefits or avoiding risks. We know that we don't know whether fracking will have similar effects on price in the UK for a whole host of reasons, including mineral rights laws, existing infrastructure, varying geological conditions, export controls and capacity, population density, tax, regulation, civil disobedience, etc. Given that beyond energy security, the

main benefits of fracking and unconventionals are economic in character, those participants employing a cost-benefit style analysis found it difficult to justify giving fracking and unconventionals their 'acceptance' on the basis of promises, particularly when those promises are being made by politicians and industry actors that many had previously expressed a lack of trust in. The fourth comment illustrates this issue – a participant stating that the benefits seem worth the risks is responded to by other participants with a series of questions about how labour intensive the process is and whether opportunities, particularly the best opportunities, will by-pass local people. As a result participant's attempts to judge whether the possible benefits seemed worth the potential risks often went unfinished, or were inconclusive. The fifth comment is a different take on the uncertainty of possible benefits. It comes from a much more sceptical participant in a much more sceptical group (Lancashire Wildlife Trust group). There is a suggestion however that what we might have to call 'begrudging acceptance' or 'instrumental obedience' may be possible, borne primarily out of their own sense of inevitability, through "philanthropic" or redistributive policies enabling, as they themselves put it, "making the best of a bad job". It is important to note that details on these sorts of policies, aimed at benefitting local communities or NGOs, were not yet being fleshed-out at the time of the research. The final comment reflects on the apparent lack of specifics in current regulation and uncertainty about how regulation for a fully commercial scale UK fracking industry might look and be enforced. All of these comments about 'what we know we don't know' focus on the precise operative framework and 'culture of exploitation' of fracking and unconvetionals in the UK. Other comments concerning ignorance took up the difficult challenge of talking about 'what we don't know we don't know', the limits of knowledge, and the possibility of mistake and surprise.

Robert: For me, they can make it as safe as it could possibly be, but I... as with fear of flying… I'm afraid of the idea of nuclear power and I just think of the disasters, as you would think of air disasters. And no one will ever... no nuclear power industry PR person could ever educate me - or whatever the word is - otherwise, because I have that primeval fear of the thing going off and there being horrific consequences.

Moderator: So you think you can have all the regulation you want, you can have all the health and safety stuff in place, but there's always going to be... it's innately dangerous, there's always going to be this - even if it's slim - this possibility.

Charlie: Well, we haven't had nuclear power for, what, 60 or 70 years. We've already had a fire at Windscale, renamed Sellafield, we had Three Mile Island, Chernobyl, Fukushima. So it's not just one or two. There's lots of things that have happened.

Robert: And when something does go wrong it goes big style. It's a huge, huge cataclysmic event…

(History society members, Nottingham, pg216-17)

Jack: We've only got two… we've had two [earthquakes], haven't we, 2.5 [magnitude] being the biggest? Well, how do we know… they could be getting bigger?...
Shaun: Yeah, well the perception is what if this, what if that? If you think like that…
Joe: What about when we have the first disaster, if we do have one?
Jack: Yeah, it could happen, couldn't it?
(Ex-miners, Nottingham, pg271)

Moderator: So what concerns you most?
Jack: I know, like, 1% of 350 metres or whatever it is, to get at two kilometres… but if it's contamination, if they can set fire to water and there's gas in the water then I think the risks are too high. You don't know what's going to happen in ten years' time, 15 years' time. There could be a national disaster, but I don't think I'm being doom and gloom.
Moderator: The risks seem to be, from what the scientists are saying, quite low.
Jack: But there's still a risk. How can you set fire to gas in your water? That's scary, that is, to me.
(Ex-miners, Nottingham, pg274)

Aaron: But I'm concerned about the environment and the impact it's going to have. And I certainly don't like the idea of pumping chemicals underground. And I don't think enough science has been done into this process in the States… Which makes you wonder just how dangerous it's going to be. (Lancashire Wildlife Trust group, Chorley, Lancs, pg305)

Scott: Well, you look at the big oil leak in the Gulf of Mexico.
Moderator: What do you, what?
Scott: I mean that's supposed to, they're supposed to be experts…
Paula: **They're human, aren't they, not divine.**
(Parents of university students, Oldham, pg361)

The first comment, in reference to nuclear power, sets out the issue of uncertainty when, however unlikely, the scope for damage is high and the consequences potentially irreversible. The participant likens their response to these low probability, high impact risks as a "primeval fear". The next three comments apply similar anxieties specifically to fracking. Earthquakes – currently rare and low magnitude are expected to get bigger. The quoted 1% figure for the probability of stimulated fractures exceeding 350m vertically (Davies et al. 2012) is seen as asking for trouble. The "lack of research" arouses suspicions that the process is more dangerous than we fear, rather than hope that it will be shown to be less problematic. The final comment points to Deepwater Horizon and asks questions about how risk assessment style analyses can account for human error and mistake, as well as suggesting a more humble approach to knowledge and control. Time and the future are crucial to these comments. They call for long-term thinking and assume hubris will, eventually, inevitably, be punished. Overall there's a sense of impending doom – a conviction that if something can go wrong, it will go wrong. These make for difficult conditions in which to make decisions, and form opinions and judgements. The initial response was often a longing for certainty:

Sam: It says on the board 1947, and then it says over 2 ½ million have taken place globally. Cuadrilla [from their website]. Surely there's a science behind it with all that amount of drilling? Surely there's a science behind it that we can scrutinise?
(Lancashire Wildlife Trust group, Chorley, Lancs, pg306)

Moderator: So Emily, how do you feel in these situations where there's uncertainty in science?
Emily: I think you just get a little bit frustrated with it all because you think, "Well I don't really know and if they don't know then who does," and I think that's how you feel, you kind of think, oh well, I don't know now," I'd switch the news off if it got like that.
(Mothers with young children, Newcastle, pg179)

Moderator: How certain would you want people to be about the implications of causing these fractures and how they behave, how far they go?
Pete: Cast iron certainty.
Jack: Yeah, 110%, you know.
(Ex-miners, Nottingham, pg225)

As Wilsdon & Willis (2004: 15) point out focusing on risk, yearning for certainty, and implying, that in these sorts of debates, "the likelihood of certain outcomes is susceptible to rational calculation", is an "entirely understandable way of rationalising an otherwise open and daunting set of questions". Questions, for instance, about "the long-term social consequences of a technology's development" (Wilsdon & Willis 2004: 15) and application. This blind-spot for ignorance and ambiguity expressed above by participants is most likely a legacy of the relatively recent rise of risk management as a dominant discourse in policy and governance circles (see Power 2004). An open future full of possible surprises, social uncertainties and humble assessments of both the present state of knowledge and the likely future state of knowledge make judging the ethical quality of an action based on its (presumed) consequences seem futile. As part of the DEEPEN-project of public engagement on nanotechnologies Dupuy (2010) suggested that the ethics employed by 'laypeople' were not consistent with imperative moral philosophies (e.g. consequentialist utilitarianism) which "emphasise the moral status of action and its characteristics" (Dupuy 2010: 154). Instead they were more closely associated with virtue ethics which shift the focus "from intrinsic features of action to the factors that determine the agent to act – to beliefs, desires, feelings, inner dispositions, skills, and the like" (Dupuy 2010: 154). This focus on 'the factors that determine the agent to act' is arguably more useful in a case like fracking, where there remain degrees of opaqueness for both future risks and benefits. This also partially explains the extent to which the perceived trustworthiness of actors (and their motivations) from industry, government, and science has been found to be playing a role in structuring responses. If good political decision-making could really be purely informed by 'sound science' then there would be no reason to fear the remoteness of representative to citizen, or expert to layperson. The model only

becomes problematic when it's shown as being incapable of supplying all the answers, or even asking the right questions. The fracking and unconvemtionals debate is alienating because some laypeople perceive that a risk-assessment style analysis is both incapable of getting to grips with uncertainty and ignorance, and unwilling to ask the collective about how best to proceed under those conditions. In the following interaction there is speculation as to whether unpredictable consequences could be made good through some form of retrospective recompense:

Leslie: Oh yeah, insurance. Insurance doesn't come into it. I mean, this is something that can't be insured. It's something that's a natural element beneath the ground. How can that have a price on it?
Robert: I'm talking more about sorting environmental damage or material damage to buildings or whatever. Subsidence, you know, coal mine subsidence, they cover that.
Moderator: So there could be mechanisms to deal with...
Charlie: But, then again, insurance can't counteract environmental damage. Like the BP thing, the BP oil, deep… deep…
Moderator: Deep Water Horizon.
Charlie: Deep Water Horizon, yeah, no amount of insurance is going to undo that, is it. It's similar technologies, isn't it?
(History society members, Nottingham, pg225-26)

The conclusion is that this is an unsatisfactory approach, partly because of an uneasiness about marketising valued aspects of our environment, and partly because many such aspects of our environment can't easily be retrospectively put back together again once broken. Rather than retrospective action, participants mostly favoured more pre-emptive and precautionary action when making decisions and forming judgements under conditions of uncertainty and ignorance:

Moderator: It seems that - and please tell me if I'm putting words in your mouth - in the room there's this sense that precaution might be a sensible option here?
(General agreement)
Charlie: Yeah, precautionary principle.
Moderator: And so you'd want to apply that?
Charlie: Yeah (overspeaking).
Karl: Mmm.
Moderator: Is there not a risk of missing out on a big opportunity here that others might take up and we don't?
Simon: I can live with that!
Charlie: That's just another way of selling it to us, isn't it… might get left behind.
(History society members, Nottingham, pg234-35)

The precautionary principle, for Felt et al. (2008), should not be thought of as something only to be applied to those "risks that science is not yet able fully to evaluate" (Felt et al. 2008: 59), but as a broader project, re-shaping risk-assessment and risk management practices. Therefore, for them, it has implications for "not just the practice of risk

assessment, but the authority which it can logically carry in the larger process of regulation and policy for innovation" (Felt et al. 2008: 61). This expands the scope of the principle to attempt to address the sorts of concerns expressed by the participants, not only in the uncertainty theme, but across all of the themes presented by this research. For instance by promoting: "independence from vested institutional, disciplinary, economic and political interests"; the "deliberate search for 'blind spots', unknowns, and divergent scientific views"; "contemplation of full life-cycles and resource-chains as they occur in the real world"; "inclusion of industrial trends, institutional behaviour and issues of non-compliance"; the "explicit discussion of appropriate burdens of proof, persuasion, evidence, analysis"; the "comparison of a series of alternative technology and policy options and potential substitutes"; "deliberation over justifications and possible wider benefits as well as risks and costs"; "drawing on relevant knowledge and experience arising beyond specialist disciplines"; "engagement with the values, knowledge and interests of all stakeholders possibly affected"; "general citizen participation in order to provide independent validation of framing"; "initiation at the earliest stages 'upstream' in an innovation, strategy or policy process"; and "emphasis on strategic policy practices like reversibility, flexibility, diversity, resilience" (Felt et al. 2008: 62-63).

In summary there was a broad consensus over the need for greater (technical) knowledge and understanding on fracking and unconventionals. Many were optimistic that this could be achieved and were therefore concerned by the sense that the decision to exploit was being rushed through. A rushed decision, it was widely held, would almost inevitably be regretted at some point in the future. These participants also found it hard to accept fracking now, at current levels of understanding and detail, because of the vagueness of crucial contingencies like regimes of tax and regulation, and the likely 'culture of exploitation' or expected institutional behaviour. This vagueness clouded questions of possible benefits, and whether they were worth the risks, as well as the likely virtue, and 'good neighbourliness' of operators. Others were more willing to contemplate areas of ignorance and questions of ambiguity. For these participant's fracking seemed to be 'asking for trouble', with risk-assessment style assurances expressing minimal danger as likely to exacerbate concern than defuse it. These 'assurances' were seen as communicating institutional arrogance and complacency making fears of impending doom all the more acute. It was suggested that in conditions of uncertainty and ignorance shifting the focus of ethical judgement from the intrinsic characteristics of the action to the factors seen as determining the agent to act (Dupuy 2010) was arguably a better suited approach.

The central importance of the trustworthiness of actors (and their motivations) to public responses would suggest the importance of lay ethics in relation to fracking and unconventionals. Overall, though not unequivocally, when making judgements and decisions in conditions of uncertainty and ignorance, participants favoured a precautionary approach, particularly after deliberation and interaction. I then used the work of Felt et al. (2008) to suggest that the precautionary principle should not be used merely in cases of incomplete scientific understanding with the explicit expectation of being a temporary measure until science inevitably 'catches up'. Rather, as guiding and reshaping the practice of risk-assessment and the production of knowledge itself. Therefore slowing-down and opening-up the debate about fracking and unconventionals to better include the public concern and sentiment articulated across all of the themes presented here. This preference for precaution could form the basis of a condition of precaution which demands that uncertainty act "as moral basis for action and the reflexive intertwining of knowledge and interests" (Stirling 2010: 10), prompting the querying of 'what we know?', 'what we don't know?', 'what we want to know before we proceed?', 'what is the full range of possible options?', 'what human and environmental values are embedded in each of these options?' and 'who should contribute to our attempts to answer all the above?'. There is little in the existing survey research to make any sort of comparison with beyond the acknowledgement of a public 'appetite' for more information. The social treatment of uncertainty lags behind the technical assessment of risk, which as discussed previously is itself currently far from comprehensive.

4.5 "Risk"

This theme does not involve technical appraisal of the various risks. Instead it involves comments that represent initial responses to the technique and critical perspectives on the limitations and assumptions of risk discourse. Concern was rarely straightforwardly about risk alone. Instead concern often simultaneously expressed either some form of critique of the dominance of risk discourse, or, a much broader set of questions related to, but not confined to risk (see Wynne 2007), potentially including a host of epistemological, hermeneutic, social, political, or ethical judgements. There were many comments that pointed to the difficulty of discussing 'the underground', suggesting a lack of cultural and linguistic resources for conceptualising and discussing 'that which goes on beneath our feet'. Fairly distinctively two risks dominate public and expert discussions about fracking and unconventionals in the UK. If anything, whilst the enduring image of fracking's dangers in the US, and to some extent around the world, is that of taps on fire representing

the possibly of groundwater contamination, the idea of earthquakes possibly supersedes that in the UK. Both, however, capture imaginations and fears with a 'Hollywood', dramatic, and highly remarkable quality:

> Diane: So, if you don't die in an earthquake, you might die drinking poisoned water. (Parents of university students, Oldham, pg357)

This comment could easily be seen as hyperbolic. It could be used as evidence of an irrational public in need of being informed. It could also, (only slightly) more sympathetically, be used to suggest that the explosive or shattering disaster-movie aesthetics of earthquakes and 'flame-throwing' taps are inflating these risks place in discussions at the expense of more prosaic concerns like water consumption, traffic, and changing the character of local landscapes. To do either would be to miss a crucial point –

> "[r]isk is not solely a cultural construct of possible danger, it is also quantified and made real by the extant technologies of visualisation and quantification and the use of the (often numerical) results to justify actions" (Cartwright 2013: 204).

The visualisation of the subterranean environment, as geologists know better than anyone, is an awkward and difficult task. The problematisation of that sphere for laypeople prompted by fracking leaves us, particularly in the relatively stable geology of the UK, short of cultural and discursive resources. Earthquakes, infamously, are highly difficult to predict. Predicted (to some extent) earthquakes, now infamously, can be legally and politically awkward to say the least (Davies 2012). The legal and regulatory status of fracking is emergent, or in flux. US proprietary laws shroud the issue of the dangers of contamination in secrecy. Little is known about how, for instance, high levels of methane in an environment may interact with existing diseases present in a population, or the effect contamination could have on food, and those consuming it (Cartwright 2013). Risk, for Cartwright (2013), "is produced through the process of tacking back and forth between locally perceived dangers, the technologies of perceptions used to quantify/ make visible/ treat those dangers, and the laws used to regulate practices surrounding what is perceived to be risky" (pg. 211). Therefore between real or imagined images of flaming taps and stories of seismicity; the invisibility and latency of the development and realisation of these dangers; and the indeterminate nature of future legal and regulatory frameworks and their *de facto* application, as well as the exclusivity and remoteness of their design: seismicity and contamination should be seen as highly problematic issues.

Further, de Rijke (2013) highlights the material qualities of gas and fracking. Methane is a "volatile, highly flammable, odourless, and invisible substance", which can often only be detected with technological devices (de Rijke 2013: 17). These qualities can give rise to anxieties "about the possibility of ubiquitous but invisible substances" (de Rijke 2013: 17) pervading the everyday. In terms of origin:

> "Unconventional gas originates deep underground and is the product of organic decay. In that way it is the antithesis of oxygen, which is both a product and source of growth, and which methane requires in order to burn and release the energy we seek. Apart from places such as swamps and garbage dumps, subterranean natural gas is generally contained in, and by relatively stable underground geological formations. To release unconventional gas, such stability must often be physically fractured, allowing gas to cross or diffuse those boundaries" (de Rijke 2013: 17).

These material qualities, for de Rijke, make fracked unconventional gas an archetypal example of 'matter out of place': "its material qualities contribute to a sense of anxiety as it escapes above ground into the inhabited environment" (de Rijke 2013: 17). Examples of 'dangerous material boundary crossings' (de Rijke 2013), like *Gaslands* flame-throwing taps, contribute to the public concern and unease surrounding fracking and unconventionals. Similarly, whilst the UK regularly experiences small-scale seismicity and has a history of earthquakes caused by extractive industries, most notably coal mining, in public discourse the notion of seismic events in the UK remains exotic, 'out of place', and a sign that something 'unnatural' is occurring:

Alan: It's the foundation of this country and if that happens all over the country… It worries me and I think it would make them very unstable or I'd have that feeling…
Diane: Yeah. **Well fracture means break, doesn't it?**
Alan: Absolutely.
Diane: You're breaking something.
(Parents of university students, Oldham, pg349)

Emily: It's where they're drilling and it like vibrates the earth and it caused the earthquakes, and somebody was saying, "Yes it does, it's okay it's manageable," and, "No it doesn't." That was recently. My instinct went, "Oh, what are you doing?" You know, it's like not right, **it doesn't feel right**.
(Mothers with young children, Newcastle, pg178)

Caroline: It's **unnatural**, that's what I think.
Moderator: What seems unnatural about that?
Caroline: Just fracking.
Emily: Fracking.
Caroline: Fracking.
(General agreement)
(Mothers with young children, Newcastle, pg187)

Like fracked unconventional gas as ‘matter out of place’, there’s a sense that the process of hydraulic fracturing is almost unnatural, inherently destructive, and intuitively a bad idea. In the absence of access to ‘technologies of visualisation and quantification’, or experience of the problematisation of the subterranean, or even of thinking and talking about the subterranean, participants often used metaphors like the one used in the first comment – “it’s the foundation of this country”. Further examples include: “they’re fracturing the foundations, aren’t they, of you know, Great Britain I suppose” (Parents of university students, Oldham, pg355); and “Yeah, and to us, we don’t know anything about this. But we, it seems like common sense that if you’ve got something like rock and you chip away at it, all over, you’re chipping away, it’s –Eventually going to. It’s going to weaken, isn’t it? If you fracture it’s going to split” (Parents of university students, Oldham, pg358-59). The quotes attribute the power to ‘weaken foundations’ to fracking. The foundations in question could easily be seen as both those of land and people, or *country*, particularly in the context of issues of trust, alienation, and exploitation. Instability of ground as representative of destabilisation of the fragile binds within society, and pre-empting the final theme, those between environment and society.

Hydraulic fracturing’s relationship with water (consumption and contamination) was also seen as problematic:

Robert:	Well, I'm not exactly too clued up on groundwater procedures and where it goes to and where it comes from and what it ends up in and what processes it goes through. But, very simply, all I drink at home is water, for example, out of the tap.
Karl:	Yeah, we're reliant on non-saline water, aren’t we?
Lauren:	Water's a massive commodity...
Robert:	I don’t filter it, I don’t like bottled water. I just drink it straight out the tap.
Moderator:	That's really interesting, actually, because at the beginning we started talking about energy and it's this thing we have to have. We could have a very similar discussion about water, couldn’t we?
Karl:	Another taken for granted, another cheap resource we assume will always be there.
Robert:	Yeah. I visited a sewage treatment plant in Beeston recently and that was a real eye-opener. It made me think about the... It's invisible. It's one of those invisible things, isn’t it, as you say, we don’t really dwell too much upon.
Leslie:	Well, again, looking back to being in Kenya, my daughter has to go and buy the water. And we flush our toilets with drinking water. Absolutely crazy. So if we're going to get contamination of the source of the water, I just... I'm sorry, it's beyond my thinking that anybody could even consider doing something that could cause that!
Moderator:	We should stress that it hasn’t been proven.
Leslie:	No, it hasn’t been proven.
Anthony:	Doesn't mean it's not going to happen, does it?
Leslie:	Absolutely.
Moderator:	So there's a balance to be struck here, isn’t there, because... just because there's a risk that something might happen... I mean, there's loads of things that we do in our day-to-day life where there's a risk that something might happen.

Charlie: But I think when you're talking about water, you're talking about something that's so... everybody's need. And it's not something you can live without and it's not something that you can cope without. And if you're going to say that you've got flammable taps then you're hitting.... It's like, talk about panic… Even a 1% chance of having... again, I keep coming to the phrase flammable tap, you think about the panic that that's going to have.
(History society members, pg233-34)

Mark: If you've any chance of contaminating the water table in this country, it should be stopped. They cannot contaminate the water system.
(Allotment owners, Newcastle, pg140)

The two comments, with varying degrees of matter-of-factness, express the same uneasiness about fracking's relationship with water. Water much like basic energy use (as well as, to a great extent, food and medical care, as previously discussed) is seen as a non-negotiable need. Being seen to jeopardise the supply of one for the supply of the other will not be perceived to constitute 'progress'. For some, fracking's relationship with water will be *the* site of discursive interpellation and political contestation around which a whole range anxieties and fears about energy futures, environmental ethics, and 'cultures of exploitation' will coalesce:

> "The focus on water and the dangers that oil – and now, even more directly, gas obtained by fracking – poses to the very stuff of life might well generate more significant political outcomes for those concerned with the lived realities and social, political and environmental consequences of our petro-societies" (Szeman 2013: 6).

The other "risk" that exercised participants, particularly in Lancashire, was about the apparent propensity of a full-scale commercial fracking industry to industrialise landscapes.

Aaron: Yes, but I think it's going to be a physical impact for our area, the Fylde, because the traffic movement, the water issues, I don't think that's been really brought to the fore… It's all about tremors, but… we all know the Fylde, it's country roads, isn't it, and I don't think there's the infrastructure there to take the amount of vehicles and traffic.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg318)

Dan: That's [the amount of possible wells in Lancashire] not a game changer, that's a landscape changer.

Aaron: That's one of the things that they talk about in America, it industrialises the landscape. In terms of the Fylde, it will industrialise what is a rural landscape at the moment.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg308)

In these comments local character, identity, and patterns of life are seen as being at stake. This is consistent with survey research from the US, where, for instance, Wynveen (2011) found concerns about the affects a rapidly developing fracking industry was having on

quality of life and community identity and character from respondents in an area of the Barnett shale region of Texas where development was just beginning to take off.

To clarify, these participants' comments along with insights from the anthropology of energy and elsewhere help to begin to explain, in part, why the fracking and unconventionals debate may continue to prove highly controversial. Whether because of the complex and highly specific ways in which risk and danger are experienced, the materialities or 'out of place' nature of the dangers themselves, or the symbolic importance of what is seen as being at stake or threatened (ie water, 'clean air', or 'the countryside'), the risks of fracking pose serious questions. However this research also suggests that quite apart from the dangers themselves, the institutional responses to both the risks, and public concerns defined as ostensibly about those risks, is a source of at least a degree of concern. As such, as well as expressing concern over the 'dangerousness' of risks participants also regularly reflected on possible 'blind spots' of present knowledge, the dominance of risk assessment style analyses, and the framing of the debate more generally. Both the possibility of the 'scale-up' of risks if operations were to intensify beyond exploratory drilling and issues regarding the 'long-term lifecycle' of operations were important sub-themes:

Scott: But the place in Blackpool it was an experimental one, wasn't it?
Paula: It's not long-term.
Diane: If this is long-term is this going to keep carrying on?
Scott: That's right, but in a short-term experiment there was two earthquakes and I know they weren't massive, they weren't big, but there was two, nonetheless, you know…
Scott: Risks can spread and cracks can spread, can't they?
(Parents of university students, Oldham, pg356)

Karen: If these holes are in the ground forever and the water quality in 100, 200 years we've still got to do some sort of monitoring… and very quickly laws can be brought in to deregulate certain, or to lower the standards that regulations going on... So I really am concerned that the regulation is going to collapse in 20 or 30 years' time when nobody's looking so hard, and we're struggling to actually meet our energy needs.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg310)

It will not escape the reader, particularly those with technical expertise, that at times descriptions of the processes and dynamics at work are technically unsound. This may be seen as compelling evidence that the primary issue with fracking is an issue of public misinformation, or a public deficit of understanding. I suspect that this interpretation misses crucial lessons from the trust, alienation, and uncertainty & ignorance themes presented by this research. These comments are not attempts to describe, with technical

accuracy, the precise processes at work. Instead, they are expressions of dissatisfaction with risk discourse, especially in the light of these perceived blind spots. They are a critique of the dominance of risk discourse. To be clear, the concern is not that technical risk knowledge contributes to and influences the debate, it is rather the perception that too often in the past, and potentially once again, technical risk knowledge *defines* the debate: the framing of the debate; what is at stake; the questions that ought to be asked; and those who are competent to answer them.

The first comment assumes that if a relatively short period of exploratory operations has caused two small earthquakes, then longer-term intense commercial operations may well cause larger seismic events. The notion of risks spreading goes back to the invisibility and latency of the danger, and to the sense of inevitable, looming disasters in the uncertainty and ignorance theme (section 4.4), as well as the sense that expert institutions have in the past and may continue to be too complacent. The second comment worries that danger lies at some point in the medium to long-term future of wells or storage pools, if and when controversy and scrutiny die down and the temptation is there, either at a regulatory or operational level, to cut corners. Again this speaks to the fear of storing up future risks and dangers for ourselves, or for future generations, and again the associated dangers of complacency and the dissatisfaction of inevitability. Another critique of expert risk discourse came in the form of questioning the legitimacy of thresholds of acceptable levels of risk:

Darren: But if we knew that our children or grandchildren were going to be affected health wise, would we still go and do it?
Jason: Did our fathers and grandfathers…?
Darren: No, but forget the past, we now know that there's an energy source down there. So we know in 50 years' time it's going to make everybody's lungs and whatever bad, or whatever it's going to do or, you know, would we still go and get it because it's cheaper today?
(Ex-miners, Nottingham, pg261)

Charlie: And nowadays we're a lot more savvy about this sort of thing. Whereas, again, 150 years ago when all the big coalmines were dug people just accepted, oh we're just digging a hole in the ground, you know. I don't imagine there was quite the level of public fear that there would have been about digging holes in the ground and making…
Moderator: So do you think there's a different threshold of what we might call social acceptability?
Charlie: Unquestionably…
(History society members, Nottingham, pg224)

Aaron: It depends where you go. Interestingly, we do quite a lot of work in Heysham… and the people around there… I went to a public meeting and the meeting was overwhelmingly in favour of new build nuclear power, because they got so used to

it and, in a way, have grown their trust in it. So I think it will vary hugely, depending on where you are.
(Lancashire Wildlife Trust group, Chorely, Lancs, pg295)

Kirsty: I think we should be moving away from that now and onto renewable energy.
Moderator: So there is this idea that just because it was acceptable in the 1950s –
Kirsty: Why should we need it? And if you've done damage then, why should they do more damage now?
Janet: It's different now as well, isn't it? So you should be more informed, anyway, given that the technology in comparison with what they had in the '40s for instance, you'd think they'd be more informed on the risks or what the potential damage could be.
(Mothers with young children, Newcastle, pg190)

These comments are in response to the implicit suggestion made in the Royal Society & the Royal Academy of Engineering (2012) report that because the magnitudes of the seismic events experienced in the North-West are comparable, if not slightly below, those that were associated with the UK coal mining industry historically, then they represent a socially acceptable risk. The first two comments pose the question whether, because something has historically been acceptable, it should remain so *ad infinitum*. The participants suggested overwhelmingly that this is not, and should not be the case. The third comment suggests the social acceptability of risk might vary through space as well as time. The fourth comment offers the explanation that these days citizens are better informed, or have more resources and opportunities to inform themselves. When this greater capacity to access and digest information about environmental and health risks is not accompanied by a greater sense of agency; alienation, controversy, mistrust, and even fatalism are likely to emerge.

In summary, it was suggested that participants concern over the risks was complex and influenced by embodied and local experience of perceived dangers; the ability to see, know, and quantify those dangers; the legal and regulatory frameworks charged with managing the danger; extant trust and senses of agency in relation to those frameworks; and the material qualities of the dangers themselves. It was suggested that fracked unconventional gas represented 'matter out of place' and that in the UK earthquakes were seen as the unnatural result of human arrogance, complacency, and meddling. Furthermore participants narratives about 'fracturing foundations' were presented as a metaphor for uneasiness with both the social and environmental ills seen as likely to be produced by fracking, as well as with troubling the fragile relationship between society and its surrounding environment. Respondents also saw the relationship between water and fracking as highly problematic. Furthermore, participants, particularly those in Lancashire, reflected on the possibility of the industrialisation of the landscape around them. Finally

participants criticized what they saw as shortcomings in the dominant risk discourse. Scale-up of risk, the long-term lifecycle of risks, and thresholds of social acceptability were seen as either only partially considered, or illegitimately presumed. It was suggested that the dominance of a risk-based approach, combined with the frequent simplification and mis-categorisation of public concern as being about "the risks" was itself responsible for at least a degree of unease. The comments presented in this theme could form the basis of a condition of humility (see Jasanoff 2003 for a critique of 'technologies of hubris', and an exploration of possible, alternative 'technologies of humility'). This condition would call for risk to be thought of in localised and situational contexts where vulnerability and acceptability are contingent on social and hermeneutical processes, as well as technical facts. Moreover, this condition deems necessary the acknowledgement that "rather than seeking monocausal explanations, it would be fruitful to design avenues through which societies can collectively reflect on the ambiguity of their experiences, and to assess the strengths and weaknesses of alternative explanations" (Jasanoff 2003: 242). UK survey research has found that publics strongly associate fracking with seismicity and that the association with water pollution/contamination is far less coherent or emphatic (Britain Thinks 2012; O'Hara et al. 2013). The materialities of these dangers and the metaphors and narratives used to give meaning to, and articulate concern about the risks, as well as the extent to which risk discourse can provide a complete understanding of their 'acceptability' or otherwise, and the role this plays in structuring concern, all require further consideration however.

4.6 Lay Appraisal

This theme includes comments that contend the exploitation of unconventional fossil fuels constitutes either a sensible, or an unwise decision, in the context of responses to climate change and energy "crises". Comments in this theme also reveal the logics or priorities seen as essential in arriving *at good decisions* for *good reasons*. Some participants viewed efforts to respond climate and energy "crises" as almost mutually exclusive, whereas others subscribed to the idea that tackling environmental problems and ensuring sufficient energy supply could be reconciled. On the whole, questions of energy futures were seen as dilemmatic; whereby no single choice or mix of options was seen as completely satisfactory with each source of energy seen as having drawbacks, and relational; whereby options' relative merits were weighed up against each other and the emphasis placed on a diverse mix. Furthermore options were often thought about in local and embodied ways. It was often pointed out that a 'national' debate may overlook local specificities that may

make certain sources more or less conducive to supply sufficient, affordable, and sustainable energy. Energy production and supply infrastructure was often thought of in terms of which participants thought would blight the landscape least or which they would rather have 'on their doorstep'. For some, often despite reservations, unconventional fossil fuels seemed like the lesser of two evils, or more accurately the lesser of a group of evils. This was sometimes in relation to renewable energy, justified through either severe doubts about the current capacity and likely future capacity of renewable sources, or senses of helplessness, fatalism, or insignificance about global efforts to respond to climate change. In the answer below unconventionals are described as preferable to nuclear energy and therefore presumably acceptable as a substitute for either existing capacity, or future increases in nuclear capacity:

Grace:	Yeah, Robert said if we're talking about nuclear energy and fracking, yeah, I think I would have to go for the fracking if it was going to be on our doorstep and we had no choice. But neither of them enthuses me anyway at the moment.
Moderator:	The lesser of two evils again.
Grace:	Yeah.
	(History society members, Nottingham, pg238)

Unconventional exploitation was also seen as a good option, if not unproblematic, in the context of fears about the increasingly competitive 'fight' to secure increasingly scarce resources seen as being likely, if not inevitable at some point in the medium to long-term future. For those that subscribed to the likelihood of this scenario increasing prices and struggles to "keep the lights on" were concerns. These fears were often exacerbated by doubts about renewables and our ability or willingness to reduce consumption or increase efficiency. The promise of a domestic unconventional supply appealed to participants with both doubts about the capacity of domestic renewable sources and relying too heavily on imported fossil fuels:

Alex:	Security of supply.
Moderator:	And what's your fear in having unsecure…?
Alex:	This country is a net importer now, isn't it? Look at gas.
Sam:	We had two days left last week [in reference to the news story 'Gas price warning as cold March leads to shortage in supplies', Harvey 2013].
Alex:	We are economically held to ransom, potentially. So the prices you pay now are nothing compared to probably what they're going to be or could be.
	(Lancashire Wildlife Trust group, Chorley, Lancs, pg299)

It should be noted that exploiting unconventionals was rarely seen as compatible with efforts to mitigate the worst consequences of anthropogenic climate change. The transitional fuel argument, in particular, where unconventionals are presented as an opportunity to phase out coal whilst buying more time for the refinement of renewable

capacity, and therefore a positive climate change response, was often seen as highly problematic (for reasons expanded upon below). Instead participants that on balance saw the exploitation of unconventionals as a good option were almost exclusively unconvinced about whether to invest, personally, in the climate change mitigation agenda. To clarify, doubts about global environmental change were rarely expressed in terms of the science, but rather in terms of senses of remoteness, abstractness, insignificance, fatalism, and alienation. It would be a simplification to suggest that the fracking and unconventional debate is merely a proxy debate about climate change, however for some participants CH4's greenhouse gas status meant that unconventionals simply seemed to be a step in the wrong direction, the avoidance of a decision, or indicative of political inaction on the issue - for them, climate change was the bottom-line. In other words many participants, whether broadly concerned or hopeful about the prospects for unconventionals, found it hard to reconcile the exploitation of unconventionals with responding to climate change. There were very few voices that were both exited and hopeful about fracking and unconventionals and persuaded by, and committed to, the need to respond to and mitigate the worst effects of anthropogenic climate change.

Charlie: So the downsides are earthquakes, contamination of groundwater and the upside is burning more fossil fuels.
(History society members, Nottingham, pg234)

Charlie: My point of view is that I question the actual end reason for it anyway, which is just more CO2 emissions. It's just, like, you're going down a road which is just a stupid thing to go down.
Moderator: Okay, this is all by the by, because the bottom line is...
Charlie: Exactly... the means don't seem to have any use.
(History society members, Nottingham, pg229)

Even taking the unresolved "risk" issues out of the equation some participants had fundamental problems with the ultimate 'ends' of fracking and unconventionals. There was an interesting contrast between groups on this point. For the History society members group from Nottingham the immediate risks of contamination and seismicity, for now at least, seemed remote, perhaps due to the overwhelming focus of industry operations in Lancashire and Sussex. They preferred to focus on the 'ends' rather than the 'means' and on balance that group decided regardless of the uncertainties surrounding contamination and seismicity, unconventionals perceived likely relationship with climate change was ultimately prohibitive. For example: "the upside [a fossil fuel] is something that I don't think is actually worth it in the first place" Charlie, pg235). This is in stark contrast with the Parents of children at university group in Oldham who had very little interest in discussing, for them, a global and abstract issue, and preferred to continue discussing the

risks of fracking which were seen as a more immediate, proximate, and real issues. For example: "it's a world thing [responding to climate change]. It's not just to do with England. This [the risks of fracking] is to do with Lancashire. This is why we don't want it. Because it's to do with us. And it's immediate, but everything else they're talking about [climate change] is, it's too global", Paula, pg366). It is certainly tempting to suggest that geographical location was at least partially structuring this contrast.

Some participants worried about the exploitation of unconventionals resulting in a shift of focus, in terms of either attention or funds, away from what they saw as more sensible responses:

Louise: I think we're too fixated on big energy projects. I'd like to see much more around decentralisation of energy supply, so that local communities could generate their own energy, in different ways, small implemented schemes. But you first have to focus on reducing energy use. I think instead of **government policy which is all about generation**, I think we want reduction.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg296-97)

Dan: I think the emphasis has been taken away from trying to reduce consumption, and lowering the need for all this energy, and I think you mentioned earlier about the focussing on just finding new ways to find it and this, that and the other. So having that as a statement, **shale energy is part of the future**, clearly a significant part, then that's what the focus is… that's my biggest concern.
(Lancashire Wildlife Trust group, Chorley, Lancs, pg312)

Anthony: Hmm. And should we be... yeah, so should we be spending lots of money on what is, essentially, a **short-term solution** when we could be spending more money on a longer-term solution that would have longer term benefits, rather than wasting x millions of pounds on this, which is only going to last, say, 30 years. Whereas if you're spending it, again... refining the idea of solar energy that's going to last a lot longer.
(History society members, Nottingham, pg240)

Charlotte: But if they're prepared to spend all of this money doing all this research and development and all that on that, why can't whoever it is that's investing invest more money in kind of like solar?
Kirsty: Solar.
Charlotte: Do you know what I mean?
Moderator: So you think it's just going down completely the wrong route?
Charlotte: Yeah. I do, yeah.
(Mothers with young children, Newcastle, pg192)

The first comment worries about government policy which Louise sees as overwhelmingly about matching demand rather than about trying to curtail it, either through improving efficiency or lowering consumption. Louise is also concerned by a perceived preference for grand infrastructure projects and fears this works against small-scale, decentralised, community-based schemes. The second comment is concerned with the phrase 'shale gas

is part of the future' which was included in the 2013 Budget speech by UK Chancellor of the Exchequer George Osborne (HC 2013 Budget, Chancellor's Statement 20 March). Again the concern is the perceived imbalance in a strategy seemingly focused on securing increased supplies. The final two comments share the belief that unconventionals seem to be an unwise option because they are seen as a short-term solution, a quick fix, papering over the cracks, offering temporary but ultimately superficial respite, or delaying difficult but inevitable decisions and actions. As such they're perceived as wasting time we don't have, as a possibly risky investment, and as starving potential longer-terms solutions of focus. Unconventional's perceived 'short-termness' was partly down to their finite nature:

> Sam: I just think, long term, in the grand scheme of things, it's nothing, is it? …And is it worth potentially wrecking pristine areas or sites?
> (Lancashire Wildlife Trust group, Chorley, Lancs, pg319)

Unconventional's perceived 'short-termness' was also partly down to the overwhelming rejection of the 'transitional fuel' argument. Shale gas, for instance, most participants believed, would not offset CO2 emissions by replacing coal-fired generation, but as has been the case in the US (Broderick & Anderson 2012), would (in global terms) be burnt in addition to that coal, as rather than being left in the ground the substituted coal is simply burnt elsewhere. Further there was a lack of trust in our ability to 'finish the transition', particularly if fears over the risks of fracking had at that point seemed to have been over-emphasised.

> Alex: My worry about climate change is that instead of using this to substitute for… we're just going to use it as an additional thing, oh whoopee, we can use more energy.
> (Lancashire Wildlife Trust group, Chorley, Lancs, pg314)

This was part of a broader criticism of the exploitation of unconventionals about the fear it might exacerbate or prolong 'the hubris of abundance', that is the fear that newly accessible unconventionals might compromise or dilute the rationale to make the transition to lower carbon energy sources in some way:

> Charlie: But it's still only pushing it back. Essentially, you're still only delaying the inevitable, aren't you?
> Moderator: Uh hum, but if you delay the inevitable by a significant period of time, you know...
> Charlie: We're in a position, luckily, where we might have peak oil before it's too late. It's like having a drunk at a bar that only has one bottle of whiskey so he can't kill himself with it. But then he finds two more behind the bar and can carry on then kills himself. It's quite handy; it's a goldilocks moment we've actually got peak oil. So we can actually be forced to stop destroying the one planet we've got that we live on.

Moderator: So… that was going to force us to make a decision, it was going to be an awkward and a difficult decision, but…
Charlie: Yeah, change is always... because of necessity it's an imperative, isn't it?
Moderator: And so taking that imperative away would presumably...?
Charlie: Taking the imperative away means we carry on drinking the whiskey until we die of alcohol poisoning.
(History society members, Nottingham, pg240)

Here an idea like 'peak oil' is seen instrumentally as a timely impetus to sharpen minds and galvanise action. In other groups high energy prices were described as a necessary evil, or the need for an 'Armageddon scenario' was discussed as an essential galvanising force. This speaks to a profound lack of confidence in the ability of governments and societies to respond adequately to climate change without being forced to do so by some external shock. In this context, this newly available tranche of fossil fuels was seen as a dangerous distraction for governments and societies all too easily seduced by, and dependant on, its familiarity and convenience - hence 'the hubris of abundance'. The analogy in the comment above from Charlie, which likens this relationship to that of an addiction and talks of poison and self-destruction is a strong and emotive expression of deep disappointment and frustration. This externalized threat, imagined or real, strategically evoked to spur us on to avoid its realisation is consistent with Dupuy's (2010) notion of 'Enlightened Doomsaying':

> "[v]ery much in keeping with the laypeople's notion that things will inevitably end up in tragedy: Only by pretending to believe that our destiny is the self-annihilation of humankind we might be able to avert it" (Dupuy 2010: 169)

'Alarmists', by ensuring we can't forget the existence of the threat, aim to avert the accuracy of their fears (Jonas 1984, quoted in Dupuy 2010). For Dupuy, the alarmists' visions of a dystopian fracked landscape, rather than assurances of manageable risks, hold a greater chance of avoiding the threat. 'Enlightened Doomsaying', then, is a strategy of instrumental proximity to a threat, or a worst case scenario, as self-refuting prophecy. It is therefore consistent with the concept of slowing-down and the precautionary principle as an insistence on the acknowledgement of the potential of catastrophe as part of the social appraisal of technological choices, followed by the insistence that this acknowledgement galvanises action and prompts scrutiny.

Finally participants also set out the priorities and logics that they would deem to be behind good decisions for good reasons.

Dan: Yes, it's all relative to our expectations.

Karen: But people**, I think, ought to be able to live in dry, warm houses.**
Dan: **Yes, of course they should.**
(Lancashire Wildlife Trust group, Chorley, Lancs, pg293)

Moderator: I'll play devil's advocate I suppose, are we not missing out on an opportunity there?
Alan: Well, it's not going anywhere is it?
Moderator: Okay….
Trevor: Well, it's not like a decision you've got to make now. It'll still be there.
Alan: You're right, yeah…
Paula: We don't have to take an opportunity, do you? **It's a choice**.
(Parents of university students, Oldham, pg360)

Trevor: I think just to **slow down**, you know… it's about getting something that's got some longevity.
(Parents of university students, Oldham, pg346)

Alex: And **at the moment it's economic growth over the environment**, every time. It's we need to grow, we need to grow because of this, this, and this, and at the moment sod the environment, we need to push forward, and a comment was made last week at a meeting about this, "Let's go back to the old great crested newt thing, it's lorded as a barrier to development," and then someone said, "Show me a development that has been stopped by a great crested newt and I'll buy them a pint, because there isn't one."
(Lancashire Wildlife Trust group, Chorley, Lancs, pg303)

Kirsty: Because we borrow it from our kids, don't we? We borrow the earth from our kids and my daughter hopefully she'll have children, and if we don't do a bit...
Caroline: **What's going to be left for them?** Yeah.
(Mothers with young children, Newcastle, pg172)

The first comment sets out a modest dual-goal. That in our attempts to responds to climate change there are minimum energy needs, we could say rights, which ought not need to be compromised. The second comment sets out that there should be a choice. That as part of a deliberation about the merits and drawbacks of fracking and unconventionals, they should be weighed up against a list of alternatives, and that the result of a debate should not be a foregone conclusion or have a sense of inevitability. The third comment sets out that such debates and decisions should not be rushed and should have a long-term focus in order to try and prevent the storing up of future problems and complications, or a 'one step forward, two steps back' dynamic. The fourth comment sets out that despite the undoubted importance of economic rationales they should not automatically trump other legitimate concerns every time. That there should be the possibility that occasionally the fate of the great crested newt would take precedent over economic interests or concerns. The final comment sets out that the interests of future generations should hold weight in today's discussions.

In summary, participants saw debates over energy and climate futures as dilemmatic and relational. Many participants often spoke for the relative merits of domestic

unconventionals, with energy security, domestic production, and shorter transport distances seen as their main benefits. However, on balance, the majority of those who were willing to accept unconventionals as a good response to any looming energy 'crisis' were only able to do so because abstract and global environmental discourse left them feeling alienated. On the other hand those that were persuaded by environmental politics found it impossible to reconcile the exploitation of unconventionals with an adequate and meaningful attempt to respond to climate change threats. The transitional fuel argument, an attempt at just such a reconciliation, was viewed in particularly problematic terms linked to the findings of the trust and 'culture of exploitation' themes. There were concerns about the coherence of the government's message and the perceived potential of unconventionals to distract and foster complacency. Phrases like 'quick-fix' and 'putting off a decision' were popular to articulate fears of 'the hubris of abundance' and the need for an external force to guard against complacency, foster will, and galvanise action. Finally participants suggested a series of logics and priorities that they thought should be informing discussions and decisions, but detected that they perhaps were not or will not. These logics could be synthesised into a condition of appraisal through which perceived inevitability is challenged, as well as the privileging of technical knowledge over democratic ideals, and economic rationales over lay ethical judgement. This would require open-ended appraisal methodologies that do not *a priori* privilege certain pathways over others. The focus would be on process rather than outcome where the reasons, logics, values, and assumptions behind choices would be rendered explicit and opened to scrutiny. These findings expand considerably on survey research focusing on public perceptions of the 'cheapness' of shale gas and of whether shale gas will result in higher or lower greenhouse gas emissions (O'Hara et al 2013).

5. Conclusion

Hannah: Well if you think, the film, Erin Brockovich.
(General agreement)
Emily: That's what, pollution and all the people had cancer and all the stuff like that and it had been going on for years, and obviously because the corporation was so massive they just tried to buy them off… and they've already done it [fracking] in this country anyway, haven't they… it'll be hindsight. Ah well, maybe we shouldn't have…
Hannah: Yeah.
Moderator: So Emily, from what you're saying would you prefer a kind of cautious approach?
Emily: Well yeah, I mean we are probably going to have to do something like this I would imagine if they're looking for other ways [to supply energy], but I think you'd still have to kind of go down every avenue to make sure it's not going to affect people because it's the same as everything, it'll come back and it will have affected somebody and then they'll be a huge case over it and it'll be hindsight. (Mothers with young children, Newcastle, pg194)

In the quote above, the film *Erin Brockovich* (*Erin Brockovich* 2000) is raised as not just a point of comparison or seeming similarity but as a fabalistic note of caution. In the film, which is a dramatisation of a real legal case, a 'plucky' young mother with no formal legal qualifications (expertise, we could say) takes on an energy corporation trying to bury the fact that corner-cutting and regulatory failure have caused environmental damage and severe human health impacts. Again, the morality and narrative of the film are there for all to see. The way the film is invoked here is in-line with the often-expressed fear that fracking might represent some sort of Pandora's Box (see Davies and Macnaghten 2010), that if something can go wrong then inevitably, eventually, it will. There's a slightly different sense of inevitability here too, a sense of almost resignation in the face of apparent repetition. Far from a novel story fracking seems all too familiar. It seems here that, paradoxically, uncertainty and ignorance mean that publics fear they already know how the story ends. One of the few certainties is that "the language of certainty no longer reassures" inversely "it now connotes arrogance, insensitivity, and an inability to learn" (Hajer 2009: 29). The perception that fracking represents the same old story, with the same old characters acting in the same way - along with the ever-present themes of trust, alienation, exploitation, the under-acknowledgement of uncertainty, and the marginalisation of lay perceptions of risk discourse and of lay judgements on technological choices and their underlying motivations - mean policy actors are more likely to encounter public resignation than public acceptance, if not a degree of continued uninvited public intervention into the debate.

This thesis has argued that the institutional response to hydraulic fracturing and the exploitation of unconventionals - as characterised by a risk assessment approach built upon a conception of facts as rigidly separate from values; an often apparently reactive approach to governance and regulation that makes broader explicit, deliberate, and inclusive social and ethical appraisal of emerging innovations difficult, if not impossible; and early signs of an instrumental approach to public engagement envisaged as involving the establishment of one-off, highly circumscribed, tilted forums where the (pre)established facts are presented to publics whom then, it is assumed, fall into line - is likely to exacerbate rather than alleviate public unease. It also argued that a deliberative focus group methodology was able to illuminate these failings and their role in exacerbating or even creating public frustration; and elicit not just public responses to fracking and unconventionals, but underlying factors structuring public responses. Finally, it was argued that group and individual responses fell into six distinct but related themes, each of which could form the basis of a condition upon which 'conditional acceptance' would be contingent.

In general, participants' responses were complex and regularly highly sophisticated. Concern was rarely simply or singularly about perceived danger or risk alone, the broader social and political context was crucial too. In the absence of expert knowledge and technical vocabulary, and in the context of complex contingencies and areas of uncertainty and ignorance, public judgements often concerned the "beliefs, desires, feelings, inner dispositions, skills" (Dupuy 2010: 154), and other factors that determine research, commerce, and policy agents to act.

The six conditions of acceptance put forward here, are as follows: i) Representation: the necessity for publics to be given the space and opportunity to deliberate the issue (e.g. public engagement), possibly arrive at a degree of consensus over the constitution of public interests and values, and influence the decisions of representatives (i.e. the invigoration of the relationship between represented and representative). ii) Redistribution of Expertise: the necessity for publics to be given the space and opportunity to shape the scope, direction, and pace of innovation if the development of that innovation is sufficiently 'upstream' to facilitate this. Otherwise, as is the case with fracking, the necessity for publics to influence risk assessment and management practices, including questions of institutional and expert framings and the limits of present scientific risk knowledge. Furthermore, the necessity for a scientific culture that is responsive to public (invited or uninvited) scrutiny, values, and interests more generally (i.e. the invigoration of the

relationship between laypeople and experts). iii) Justice: the necessity for public values concerning ethics, fairness, and equity to influence both the direction of innovation at an upstream phase, and the conditions of application and 'culture of exploitation' at a downstream phase. iv) Precaution: the necessity for uninvited controversy and concern over innovation to prompt scrutiny and debate over both questions about the limits of present scientific risk knowledge related to an innovation and its potential consequences; and questions about the normative visions, values, and assumptions embedded in an innovation. v) Humility: the necessity for scientific risk knowledge to be envisaged as making an invaluable contribution to such debates, but not as defining, dominating, or determining such debates. And finally, vi) Appraisal: the necessity for technological choices of this importance to be subjected to a process of deliberative appraisal and scrutiny. This appraisal process would need a particular focus on rendering explicit the human and environmental values embodied in an innovation or a range of possible technological pathways, and in so doing open these choices to deliberative political engagement.

The first three conditions (representation, redistribution of expertise and justice) are consistent with the task Callon and colleagues term 'the democratisation of democracy' (Callon et al. 2009). This task involves moving from the double delegation, those between citizen and representative, and between layperson and expert, to dialogic democracy. That is the 'never-completed undertaking' of 'the double exploration of possible worlds and of the collective' (Callon et al. 2009). This double exploration challenges the monopoly of experts over the state of knowledge and the monopoly of representatives or spokespersons over the definition of the constitution of the collective (that is, relevant stakeholders). This means "[a]ccepting the participation of groups in the composition of the collective, and agreeing that the list of these groups and the way in which they define their identities may fluctuate", and "[t]olerating the multiplication of sources of problematization" (Callon et al. 2009: 136). In other words, the emergence of concerned groups prompted by a technological innovation is a valuable contribution to democracy, governance and the production of knowledge. The views of publics, including their very nature, should not be *a priori* assumed before they have been given the opportunity to be voiced. Once voiced these public views should remain open to dissent and negotiation. Also, once voiced, these public views should be represented. If they are established at an upstream phase of innovation these public views should help to shape the direction and purpose of that innovation. If further downstream, as with fracking, these public views ought to prompt the

scrutiny of expert assumptions, values, and definitions, and thus prompt more robust and substantive risk-assessment. At this downstream stage these public views should also prompt a broader set of questions beyond those of feasibility and safety, to include questions about whether the technology is or could be reconcilable with broader values and social-environmental aspirations, and how it compares with alternative options, thus prompting deliberative technological choice. The first three conditions call for the will and the procedures to accommodate these explorations, 'problematisations', and prompts.

The latter three conditions (precaution, humility and appraisal) call for what Stirling terms the transition 'from Enlightenment to Enablement' (Stirling 2010). This transition involves acknowledging that innovation is essentially a matter of societal choices, albeit choices that are driven by multiple factors, complex contingencies, diffuse and myriad decision making processes, and the exercise of power (Stirling 2010). Innovation, is not therefore a succession of 'Eureka' moments forming an unwitting linear arc of progress. As such this transition seeks to improve the deliberative and democratic nature of social technological choices. Firstly, if technological choices are, at least at an early stage, essentially malleable, then the direction and purpose of innovations can be guided by public interests and values. Secondly, in the absence of guidance from deliberative public values and interests, are these malleable choices not in danger of being unduly influenced by either powerful political, economic and institutional interests or simply by habitual underdetermined preference. And if so, is there not a risk that these technologies may be incompatible with public interests and values. This is why social appraisal of technology emphasises the need for "a general discipline in technology choice, under which environmental and human values are rendered more explicit and transparent and the intensity and orientations of commitments become a matter for deliberate political engagement" (Stirling 2010: 10). If the first three conditions call for the will and procedures for the 'democratisation of democracy' then the latter three call for concepts and strategies necessary for the (acknowledgement of the) 'politicisation of technology'. That is, the call for explicit acknowledgement and intentional deliberation of technological choice, limits to knowledge and understanding, and the normative visions and agendas shaping 'progress'.

Important areas for future research include the mediatisation of this issue, particularly via the internet and social media. There are important questions about how this debate is organised, formulated and played-out online, and about how this might present

opportunities (or pitfalls) for new forms collective deliberation which were not addressed in this study. Secondly, this study has presented the argument that there is a gap between the ways in which institutional actors and publics are framing the issue. In order to explore and substantiate this argument further stakeholder interviews with industry, policy, and expert actors may prove insightful. Furthermore this study has focused on the North of England for sound theoretical reasons. However since the research was conducted protests near Balcombe in West Sussex have opened up an intriguing (if occasionally embarrassing) social dimension of the debate in the UK, centred on a perceived North/South divide. Further research comparing the nature of public responses and concerns between the "North" and "South" would make a valuable contribution to the understanding of this geography that is specific to the UK debate. Finally Felt et al. (2008) point out in their critique of public engagement practices that treating such discussions as one-off snapshots is likely to underplay the emergent and dynamic nature of deliberation and judgement formation. Therefore research that revisits participants several times over the course of a longer-term project, whether those participants are general members of the public or already embroiled concerned groups, to chart the emergence of the debate, may provide a more detailed understanding.

Appendices

Appendix 1 – Topic Guide

Topic Guide

Briefing

Introduction - Me and my research - how it will run, no arguing, not a test, all about your opinions and experiences, no right or wrong answers etc…

Explain about recorder – data protection, anonymity etc

(5mins) **7.05**

Section 1 (no board) – Energy

Energy, Priorities and the Future

When I say energy, what comes to mind?
- What problems or benefits do associate with energy?
- How would you describe your/our relationship with energy?

Does the question 'where does my electricity come from' ever play on anyone's mind?

Do you see this issue as being important to you personally and why?

Does anybody ever notice stories about energy in the news?
- Energy industry specifically?
- How do these stories make you feel?

(30mins) **7.35**

Section 2 – Keeping the lights on

Choices, Strengths and Weaknesses

What types of energy can you name?
- What do you think about each of these (+ves/-ves)?
- Which of these would you like to see exploited in the future and why?
- What factors do you think it's important to prioritise when making these decisions

What about using less energy through increased efficiency or lower consumption, has anybody ever tried to do anything like that?

I have a hypothetical question for you, if tomorrow a vast new supply of fossil fuels was discovered underneath Britain that could be commercially exploited what would you make of that?

- What sort of questions would you want to ask before deciding whether or not you'd support its exploitation?

(50mins) **7.50**

Section 3 (board 1) – The technique of 'fracking'

'Fracking' & Initial Impressions

Has anybody already heard of hydraulic fracturing or 'fracking'?

What are your initial impressions?

Do you have any questions?

(55mins) **7.55**

Section 4 (board 2) – "A Golden Age of Gas?"

Unconventional gas, potential benefits, and personal relevance

On this board there are some big claims about unconventional fossil fuels (golden age, game-changer, power the world, wonder gas etc), do you see it as such a big issue?

How do you feel about the opportunities presented on this board (security, economic etc)?

- What do you think it might mean for you?
- What about society in general?

Do people feel optimistic about what they see here?

(70mins) **8.10**

Section 5 (board 3) – Hazards and Risks

Hazards

Talk them through the various risks. Does anything on here concern anybody?

- Do people agree/disagree
- What on this board concerns you the most? And why is that?

Science and Regulation

Talk them through groundwater/seismicity debates. How do you feel knowing that these uncertainties exist?

- Do people agree/disagree
- What should we do until we have more definitive answers (precaution vs. trial and error)?
- Do you think we will eventually have definitive facts (not easily measured, unknowns/surprises)?
- When you see disagreement among experts how does it make you feel?
- How do you decide who to believe/trust?

Key Questions

Given everything we've spoken about, what are the key questions you would want to ask before deciding whether to exploit shale gas?

Are you happy about how an appropriate level of 'safety' is being decided (RS & RAoEs)?

Do those potential benefits seem worth these potential risks?
- Why?
- Is this a good way of making this decision?

(90mins) **8.30**

Section 6 (board 4) – Unconventional Gas: Tomorrow's Energy Source?

Climate Change

When thinking about how you feel towards hydraulic fracturing and unconventional gas how important is climate change?
- Is this "part of the future"? (Osborne – budget)

Talk people through 'transitional fuel' and 'baseload fuel' and counter arguments from Tyndall Centre and Greenpeace. Do you think we can exploit shale gas and respond to climate change?
- What do you make of our ability to 'finish' these transitions?

Peak Oil

Is peak oil a phrase anybody's heard before?
- If not explain
- What do you think about peak oil, does it scare you?
- What do you think about the idea that hydraulic fracturing and unconventional gas might push peak oil back and make it a less pressing concern? Are you reassured/worried about that?

Trust & Scepticism

We'll move to the right hand side of the board now. Explain lobbying story. Does this sort of thing concern you? Why?

Explain Gulf of Mexico/ Halliburton connection. What do you make of this story? How does it make you feel in relation to hydraulic fracturing?

Explain Halliburton loophole. How does this story make you feel? Can you imagine something similar happening in the UK? Why is that?

Explain British gas story. Does this story affect how you think about the possibility of lower gas prices? Do you think you'll see any of the benefits? What or who could change your (pessimistic) view? Who do you think might benefit the most from this? Will they be the ones who have to live with the risks?

Explain Duetsche Bank reasons. What do you make of this idea? If you contrast this to the optimism on the second board – how do decide who to believe?

Concluding questions and impressions

If this is part of the future, what sort of future do you imagine that being?

- Is it a future you're looking forward to being a part of? Or does it concern you?
- Is it the direction you personally would favour?

Do you think we, as a society, are well placed to make a sensible decision on this issue?

- Who will be making this decision? Who should be?
- Would you say you trust these decision-makers (politicians – also industry, science, regulators, even NGOs) to act for the 'right reasons'? What are the right reasons? Do you feel dependant on their knowledge and decisions? How do you feel about that?
- Do you think these groups have made good decisions for good reasons in the past?

Is 'fracking' to exploit shale gas a good idea? What more would you like/need to know in order to make wise choices?

When you think back over everything we've discussed today. What, if anything, made you feel most concerned? And similarly, what, if anything, made you feel optimistic?

(115mins) **8.55**

Debrief

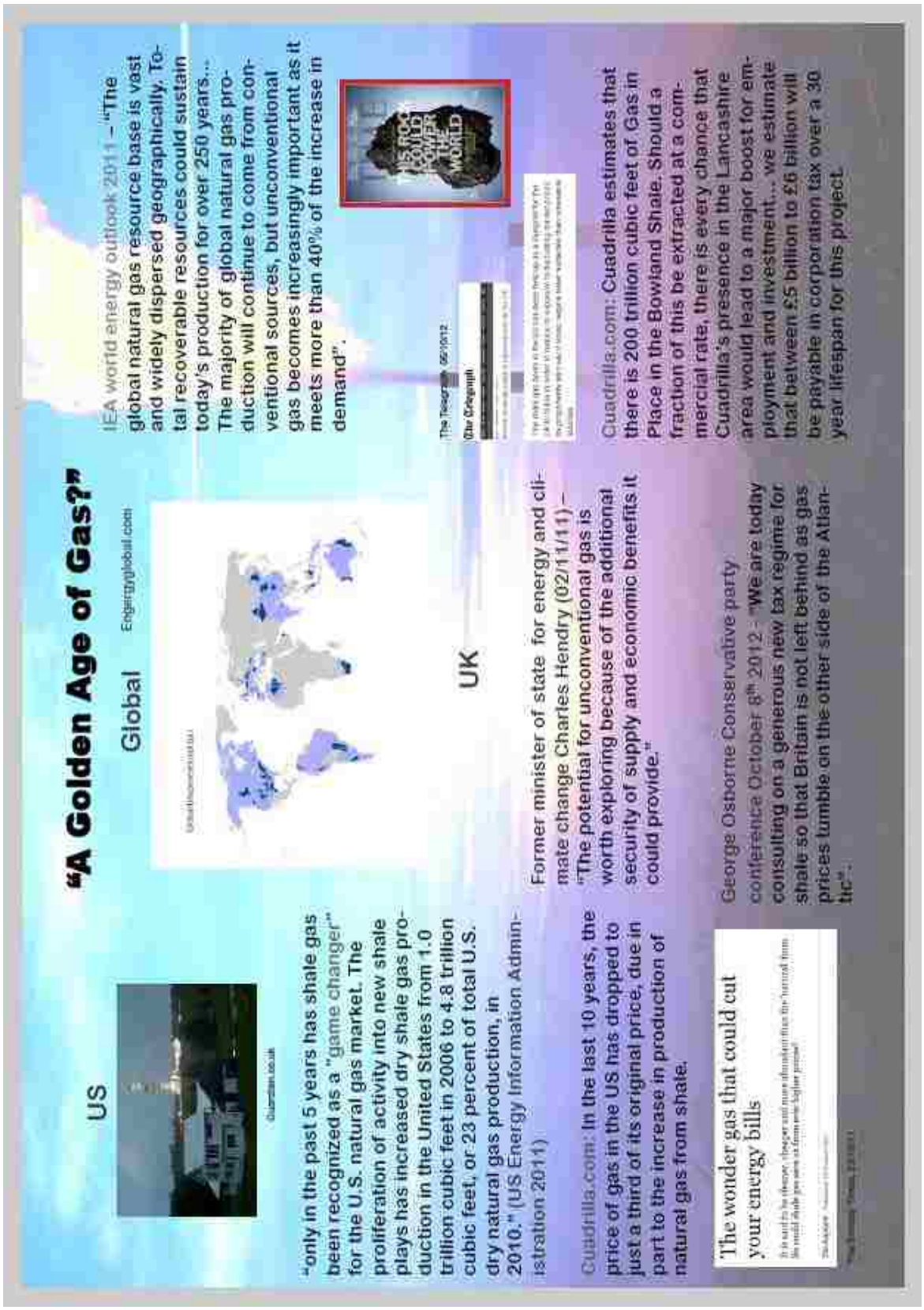
Thank them for participation. Brief description of my research. Any questions?

Here's my email address, if anybody has any queries at a later date, or would like to discuss my research, feel free to contact me. If you'd like to read a summary of my thesis jot your email address down on this sheet.

(120mins) **9.00**

Appendix 2.1 – Concept Board 1: "The Technique of Hydraulic Fracturing"

Appendix 2.2 – Concept Board 2: "A Golden Age of Gas?"



Appendix 2.3 – Concept Board 3: "Hazards and Risks"

Appendix 2.4 – Concept Board 4: "Unconventional Gas: Tomorrow's Energy Source?"

Appendix 3.1 – Transcript Group 1: Allotment owners

Interviewer: What will do is we edit them, take your names out. And any sense of personal material but I don't really anticipate that's going to happen. Thank you. Sorry about that. And then if like you use the words that are said, anything like, even like rhesus or research paper that we come to write from these groups, this is the first of six, by the way, we'll be using pseudonyms, attributing quotes to pseudonyms, so it won't come back to you basically, that's all the data protection, so. All right, so, without further ado, let's get down to the conversation to do with energy. Just by way of an icebreaker, I'm sure you've all been kind of mingling in that room before so if we could maybe go clockwise Male A, starting with you, if you could just say quite briefly when you hear the word "energy" what that brings to mind.

Male A: Heat.

Interviewer: Heat?

Male A: Heat, straight away.

Interviewer: Heat straight away. And how about you?

Female B: Price rises.

Interviewer: Price rises, okay. Yeah, is that something that everybody can?

Male A: Of course.

Female B: Yeah.

Interviewer: Oh, right, oh okay. And Male C?

Male C: Along with price rises and how much it'll cost, running your house and stuff, yeah.

Interviewer: Yeah, okay, similar.

Female D: Worry.

Interviewer: Worry?

Female D: Yeah.

(laughter)

Female D: How much it costs to run your home, yeah, it's money, yeah.

Interviewer: Money. And Male D? Other Male D so, we've got two [name]?

Male D: The future really as well.

Interviewer: The future? How so?

Male A: What's going to happen, how we can survive and all this.

Interviewer: Okay, keeping the lights on, that's a phrase you hear from time to time.

Group: Yeah.

Interviewer: That sort of thing.

Male E: The car, driving the car, getting electric.

Interviewer: So worries to do with always having abundance? Would that be accurate?

Male C: Probably yes.

Interviewer: I don't want to words into your mouth, but, what sort of -

Male E: The answers to these, what, is it a high region, is it oil or gas, you know?

Interviewer: Okay. We'll be talking about use of things actually.

Male E: Right okay.

Interviewer: We'll come onto that.

Male F: Cost first of all. The longer term it has to be for the future generations, where will they get their energy from and how would it be produced and what from?

Interviewer: Okay, yeah, interesting.

Male F: Just this, resources of earth, where would they, where would they come from?

Interviewer: Okay. And, sorry your name?

Male G: It's [name].

Male A: The wind or nuclear. Which way do you go?

Interviewer: Wind or nuclear, what do we get?

Male A: Yeah.

Male A: Yeah, which way would you go?

Interviewer: Which way would I go?

(laughter)

Interviewer: I don't know, I guess, I know what you know.

(laughter)

Male A: They've just now, they've just said they're going to build a new nuclear power station. And there's guys down there saying no, no, don't build it. Are they going to go up to these little villages and say don't, there, and not put the windmills up?

Interviewer: Yeah.

Male A: You can't have nuclear and the windmills all over the countryside. Could they?

Interviewer: The government would.

Male A: No, they just don't like it the government. The people that don't want nuclear want all the windmills.

Interviewer: Yeah.

Male A: Makes no sense, doesn't it?

Interviewer: Difficult choices?

Male A: Yeah.

Interviewer: All right, that was really interesting actually, I mean I wasn't necessarily anticipating it quite, well in a sense I was. It was quite negative, quite concerned, quite worried. What about, so we're worried about that we're going to have enough energy, what about more broadly energy as this kind of thing that enables us to do what we want? So is kind of to be assumed that that's a good thing, that we need it? That it helps us in our day to day.

Male G: You can't do without it.

Interviewer: You can't do without it, exactly.

Male G: More and more everything's just electricity.

Interviewer: So –

Male G: You can't do a single thing without electricity.

Interviewer: Yeah.

Male G: You stop that the world will just grind to a halt, wouldn't it?

Interviewer: Yes, pretty much.

Female D: Hmm.

Interviewer: And so it's this enabling thing, would everybody go along with that? Obviously I think that's probably?

Male A: Yeah, well it depends on what you're talking about energy.

Interviewer: Yeah.

Male A: You take food in to give you energy to do what you want to do. It's not just electricity, is it?

Interviewer: Yeah, no.

Male A: Energy's a big thing, innit? (laughter)

Interviewer: Yeah. So, does anybody feel there are worries for the future and it's this thing that we have to have. There's this relationship of dependence which I think is what's kind of playing on people's minds when they're quite concerned. Would you go along with that Female B?

Female B: Yeah.

Interviewer: And so.

Female B: You've got to have it. And that's it.

Male C: There's present is the word isn't it? It doesn't, you've got to have it. You depend on it, don't you?

Female B: Yeah.

Male C: Years ago.

Female D: You managed without it.

Male C: You managed without it.

Female D: Everything was horses.

Male C: Yes.

Female D: Pulling carts.

Male C: Simple as that. We'd get, I mean not we did it, but people in the past have done it without energy, without electricity.

Female D: Candlelight.

Male C: It's been done, it's been done.

Male E: Well, they're still doing it in Africa, they're doing it South America, doing that –

Male C: It's not just that it's not efficient, but they do it.

Interviewer: So what problems do people see arising from this dependency?

Female B: That if it ends, if the, I suppose the natural oils, gases, that kind of thing ends, what is there out there apart from renewable energy?

Interviewer: Hmm hmm.

Female B: And I don't think many people have knowledge about renewable energy at the moment to, to.

Interviewer: You don't think we have the expertise …

Female B: No.

Interviewer: … to play the role that we might need to? Okay.

Female B: You always assume that renewal energy's going to cost you along the line.

Female D: Yeah.

Interviewer: Hmm hmm.

Female B: You see all these houses with all the solar panels and everything on and you just think that's going to be damn expensive. Would we ever be able to afford to do that?

Interviewer: Yeah.

Female B: To, you know, to afford energy of our own.

Interviewer: Yeah, it's a big upfront cost.

Female B: Yeah.

Male A: When people are saying that about the oil, they're saying they run out of oil. They got them from rape seed and plants now, right? So, if you do it from plants, you're taking away the food supplying to the people.

Interviewer: Yeah.

Male A: And that's when you've got the thing, you'll never go down the mine because you'll get it from plants. But you don't grow cabbages or meat. You growing it for that. So you're going to renew.

Female D: But where's the energy coming from to get the oil?

Male A: It's come from the sun. You grow plants.

Female D: No, to actually manufacture. They take it out of the -

Male A: Oil.

Male C: From the plants to use electricity

Male A: No you don't.

Female D: Whatever.

Male A: You crush it to get the oil.

(overspeaking)

Male G: A crushing machine.

Male A: Yeah, a crushing machine. Yeah.

Female B: Well, what's wrong in that?

Male A: We've been doing to for years before we had electricity. You've had oils from plants.

Female D: Put some meat in my hands. You ain't going to have a sorted -

Female B: You know.

Male F: I think you could do that. You couldn't do it that sort of quantity.

Male A: No.

Male F: Without ever-, without electricity. You couldn't do it in the quantity to sustain, Newcastle for instance.

Female D: Yeah.

Interviewer: So I think there are problems with those ideas particularly and where do you get the land to grow it on? Can anybody think of any other problems that arise from a kind of dependency on energy?

Female B: Well.

Male C: Who's running it?

Interviewer: Who's running it? Can you help, who owns it?

Female D: Yeah.

Male F: It's the water that's the biggest worry, who owns it.

Female H: Well, wasn't there a war when they stopped the oil? Things came to a halt? They didn't have any petrol.

Female B: Yeah.

Interviewer: Is this in –

Female H: The country always goes in to war.

Interviewer: Is this what's happened to you? Is this the three-day week?

Female H: Yeah.

Interviewer: Things like that? Stuff like that.

Female H: Well, that was the coal.

Female D: But even more recently, you know, with the petrol and things.

Interviewer: So, it's interesting because energy's this huge thing that and depending on how cynical you are about these things, but it does inform politics probably on an abnormal scale?

Female H: Oh yeah. We went to war, didn't we?

Male G: Because it was the oil.

Interviewer: Am I going to everything that's out here?

(laughter)

Male G: No, it's true.

Interviewer: No, well, okay.

Male F: It is. If they just grew carrots we wouldn't have been there.

Female H: Exactly.

Male F: It's as simple as that.

Female H: Yes.

Interviewer: I think the interesting is that varies, it's another issue that comes from this dependency when it informs maybe foreign policy and things like that.

Female H: Yes.

Interviewer: So, how about this, this idea of kind of worrying about where your electricity comes from? Does anybody, does anybody get that? Male A, do you get that? No. So when you turn a light switch on it's just there and it's good that it's there?

Male G: I took the light switch and I get a annoyed at the profits that the company are making.

Interviewer: Okay.

Male G: And I mean, the vast profits and a few cartels who own these companies now, in a way.

Interviewer: So what's, so you have a pretty erm.

Male G: I think we're screwed, aren't we?

Interviewer: You have a very negative view of the energy?

Male G: A very negative view.

Interviewer: Aha. And what do you think's fuelling that? Excuse the pun.

Male G: It'll be the profits.

Interviewer: The profits that they're making?

Male G: The company making them. At the expense of the poor.

Interviewer: So you, a conflict of mistrust is the first thing a mistrust of the energy industry in the room?

Male C: Yeah.

Male G: It's all the same. You're making huge, huge profits and the stake goes up.

Male E: Come back to your -

Female D: The last couple of years.

Male F: It's oil banks, you know? So, there's another side, and it won't be the same because I think you're totally right, it's too costly. But there's another side to that. If we get energy too cheaply now, and we use it willy nilly, that's going to cut short the time that our grandchildren, great-grandchildren, are going to be able to have what we've got now.

Female B: Hmm hmm.

Male F: So it's got to, it would, people would, people would just put lights on, wouldn't be bothered what's costing next to nowt. You've got to vigilant now. You turning lights off when you're not using them. You're, and I think you've got what's so cheap, it would turn the screw the other way.

Interviewer: So in terms of our relationship with energy Male F, you're saying that actually a bit of forced scarcity?

Male F: Yes.

Interviewer: Might in the long run be a positive thing?

Male F: Yes.

Interviewer: Does anybody agree or anybody disagree with that?

Female D: I agree with him.

Interviewer: You all agree.

Female D: See I don't, I think that it doesn't, I never ever flick a switch and wouldn't know where it's coming from, my worry is always turn the lights out, or waste electricity because of the cost.

Interviewer: Because of the cost.

Female D: Not where it's coming from.

Male F: Well, that's it. That's the.

Male A: The power station seems to be doing, it's producing 60 kilowatts an hour, right, if I switch that light off, they don't go by whatever I'm using, they're still churning it out and churn it out. Now they can tell you churning it out. They'll put in the extra end at peak times. But because somebody turns the light off somewhere it doesn't cut the power supply, it's still supplying that to the National Grid.

Male F: No, but they're using something that creates that power.

Male A: What they doing with it all?

Male F: Well, they're using something create the power aren't they?

Male A: Well, what I mean is.

Male F: It's still burning something you're not using.

Male A: Yeah, yeah, right. But they're still producing so many kilowatts per hour, right, any power station, right, now it doesn't matter what you do with your lights, they still could turn all the lights off, they're still going to produce that all the time. Because that's what it's done.

Interviewer: So, you have concerns about efficiency of the the industry and stuff like that?

Male A: Yeah, yeah. Because it doesn't work, does it?

Interviewer: And.

Male A: If you turn your light off, that power station's still producing the kilowatts it's going to produce anyway?

Male G: Yeah.

Female B: Is it not store it, though?

Male A: You cannot store electricity.

Interviewer: So, there's.

Male A: It just is made, used and that's it, end of story. You cannot store it, so it's out is, if you decide you want to turn your lights off. You know what I mean? It's still producing it.

Female B: It doesn't produce electricity because everybody turns their lights off.

Male A: No, so.

Female B: Or like pre-empting that people are going to turn their lights off?

Male A: Well, they try to convince you.

Female H: Oh yes it does. Slowing down at night.

Male E: Yeah. And boosting it at times.

Male A: Well, during the day, if you switch your light on it doesn't make any different to the power station still gets.

Female H: It doesn't make any difference to them but it does to your bills.

(overspeaking)

Male A: I just said.

(overspeaking)

Male A: We see what the nuclear power station are going to build in.

Interviewer: Is it down in Bristol, I think I might?

Group: Yes.

Male A: They're going to build it. Do you know what the price of electricity is over in that power station? Whatever it cost to build it. The government's just said, they can charge whatever it cost to build it and make a profit. That's what they'll get from the electricity over at that power station.

Interviewer: So, I mean, there has been quite a lot of mistrust of the energy industry just in the last ten minutes. Can you imagining, I don't know how you get your news, but imagining getting your news however tomorrow and there's a story there that changes your view towards the energy industry. Can anybody imagine what that story would say? Is that unimaginable?

Female B: Erm, one thing that has, sorry, go on. What thing that did change my view was finding out that some of these energy companies, particularly gas and electricity suppliers had charitable trust funds available for their clients. And that changed my attitude towards those particular.

Interviewer: So there are steps that can be taken?

Female B: Hmm hmm.

Interviewer: So you, you might call -

Female B: To give back, to kind of give something back to the community.

Interviewer: Does that persuade other people or not enough.

Male A: Well, it depends on what they're doing with their taxes. Because if give something to like charity, you pay less tax. Loads of corporations do this. Oh, we'll have a charity here and might give them so many million, but the tax bill comes down by about the same, so, they're not actually giving anything away.

Female B: No, they're not, but they're doing it benefit themselves but at the same time.

Male A: They're gaining on their taxes, it's a tax fiddle.

Female D: But ultimately we, the taxpayers, are getting that back if we need it.

Male A: Yes, but actually if they give everybody, bought the price down, everybody would get it back. But they're trying to, I don't like to say it but they make you feel good, oh –

Female D: Well, they are, yeah.

(overspeaking)

Male A: They're not actually doing it, you know, it's coming off their tax relief, their forms. They're fiddling their tax. Which we collected for them.

Female D: All the energy to tell everybody we're fit X, Y and fit your houses and buy the remainder back off you for nothing. That would restore my faith.

Interviewer: So, some sort of scheme to help you get efficiency, double glazing?

Female D: Yeah, or the -

Interviewer: Or the solar panels and stuff?

Female D: They have on the roof like. Yeah, I mean the green deal, of course you don't buy it back, any except -

Male G: Everybody will do it.

Female D: The green deal's available to everybody.

Female B: That's right.

Female D: Supposed to be, but.

Female B: So did that cost you nothing and?

Female D: Well the saving to me, on your electricity, for example, would be used to clear all that.

Male C: So you have to pay upfront?

Male A: Yes.

Female B: You don't pay anything upfront, apparently.

Interviewer: But something like that would be, would interest people.

Female B: Yeah.

Interviewer: And would maybe help?

(overspeaking)

Female D: Well if you know a bit more about it.

Interviewer: So that's a key point, sorry everyone, but that's a key point because how do find out about these things?

Female D: Well.

Interviewer: So, you all.

Female D: Yeah.

Interviewer: You seem quite savvy most of you about these sorts of issues, you seem very savvy. So how do find out about this issues? How do you?

Female D: It's the media mainly.

Interviewer: Through the media?

Male F: Certainly don't broadcast about cutting things are they?

Male E: People like capitalists who are out to make capital. I mean that's.

(overspeaking)

Male E: They're not philanthropists, are they?

(laughter)

Interviewer: Those companies whether.

Male E: The Eons and the EDFs are all French and German capitalists, aren't they.

Female H: How about the English -

Male A: Oh we shut up most of them

Interviewer: So.

Male A: So, what's the difference between energy going all out finding to get it cheap and you can't put them?

Interviewer: What's the difference? Well, going one of them probably entails making it all much worse.

Male A: Yeah, because if you put one of these tiles on your roof, you know, to save electricity, you'll save electricity. Your carbon footprint, it will take you at least 60 years to get the energy back on what was produced to make them. You know, the electricity they had to use to make these things. It takes 60 years to get it back. They can't put them so. Theoretically you're not gaining anything on it.

Interviewer: I suspect I, I think there are probably people working on trying to improve that if that's the case.

Male A: That's about it at the moment.

Interviewer: Getting that technology better is probably a present concern for us. So just to move on in terms of the media and stories related to energy in the media, I think we've kind of covered this a bit anyhow, but, so you notice stories about energy when it's in the media, do you?

Male A: Yeah. Especially when it's going up.

Interviewer: And generally, how is that, how are the sorts of stories that you do see, how do they make you feel towards the energy industry?

Male A: Well, they confuse the electricity and the case. We've had that many tariffs for electricity you don' know where you're going.

Female D: But to be fair they are simplifying.

Male A: Well, they're trying to now, but how many years you haven't known what's been happening with them? You know, do I change companies or do I stay with the same company?

Male C: I've always thought that, I'm getting on in years now, but I always thought years ago British Gas, for instance, just to pick a company, was British Gas, and that's, everybody paid the same. You can't tell me depending on what you put, how much you use, you paid the same rate or whatever it is. But now you've got all these different people, companies saying, well I pay cheaper and I can get, how can they pay cheaper?

Interviewer: So, what's, how?

Male C: How can one company give it you cheaper than another company? And they compete against each other. How can it happen? Price of gas per.

Male G: You can use it.

Male C: What about, maybe, the price of gas is the price of gas. How can somebody be cheaper than somebody else?

Male G: And it's just -

Male C:It doesn't make sense to me.

Male G: It's the same supplier.

Male C:Of course it is. It doesn't make sense to me.

Male A: British Gas is still pumping gas into your house. But some other company say, no, we'll do it cheaper.

Male G: You buy the customer don't you?

Male A: But it's still the same gas coming from the same supplier.

Male F: It costs the same to deliver it. Same. I has to. Same.

Interviewer: Sorry, these concerns about tariffs and them being complicated I may see in the news about simplifying this at the moment, are these concerns that other people will have and what's the fear behind these complicated tariffs? What do you think that's.

Male C: Well, I changed my tariff last week. I went from Eon to Co-op. Now Eon on my list had 42 different tariffs.

Interviewer: And so, the list of tariffs, that's a lot of tariffs in anybody's money, but what do you suspect that's behind it?

Male C: Correct.

Interviewer: Why? So you think they're wilfully making things complicated?

Male F: Correct.

Female D: I think they hope that people that drop off a tariff won't be new, because they can't be bothered or they don't have the time to look into things.

Interviewer: So would you say this whole idea of energy being taken for granted, then they don't switch it? Do you think that's contributing to this because people just think, oh, I don't like, energy's sorted by direct debit and they don't have to worry about it. It's a bit both?

Female D: I mean, I think that if I was paying every quarter, I'd be thinking, ooh, where's this money coming from? I'm going to have to tighten my belt a little bit and turn more off and be, you know, just be tighter with my gas and electric but I pay monthly and I know that it's coming out and hopefully it covers the tariff and I pay every month and if it doesn't then I'm a bit in debit. Then I'll have to sort it out.

Male C: I think there's a lot of it that we're seeing, you see all these adverts, gas at such a price for six months, or six months free, if people join it, then all of a sudden at the end of the six months bang it goes up higher than what you were paying before.

Male G: It does.

Male C: You're being fooled, you know, they're not here to make money, a company doesn't go to give you gas or electricity for nowt. They're going to make money off you. And they will do it any way they can.

Interviewer: Okay, we'll bring that part of the discussion to a close. That was really interesting guys, thank you. We're going to move on to talk about choices, so this is more broadly about our source of energy, so rather than companies, it's going to be about a company, the different forms of energy we have. So I think I'll utilise this flipchart now actually. And just around the, or what sources of energy can we name? I feel like I'm talking to schoolchildren here.

(laughter)

Interviewer: Apologies, sorry. So what, it's because I don't want to tell you what to say, you know, I can't.

Male A: I'll start.

Interviewer: Great. You can. All right. Different ones.

Male G: Water.

Interviewer: Water. How so?

Male G: Hydro.

Interviewer: Hydro. Hydroelectric.

Female B: Coal.

Interviewer: Coal. And how? How, what would you group coal with?

Female B: Well, power stations?

Interviewer: Power stations.

Male G: Solar energy.

Interviewer: Solar energy.

Male C: Solid fuel.

Interviewer: Solid fuel?

Male C: Yeah.

Interviewer: Could you? We have nuclear here. We have hydro. Erm, and coal.

Male G: Wood.

Interviewer: Wood? I've probably got this done wrong.

Male C: We've got wind.

Interviewer: Wind, of course.

Female H: We got waves.

Male A: And waves too.

Interviewer: Waves etc. And so we have, we really have kind of carbon, fossil fuels down here.

[cough]

Interviewer: Gas, holes, Energy kind of answering up there. Do you agree with energy being kind of on its own up there?

Female B: Hmm hmm.

Interviewer: Do you understand why it might have been there? Okay so, can we talk about the positive and negatives that we see in each of these?

Male F: Why have you put solar in there?

Interviewer: Solar? Sorry. Let's not complain, I'll make it.

Male G: And gas, obviously.

Interviewer: I'm sure you can think of others there. But just these groups, so, renewables and fossils fuels and then nuclear as well. What positives and negatives do people, let's start with you three, what positives and negatives do people associate with nuclear power?

Male C: Well, positive's is it's clean.

Interviewer: It's clean?

Male C: It's clean energy. You know.

Male F: It's cost effective.

Female B: Hmm.

Interviewer: Cost effective?

Male F: It can't kill you. But having said that.

(laughter)

Male F: It's a passive danger, there's a passive danger concerned.

Interviewer: So Male F what would you say it's cost effective in relation to?

Male F: Because everything else, apart from your wind, your solar and your hydro, the rest of them will run out someday.

Interviewer: Okay.

Male F: So you can hardly rely on something.

Interviewer: You take that?

Male F: Them three things could produce enough electricity to sustain the world.

Interviewer: Yeah. What the guys sorry. So you doubt renewables? You doubt -

(overspeaking)

Interviewer: You couldn't help. And what do people think about prospects in the future of, you know, if we improve the technology, refine the technology, what about the prospects of really high counts of renewables? You think that would produce enough energy?

Male A: No, because you get the same people, who've got loads of places in this country where you could have wind. You know, the windmills, but people in villages do not want 500 windmills across the top of them.

Interviewer: Okay, that's.

Male F: I can understand that but the same people, would they complain that they couldn't switch the light on of the night time?

Male A: Yeah, but the problem.

Female D: Yeah, given the choice.

Male F: Given the choice would they want a light bulb on or would they just not want windmills?

Male A: There was a guy on and he was saying windmills make a hell of a racket, you know, it's, because they're going through the wind so they make a noise and he says it ridiculous the amount of noise you get off those windmills.

Male F: I work next, I worked –

Female D: It would make a hell a bit more, a bigger racket.

Male F: Plastic one, they cramp them.

Female D: Oh yeah.

Male F: And the same next to where I work. And I work night shifts up there. And you can't hear them.

(overspeaking)

Male F: Well, as far as from here to the next room probably, you can't hear a thing.

Interviewer: Originally it was interesting [name] because even if theoretically they could produce enough energy, you're suggesting there's going to be groups in society that are going to kind of fight the whole to the way?

Male A: Oh yeah.

Interviewer: And they might prevent it?

Male A: Yeah, there is one now going on.
Male F: Yeah.

Male A: There's that guy from America that built the concourse in Scotland. And they've said they're going to put 500 windmills out in the North Sea, and he said he'll pull out, he says he will not have his five-star golf course there if they put the windmills up. He said. It's nothing to do with him.

Male F: I really have to say that the windmills in my opinion will never ever be cost efficient because they, you're reliant on the weather.

Male A: Yeah.

Male F: Same as the solar. You're reliant on the weather.

Male D: It's too windy to switch them off.

Male F: Aye. Because they go too fast.

(laughter)

Male G: They cannot generate enough same as the state as what we got now.

Interviewer: Yeah, so

Female H: Sustaining, though, it's just adding to it, you can't have all your one source, you can't have all nuclear or all –

Male F: But what I'm saying is, the bottom four there, one day, they'll run out.

Female H; Yeah.

Male F: Right. No the sun is going to be there and the wind's going to be there but I don't think they can sustain enough to top up the nuclear. I don't want to go. Whichever goes first, it doesn't matter. Your water's always going to be there, you're going to have hydroelectricity, you'll always have that. You can build dams, you can make, you can create that. You cannot create the wind, you cannot make the sun shine. The nuclear is the only way that I can see it every working.

Interviewer: So, Female B, that was exactly, that was very interesting when you said it's not just one or the other.

Male A: You got to have water.

Interviewer: Course that's fitting. Sometimes we kind of forget that when we do things like this. So what with that in mind then, what's your kind of ideal mix, kind of in the future, what would you have, what wouldn't you have? We'll all be playing a bigger role in what would be kind of in the background there?

Male F: I think you go down to 10% nuclear to start with. That's your main core. And then go for the rest of them to top everything up.

Female H: It's all more local.

Male F: Yeah.

Male G: What do you mean local?

Interviewer: Okay.

Female H: Two sort of smaller communities perhaps.

Interviewer: Okay.

Female H: General nuclear's the core of it.

Interviewer: Do people agree with this idea that nuclear would be the kind of core?

Male F: It's the only way forward. Only way forward. It's not, well, is it.

Female H: It's a bit interesting here.

Male F: It's not the one I want, I'm totally against it because it's so dangerous, but it's the only way you're going to have a continual supply that you need.

Interviewer: Okay.

Male F: In my opinion.

Male A: Because they're putting them ones back in Japan now, aren't they?

Male G: Power station.

Female H; Yeah, but when were they built?

Male F: Exactly. They've got to be good in the system whereby the, they look, they're maintained properly. Nothing to know for instance. Everybody looked bad for about 20 years and just.

Female H: How long?

Male A: It's, you cannot just.

Female H: Don't be so much.

Male F: They've got to be looked after properly, they've got to be, maintained properly.

Male G: You cannot best the one.

Male F: No you cannot, you've got to have the whole.

Interviewer: But in terms of going back to nuclear, what about this issue of where do we put the waste? I think that's a bit unresolved. I believe Cumbria was the final council to reject having a site there, so that's a bit of an unresolved question. Presumably someone's going to have to answer that at some point. And so we have really kind of discounted these ones.

Male F: Well, they will run out.

Interviewer: So they've had their day do you think?

Male F: They'll have to. They've got to run out some day. All of that. What I mean for that, they've been built up over centuries, and millions of years, and we're using them at a rate where it cannot be sustained. They've got to go.

Interviewer: What about this idea of you use now until they get very low, and then you have this kind of transition so you don't just count them now just because they won't always be there. You use them up until the point and you make this transition to save.

Male F: Who will pay for the transition?

Interviewer: Who will pay for the transition?

Male A: We will.

Interviewer: Yeah. So, so that's interesting Male E because.

Male E: Do the companies have the will to pay for this transition? The won't although they are quite happy to keep the profits going up the wall. They keep the back burner or

whatever they call it and you care of then and all that. In the background until they need it.

Interviewer: That's interesting, so there is this idea that putting money here with this idea of making another transition at some point in the future, is throwing kind of good money after bad.

Male E: Course it is.

Interviewer: It's short term?

Male E: Yeah.

Interviewer: That's interesting. Does everybody agree or would anybody have, you know, kind of gas or coal or something like that as part of, kind of future?

Male A: It depends on how much money, how desperate they want it.

Interviewer: Hmm hmm.

Male A: They closed down the coal mines in this country now virtually they're all gone. But the coal is still up there.

Female H: Yeah.

Male A: If they get desperate, they'll want coal. We won't play open cast and then they'll put that mines back in. The coal is there. There's millions of tons of coal under this country. And if they're desperate for it, it'll come back again, they'll go.

Interviewer: If energy's expense?

(overspeaking)

Male F: It's not an infinitive, it's not an infinitive is it?

Male A: No, but it's a similar amount they want to hear.

Male F: We're not talking, we're not talking 100 tons or 300 years, it's here, infinitive. What's like says, it's got to run out sometime.

Male A: It's like saying wood, wood years ago, when they printed newspapers, used to chop down so many trees to print their papers. Now they're planting so many trees for every one they knock down.

Male F: Aye, but how many years is that going take?

Male A: Yeah, well they're doing it now, it's renewable.

Male F: I know but.

Male A: Planting trees now and pulling them down and.

Male F: That'll take 50 years to be a one that want to put in.

Male A: Yeah, but they're planning that now. It's in situ now. All these forestry commissions and the forests, are they knocking trees down and putting two up or

putting another one up in it's place. It's a 50 year plan and it's on-going. All the time.

Interviewer: So, guys, you seem to like the idea of this kind of long looking forward into the future and long-term planning. So if were, if we were with this fellas down in the Department of Energy and Climate Change, so there was a representative here and he was thinking about kind of these difficult choices we've been talking about and, what would you say to him [name], what would your advice be?

Male A: Well, they go, we'd go nu-, they'd go for the lot. And then phase out the other ones you don't want over time. It's going to take time because you cannot just say right we'll have five nuclear power stations tomorrow. It's 20 year to build a nuclear power station so you've got to plan for the future, so start doing the so many nuclear power stations round the country, then go for the wind and the hydro, and you can go to your coal.

Interviewer: His response I think would be, it's kind of what we were talking about before, some people are "not in my backyard" you know, nimbyism.

Male A: Yeah.

Interviewer: It's probably kind of getting them at leave five years, pretty difficult to build a nuclear power station and not have a bit of an uproar about it.

Female H: They've got to spread it out.

Male C: Well, the sites though, they've already got one, you can build one next to there. You got Skela-, what's the one over in Cumbria?

Male G: Sellafield.

Male C: Sellafield? Why don't they build one there? Or build two there? They've got the land.

(laughter)

Female H: Yeah, it's very easy to build it. But if you live there, yeah, you wouldn't want it.

(overspeaking)

Female B: Just two or three.

Male A: Yeah, but they need as many as possible.

Male F: Well, that's giving somebody else your problem, isn't it? You know?

Male G: Or, you can have it all whatever, we just build.

Female B: Yeah, that's right.

Male G: That's no good. Imagine what would happen.

Male C: You want to put the light on. It doesn't matter where it is. It doesn't matter if it's in your back garden, I wouldn't give a monkey's. As long as I was able to put a switch on and the light come on.

Male G: According to the government though because, 40 or 50 year ago, in terms of nuclear, and you had 75% nuclear at all.

Male C: Yeah.

Male G: In France.

Interviewer: And so, who will be building our nuclear power stations?

Female H: The French.

Male G: Yeah.

Interviewer: So.

Male C: That was a government policy, a single government policy which was carried down through successive governments, obviously, but which are French Now why couldn't we do it? Or anybody. Or whoever do it.

Interviewer: How that carried logic over to new sorts of things and saying this is the energy source of the future if you build a expert use in it, build up, you know, the capacity to do it. Then that's.

Male C: A short cut medium profit incentive to go for it.

Interviewer: Okay. Is that something the government can intervene in?

Male C: It's what the French do. I mean, the French are the French aren't they, I mean we are. They're still run by the big companies, the big oil companies, local governments in my line.

Interviewer: So that's.

Male C:It's a cynical view, I know, but I won't.

Interviewer: So this comes down to a pretty kind of deep-seated mistrust of the big companies? And the government? And so you doubt that the government would be able to forward power in that way?

Male C: Well, the French government did a long time ago.

Interviewer: Aha.

Male C: But I mean.

Male A: There's no oil company going to put its back into a nuclear power station.

Interviewer: I think there'd be plenty of people interested in investing in nuclear power.

Male A: Well, an oil company. You know.

Interviewer: No necessarily oil companies, but companies.

Male F: They'll invest, won't they? If they get a return.

Interviewer: Right, well, let's move onto, so what sort of factors, when making these sorts of decisions, and talking through these choices, what sort of factors is, are most

important to you? So what are you trying to achieve in this discussion. Is it that it's sustainable, is it that it's a long-term view, is it purely price? What's top of your list?

Male G: Mainly price, isn't it?

Interviewer: List of priorities. That's what we said at the beginning.

Male A: What's going to cost it, at the end of the day.

Interviewer: Would that be, would there be any conditions to that whatsoever?

Male A: It all comes down to money once again and what people can afford. Whatever's going to be the cheapest, it doesn't matter which one it is, the people will go for the cheapest. It doesn't matter what it is.

Interviewer: We have been talking about forward planning and this idea that if you put some money in now, long term you might reap the rewards, whereas if you go towards the cheapest now, long-term there could be issues there. How does that?

Male A: Well what, what they're saying now right, is if they invest nuclear power it will become cheaper and it'll stay longer. And then they're saying the same with solar power. Solar power will get better.

Interviewer: Hmm hmm.

Male A: It will get, it will get, without a doubt it will get better, but if it's, the price you've got to pay for solar power. People don't want to know about it. It's a certain. At the end of the day it comes down to money and how much it's costing you just to switch that switch and get electricity.

Interviewer: Hmm hmm.

Male A: And that's what it's all about these days.

Female H: But by the time any of these are up and running, I'm going to dead I don't care what.

(laughter)

Interviewer: Well, there's a serious point in that which is.

Female H: It's all about.

Male F: What about your children and grandchildren?

Female H: It's always about.

Male F: Well, that hands out.

(laughter)

Male F: I've got to say you're totally right because everybody sitting in this room without exception, without exception, are bothered about what happens now. Not 20 years' time, 30 years' time, 40 years' time because all we worried, if you get it down to the bottom is, the price of a bill. That's what we all.

(overspeaking)

Male F: But the question is.

Female H: I've got to think about the future.

Male F: But it raises the question. We're actually thinking about what, our children, our grandchildren, or things that they'll have. Because we're not. We're thinking about the price of electricity bill come through the door.

Female H: I think you're.

Male F: Everybody in this room is.

Interviewer: And so Male FI can kind of detect there's a bit of a conflict there between your pragmatic self and what you might like to be the case? Is that true?

Male F: Yeah.

Interviewer: Do other people feel this conflict between what's a good decision and what's a realistic decision?

Male A: Oh yeah. You'd like to pay less for your electricity.

Male F: But a good decision is cost. But a real decision is the future.

Male A: I think you've got problems if you turned round everybody in this country and said we're going to stop like global warming or we're going to do this for the thingy, everybody's got to pay an extra 50p a day for your electricity or your gas. We'd be up in arms, we'd be out on the street. You wouldn't do it. In their heads, oh yeah, good idea. We'll try and save the planet. But when it comes down to hard cash, they won't do it. It's true innit?

(laughter)

Interviewer: Well, with that in mind, I have a hypothetical question for you. So, if tomorrow there was a vast new supply of fossil fuels have been discovered underneath our feet and it, there were people saying this can be commercially exploited, it will help, cut your bills, how would you feel about that?

Male F: Go for it.

Female H: Yeah.

(laughter)

Female H: But that doesn't help the carbon footprint, does it?

Interviewer: No, it doesn't. No, it's a fossil fuel.

Female B: But are you actually bothered about that at the moment?

Female H: Well, aren't there two sides to this, because I think why are we, when bigger countries couldn't give a shit, for want of a better word, like America doesn't care, China doesn't care, you know. Yet we seem to be the only one that like, in the whole world that give a damn about carbon footprint.

Interviewer: Well, I think erm.

Male C: Nobody wants to stick to the rules.

(laughter)

Female H: Well, yes.

Male C: It's not use electricity, it's everything else.

Female B: I would like everything to be green.

Male C: But nobody wants to stop lighting.

Female B: I would like it to be less carbon footprint, but then I think, like what's the point? Nobody else is doing it so they're causing a bigger hole in the ozone than we are, cause they're bigger.

Interviewer: I think you're right to say you're kind of the vanguard of that, I think there are some people in Europe doing probably a bit better than we are at the moment. But your concern is this, is, if everybody doesn't do it, rather, then what's the point in one country doing it?

Male C: Yes, yes.

Male A: That was the same as what I said at the beginning. One person switching the light switch on isn't going to stop a power station producing so many kilowatts of power. You know. They're still going to produce that power regardless of whether you knock a light off. You're going to saving yourself.

Male F: It's banned though man.

Interviewer: So back to this hypothetical question that I posed. So, would anybody be a bit more cautious? Would anybody have certain questions to ask before being gungho about that prospect?

Male F: Are you saying about.

Interviewer: About this idea tomorrow.

Male F: Escalate. Right.

Interviewer: A new fossil fuel.

Male F: Right, but there'd be, it would still be the case for that, isn't there, I mean, if you burned coal for instance, you create smoke. The smoke is for all it's not inducive to your lungs, it isn't detrimental really. But this new fuel that you think you might if you like, what were in it? What would, what would, how would you cope with that?

Interviewer: So that would be a question?

Male F: It would be for me.

Interviewer: That would be a question for you.

Female D: Are there any health implications? Or are there any, any? Yeah.

Interviewer: Any others?

Male E: How do you deliver gas fracking? Now then?

Interviewer: I'm glad you said that Male E because we'll move onto the next section about fracking.

Male C: Fracking, nobody knows the future of fracking, do they? I mean.

Female B: I don't know what fracking is.

Interviewer: I think that's a good question you all strictly hypothetical.

(laughter)

Male F: Sly man. Sly man.

Interviewer: So introducing hydraulic fracturing. And somebody always pre-empts it like that. All right, so this is erm, I'll just talk you through this board now, are people going to be able to make this out? Can people make this out? Is that all right, is that big enough? I'll talk you through it anyhow. So here we have this process hydraulic fracturing and it usually gets abbreviated to fracking and has anybody heard of this in the media, has everybody heard about this?

Male C: Yeah.

Interviewer: Anybody hasn't.

Male F: No.

Male C: It caused an earthquake in Blackpool.

Male G: Allegedly.

Male C: Allegedly.

(laughter)

Male G: Careful what you say about this.

Interviewer: Seriously.

(laughter)

Interviewer: Okay, so most people have heard some mention of it, though it doesn't matter if you haven't. It actually has quite a long history actually, particularly in the United States which is where it was developed but it's really sort of taken off there in the last ten, last sort of decade. So, it's natural. We should really call it, what they're looking for is unconventional fossil fuels, it usually gets called unconventional gas, but you can get shale oil for instance, so shale is one form of this unconventional fuel and the reason it's unconventional is not because what you get is any different, it's because the stores it's from, because of where it's from, and so it's trapped in rock, so in this case, which shale, that's the shale there. It's tracked in this rock.

Male F: Is this a methane gas?

Interviewer: Yeah.

Male F: Like? I've got you now.

Interviewer: Yeah. So what you have to do to get it out is a process called hydraulic fracturing. And there's also other process that's called horizontal drilling. So they have these two technologies that have made this possible. And the other crucial factor is price of gas was at a level that made it worthwhile going to these sorts of lengths to get gas out. And so you, you create these fractures by injecting high pressure, they call it fracking fluid, and it's 99.5% or there or thereabouts water and sand with some chemical additives that perform various tasks. Erm, and so, here we just have a depiction the whole point of horizontal drilling or directional drilling is that you can go from a horizontal, a vertical line to a horizontal well so that goes along in the shale which will be a more or less horizontal kind of plane. And so you're getting kind of maximum surface area there and you're pumping down this liquid at high pressure which is causing the rocks to fracture. And the gas flows out. So that's kind of a crash course in the process.

Male C: And does the water come back up?

Interviewer: The water comes back up, yeah.

Male C: What temperature's the water when it reaches the top?

Interviewer: Why, why's that question coming up?

Male C: Then why not do what they're doing to Newcastle and just pump water down? They get hot water back up.

Male G: Heat pumps?

Male C: Opposite St James's Park they've got a big liner with a well and they're pumping water down it and it comes back up hot, you know.

Interviewer: Okay, well. That's not what they're doing there, they're bring gas out.

Male F: That's the gas there.

Male C: Yeah, but the temperature of that water's going to be hot when it comes back up. How do you keep it going?

Interviewer: I'm not sure about, well, they, the depth technically is about two to three kilometres down.

Male C: So it's going to nice and warm isn't it?

Interviewer: Quite possibly. I don't know about that.

Male C: You could use the heat off the water. As well as the gas.

Interviewer: Gas it, once you've got the gas, that's more tradable, that's much more, you know, you can put that in the pipes and so on.

Female B: Well, it would getting cold quickly.

Interviewer: That's right.

Male F: That's what you look for.

Interviewer: Exactly, so that's, it's for natural gas and so does anybody have any initial impressions?

Female B: Did you say methane?

Interviewer: Methane. Natural gas.

Female B: Is that harmful to the environment.

Male F: Yes.

Interviewer: Yes. It's a fossil fuel. It's.

Male F: The council are paying for it for the ozone.

Female B: Yeah.

(laughter)

Male F: It's honest that, aye.

(overspeaking)

Male G: Methane gas. In sewage works and stuff.

Interviewer: Okay, yes it is produced in all sorts of places.

Male f: You used to have down the mines all the time, that's why they had budgies and canaries down there because it was methane gas.

Interviewer: The answer to your question is it's a greenhouse gas.

Female B: Right.

Interviewer: And I think it's, I think I'm right in saying it's much more effective at being an greenhouse gas than carbon dioxide but it's in the atmosphere for a lot shorter period of time. So burning natural gas technically is better for the environment than burning coal.

Female B: Right.

Interviewer: But worse obviously than something that doesn't produce it.

[cough]

Interviewer: So any other kind of natural questions about hydraulic fracturing? Unconventional fossil fuels?

Female H: Well, the earthquake, you take something out, there's a gap. Something's going to move.

Female B: Hmm.

Interviewer: Okay.

Male A: What's the difference between this shale with that drilling down for here, and the shale that they're taking out of America where they're just ploughing tons of it out.

Female H: For the oil? Is that not what they're doing at Tile Sands?

Interviewer: Is this the Tile Sands?

Male C: Yeah, well it's a shale lock and they're taking it out of America and going through about three states, just taking it out again for the shale.

Interviewer: That would probably be due to another unconventional fossil fuel. But I guess there must have been different geological processes going on so there's gas and there's oil, and there's methane and then another type of unconventional fossil fuel, anyhow so I think we've kind of exhausted that. We'll move on, I'll put another board up. And we'll talk a bit about the sort of opportunities that this might bring about. So just bear with me.

(laughter)

Interviewer: You know I thought it would look really bad if I just appear and have someone just lift this board up for me. I don't think this would give a very good impression. I'm more than capable of doing that.

[cough]

Interviewer: All right, so once again, I'll talk you through this board a little bit. And so, we've got the title here, "A Golden Age of Gas", which is a quote from the International Energy Agency's, they do a kind of report every year about kind of energy prospects and that's from that so, quite optimistic language. Golden Age of Gas. So here we have an MVUS contact David Hare(?), there's this idea that this could be a game changer and really change natural gas, in particular change natural gas prices that we would pay for energy. So here we have from Quandrilla, has everybody heard of the company Quadrilla? They're operating, they're dealing, kind of exploration, research and development phase type stuff up in Lancashire. There are only a few companies doing this in the United Kingdom at the moment. This is being done in the United States where it's had these sorts of effects, so in the last ten years or so the prices of gas has dropped to just a third of its original price. And they're saying that's due, at least in part –

Male G: Is that not Heysham?

Interviewer: Pardon?

Male G: Is it Heysham in, Lancashire, where they're doing that?

Interviewer: Haysham? Erm, it's called the Bolam shale, they have one called, they have about three sites around Lancashire so that could be one of them. And so we have this Sunday Times from 2011 here, the one "the gas that could cut your energy bills". Here's a map, the International Energy Agency is saying that this a really good prospect because it's spread all around the world and they're saying that gas in general, in particular with this unconventional as well as the conventional gas that's left, could sustain production for over 250 years. So that's their estimate of just, you know, how financed that is. And so here's a map and you can see there are some places that they don't have data for. But you can see the dark, you can maybe just make it out, the dark shaded areas, a lot in North America, plenty in kind of South America as well. Dotted around Europe. Australia, China, South Africa, so there's quite a lot, there looks to be quite a lot of it about.

Female H: What about us?

Interviewer: What about us? There is, Britain's very small on the world map, but there is some, there's some dotted around Europe and there is particularly some people are quite excited about the Bolam shale which is underneath Lancashire and the company operating there has a base estimate of 200 trillion cubic feet of gas. And so it has suggesting.

Female D: What does that mean?

Interviewer: That's a lot.

Female D: Is it a lot?

Interviewer: That is a lot, yeah.

Male C: So is anybody going to know how much is under the sea? Because eventually if it's only under the land, and so they found out it was under the sea. So is it under the sea as well?

Interviewer: Erm.

Male C: So it's going to be there for a while, isn't it? It'll last a long time if it's under the sea as well, which it should be.

Interviewer: Shale under the sea [name]?

[name]: Yeah, it's beyond. Beyond my guess.

Male C: It's the same as when they first found oil, oil was only on land. And then they found, oh, it's under the sea, so it's all over the planet.

Interviewer: Yeah.

Male C:So if this stuff is under the sea, this could last, what a few years, couldn't it?

Interviewer: It might be very expensive if you have to go out?

Male C: Yeah, but that would be, you know, how much it's economical, isn't it? It's like the coal mines that we're going back to. They closed them all because it wasn't economical but if they want coal, you'll pull them up. They'll do it again.

Interviewer: I think the.

Male C: The same with oil. They would never have gone into the North Sea, you know the conditions they've got to get oil, if it wasn't viable. It depends on how viable it is.

Interviewer: I think the point to bear in mind going on is.

[cough]

Interviewer: It's that's only relatively recently started to get companies and governments excited. And wondering if we can have the same effect that they've had in America, namely kind of price drop. To be a blueprint to be followed elsewhere and so people started to pay a lot of attention to this relatively recently. So I think it's probably better to say that they're building the picture up of how much of this

out there. Kind of as we go along, that's these facts are starting to emerge and I don't think we have the full picture.

Male C: No. They won't know how much is there, will they?

Interviewer: It's difficult to ascertain that as well.

Male C: Yeah.

Interviewer: Yeah, exactly. And so, so on this board, we also have a couple of UK politicians here, the former minister for energy and climate change and he's talking about the potential of this unconventional gas, and he's talking about the security of supply and economic benefits, and we also have George Osborne from the Conservative party conference of last year and he's talking about a generous new tax regime and his will is so that Britain is not left behind if gas prices tumble on the other side of the Atlantic. And so there's a lot of optimistic language on the board, so there's stuff like "golden age", "game changer", there's this Time magazine as what the power of the world, and one big ad from the Sunday Times as well. So, do people see this as such a big issue? Is that language hyperbolic or can you understand why people might be getting excited?

Male A: It all comes down to money though, doesn't it?

Interviewer: How so?

Male A: Well these countries aren't going to go to all this bother if it's not going to be viable and they cannot sell it.

Group: No.

Male A: It's got to be viable for them, for us to pay for the gas. You know, they're not going to say, oh we've got a brand gas, you pay £20 a cubic whatever for it when they're only paying ten. Everybody's going to say no, I don't want it.

Interviewer: What do you think affects the viability of this?

Male A: Well, how much you're paying for the gas.

Interviewer: And what contributes to that?

Male A: Well, it's what the government tell us what to pay isn't it no matter how much profit they owe, the companies want to make, like British Gas.

Interviewer: Okay, so you'd be sceptical about price here? What about this idea that you know, prices have fallen in America where this has gone on?

Male C: Nearly everything's cheaper in America.

Female D: Yeah. It's the tax issue.

Male C: It's the British tax that hit us. America's folks you pay gas, oil, you name it, it's a lot cheaper in America.

Interviewer: So you think.

Male C: So them getting it cheaper across there doesn't necessarily say we're going to get it cheaper over here.

Interviewer: So you'd expect that the various differences between America and Europe?

Male C: I just, they'll be a huge difference.

Interviewer: Okay.

Male C: You'll get it cheaper, we won't have to pay an awful lot.

Male G: We probably have to pay a supplement.

(Laughter)

Male F: I can , I mean I reckon to [name], but I just look at the whole situation and think well, if somebody tells me on Saturday morning, tomorrow you'll have no electricity unless you pay £20 more a week, what would you do?

Female D: Well, you'd pay, wouldn't you?

Male F: You'd pay the £20 more a week.

Female B: Is that what the government are thinking then?

Male F: Well, no, but I'll say this, we'll just keep the lights off.

Interviewer: I hear the government's already looking

Male F: You'd pay the £20.

Interviewer: I hear the government's really thinking, this could be really handy, this could be really handy in terms of possible tax revenues for the treasury. Quadrilla are saying if there there for 30 years, and they could be five to six billion paid to the treasury, they're saying jobs in Lancashire, they're saying price drops, okay, maybe not like there has been in America, but so.

Male G: So it's going to be good for the people. For the workforce and the economy and that.

Interviewer: So, if there was shale underneath Newcastle, you'd be kind of optimistic about what that?

Male G: It's been for a full -

(Laughter)

Female B: But what about, what about if the government well, these people have paid that price for their gas in the past so we'll just keep on hiking the taxes up so that they're still paying a little bit less and it keeps them happy and we're quid's in.

Interviewer: George Osborne is here talking about a generous new tax regime to try and get these companies to start and get them going.

Male A: Yeah, he's giving given them money.

Female H: Yeah.

Interviewer: So.

Female H: You believe anything George Osborne says.

Interviewer: So, here we, we have a politician and so trust has come up again.

Male E: Yeah. Especially him.

Male A: George has -

Interviewer: So.

Female B: I think they're just paying in because they know how much they're going to get out of it.

Interviewer: Who do you mean?

Female B: The government.

Interviewer: The government. Well, the government want to explore the possibility of this, erm.

Male A: Yeah, but can you tell me what happened when they decided well, we're going under the North Sea. Oh, the prices will down. That happened, didn't it?

Interviewer: As so.

Male A: That didn't work. They sold it on the open market at the same price and everybody paid the same and it went up.

Interviewer: So the optimistic tone of this board.

Male A: They sold us out to Saudi, we got it back from Saudi, once they cleaned it up, yeah.

Interviewer: So, you're sceptical about?

Male A: Very sceptical about because if they get it, they'll sell it to France, or they'll sell it to somebody and we'll still be getting the rush hour again with gas at the moment. So they'll be getting it from Russia. We'll give it to somebody else. We'll still be paying the same price. They've been in a rack, you don't go to a gas supply of a country and say, I'll have it this week, but I'll make it happen until next week. So how long is the supply in the contract with Russia where we get most of our gas from? Russia.

Interviewer: The gas that we get from Europe.

Male A: Well, Europe.

Interviewer: Well, it'll come over from -

Male A: Comes from Eastern Europe.

Interviewer: Or from Qatar maybe.

Male A: Yes.

Interviewer: So given that we have.

Male A: So all thems the contract. This might be good but they've got to have signed the contract, haven't they?

Interviewer: Okay, so that's a question that you'd want an answer to?

Male A: Yeah. How long's the contract? Was it 20 year?

Interviewer: Okay.

Female D: Yeah, I think you need a guarantee that the prices are going reduce and can they guarantee it?

Interviewer: Okay, that might be tricky to guarantee?

Female D: Yeah, exactly.

Interviewer: And so if, in the absence of a guarantee, would you find it hard to kind of believe the hype?

Female D: Yeah. Without that seal, without really knowing a great deal about this other than what you've told us tonight, I'm not convinced.

Interviewer: And who do you think would be able to guarantee this? Though it sounds plain that George Osborne said it.

Male C: Well, they cannot because they could say, in fairness they could turn round tomorrow and say oh, George Osborne, we'll guarantee that prices will drop by 50% in five year or ten years' time. Well, they're not a government in five. Well, now they say, well, we're not the government any more.

Interviewer: This goes back a bit to the short-termism of planning financially which is maybe by definition a long-term gain. So, you doubt that we have the s-, we have the institutions and the decision making process in general.

Male C: You cannot take it over a longer period than Upholland.

Male F: I've just thought the resource that's left in the world for energy if you like, what may be coal or whatever, it doesn't matter what it is, as they're depleting, which they are every day, we're sitting here. It's depleting all the time. Because nobody can tell me that because the resources are getting less and less and less that it's going to get cheaper. Cause it's going to go the other way.

Male A: Yeah.

Male F: It's going to go up and up and up. Because there's less, there's less there to use.

Interviewer: But if you suddenly have a much larger amount suddenly, much bigger supply.

Male F: Aye, but for how long?

Interviewer: So that's the question you want.

Male F: When that starts to wane through, the prices'll go up again.

(overspeaking)

Male C: For example, with water, right, we have a water supply, Northumbrian water supply, Newcastle with water, right, they have a reservoir. They said, oh, we'll built Kielder, and they built Kielder which is massive. Did the water supply go down? Did your bills go down? No. And they've got a massive big reservoir up there now.

Male G: Well, you know why.

Male C: It's producing electricity up there, cause it goes to Manchester.

Male G: It supplies Manchester.

Male C: Yeah.

Male G: It doesn't supply us.

Male C: So, what are you getting out. So, it was on our bills, we built it. But they sent it all over the place.

Female B: What about, we don't have enough in our country, it had to bring it from other countries that have got this shale? How we can't guarantee that our prices is going to be as cheap as America.

Interviewer: Well this, to do with the security of supply and the kind of self-sufficiency element of it, if we're importing natural gas from country that's fracking, I mean, you know there are transport costs I suppose on top of the extraction costs. And so I guess, you know, common sense dictates that adds a bit onto the price than it would be if it was being fracked in Lancashire.

Male A: Yeah, but fracking in Lancashire say every five cubic metres of it, which is a near Newcastle, isn't it, right, they can get it out for say, $10. Right. But they can import it from France for five. They're not going to drop the price, are they? You know, whether it's five but they're getting the gas at the moment. They're not going to say to all of Britain, oh, we'll drop the price. No, they'll charge you same as what they want to charge from France. They won't drop the price. Well, they won't drop the price. If they're getting gas from France, say, $5 or £5 a cubic metre, right, and they get it out the ground in Lancashire for three. They're still going to charge you five.

Interviewer: So what's the American going right?

Male A: Because the American's always cheaper, you see the price of petrol. Because they don't pay the tax on it. Same at the petrol. We pay 95% tax on a gallon of petrol.

Interviewer: Earlier on we were.

Male A: We're paying tax on the gas and fuel there.

Interviewer: Okay, I mean there are significant differences between the US and the UK.

Male C: There's not.

Interviewer: In all sorts of ways, mineral rights law, the expertise are there, the infrastructure, especially to do with regulations about the lorry drivers and how often they can come without stopping, that is always an effect. So.

Male A: Let's assume that in America if you find oil on your land in America, that oil belongs to you. If you find oil here, in your back garden, it doesn't, it belongs to.

Interviewer: It's the Crown's, exactly. So, just back to this point I was talking about , trust.

[cough]

Interviewer: Talking about this idea of being able to guarantee the prices will drop. Who can that guarantee come from if not politicians?

Female B: Parliament? Like as in through a Bill, an Act of some description or whether they's too extreme. I don't know.

Interviewer: So an Act would make sure that, because I -

Female B: That is some sort of control.

Male F: Solid control on it.

Female B: Aha.

Male F: Rather than.

Female B: Than just words someone's.

Male F: Like to change one of the law.

Interviewer: So, in general there's scepticism about whether this is guaranteeing the goods be cheaper or whether these prices will really drop? And so you've got, it's got to be, they can't really guarantee this because there's lots of sort kind of factors that will determine how much is there there.

Male G: They've put the subsidies down.

Interviewer: I'm not talking of subsidies. Why, what if that was on the table, how would you feel about that? This generous new tax regime, for instance.

Male G: Yeah, we're saying portions of subsidies now and these dams to the windmills you know. You know the each one costs us a fortune every year apparently, you know.

Male C: Does it?

Male G: Oh yeah. Each windmill costs us a bloody fortune. But it's a figure out with the politician which I've forgotten, but it's a very large figure. That we are subsidising, and how far do we go with subsidies? And who will pay for subsidies you know?

Interviewer: Okay, we.

Male G: Are we? Are we ever repaid is the question, you know.

Interviewer: So, I'm getting the sense in the room the people would only kind go for this and give their backing to his if they kind of believed the promises that were being made. Is that fair to say?

Female D: Yes, it is, yes.

Interviewer: And it's hard, it's been hard to com up with a sort of promise that you would be-, yeah, what would constitute something that you could believe.

Female B: Yeah, I think this government's give that –

Interviewer: What about scientists? We haven't mentioned scientists.

Female B: The people that knew how much there was could give more of a guarantee than the government.

Interviewer: Well this is, you know, this is an estimate, erm, and they have various methods for coming by these figures, you know, they're never certain, that's the issue. You can never guarantee, and then there are all sorts of other factors that can be missed, it doesn't come out of the ground, at an economic rate, for instance, protests could shut things down and or there could be lots of regulations that we might deem that could slow things down again. So, you know, you've got to take it as it with a bit of pinch of salt possibly.

Male A: I thing that could be the end.

Interviewer: The corporation tax over 30-

Male A: Yeah. That would bring the prices down, that's the corporation, that's how much he's going to tax them. And the stuff they bring out. It's not going to affect us anything.

Interviewer: Well.

Male A: Is it?

Interviewer: Well, I suppose.

Male A: He's there, he's on about how much you can claim back on tax.

Interviewer: It's a bit of a windfall, isn't it?

Male A: Yeah, in tax.

Interviewer: What do you think would happen to that?

Male A: Our prices would still be exactly the same.

Female D: That would go to reduce the deficit, in Surrey

Male A: We'd pay the same on our gas. It wouldn't make a, he hasn't said that the price of gas here would drop, or then he's going to make him.

Interviewer: People are not promising, people are proponents of this are saying this could happen. You know, they are suggesting that this could mean a drop in prices. But there's been scepticism about that. We'll move on to, because there are risks attached, erm, which we'll mention in all the areas. So I'll just put this other board up.

[cough]

Interviewer: So here we have risks and hazards. So I'll talk you through this one again. So we have seismicity and somebody mentioned that earlier, was that you [name]? So

there were two earthquakes in 2011 or seismic events, you might call them. They were relatively small in terms of magnitude, 2.3 and 1.5. And so that's been reported here in the Times. And they do, they're pretty sure that it was the fracking that caused them. We also have this ground water contamination, has anybody heard of ground water contamination?

Male E: Yeah.

Interviewer: Contamination to fracking?

Male E: Yeah.

Interviewer: What have you heard Male E?

Male E: It's like the water table comes.

Interviewer: Yeah, the ground water.

Male E: It affects all the water tables.

Interviewer: Well, that's, there have been reports that that might have happened and people have figured out, trying to figure out whether that's happened and how it's happened. So, it's unfortunate the Climate Change Research Institution at Manchester University I think that is, they're saying that evidence from the US suggests shale gas production brings significant risk, they're not saying it definitely does, but they're saying the significant risk of ground water and some other sorts of contamination. And this is an interesting piece this one, with ground water contamination. So anyway, so this has predominantly happened in America. So that's the only case study we have of commercial scale production. And so the Environment Protection Agency in America which is the regulatory authority in charge of this, they're doing a big report into it, potential effects on drinking water, and that hasn't reported yet. That reports in 2014 but they have progress reports that didn't really give much away. So, without this authority of the reports kind of having spoken yet, that's been filmed recurrent investigation journalism, there's been a filmed called Gasland which was a kind of environmental documentary, there's been scientists having debates and so on, but you know, we're still kind of looking around to maybe see what has or hasn't happened.

Male F: What's supposed to be the contaminant?

Interviewer: So it's, remember the 0.5% additives of the various chemicals.

Male F: What could be the contaminant? Do you think?

Interviewer: So, it's those chemical additives and some of them are toxic, some of them could be carcinogenic or mutagenic.

Male F: Right.

Interviewer: So, it's stuff you don't want in your drinking water basically, but I'll talk you through this because it's kind of a complex issue. The New York Times reckons there is one case where this has happened. But others think not. Maybe what a journalist thinks is proof for scientists, as maybe hot air, idea of what proof is. So we do have a debate in the scientific community about this and they've said, this ground water contamination could have been caused by three ways. So natural methane migration, and the understanding is that that's for most forms of geology in most parts of the world, that's quite unlikely. So these two, this bit of a

mouthful, vertical propagation resulting from induced hydro fracturing, so that's the idea of these of fractures have travelled up far enough from where the fracking's going on in the ground, maybe two kilometres down, it's travelled far enough all the way up to where the relatively shallow ground water is which could be one, two, three kilometres up, to make a connectivity where those chemicals have then found their way into drinking water. And then this third one, it's a leaky wild casings which is simply that the better the well goes through the aqua belt hasn't been properly built or maintained and it's got in that way. So, people have tried to work out what might be a safe distance to have between you know, drinking water and where your, where the shale is, where you're fracking. And so there's this idea ahead that these fractures doesn't really go beyond 350 metres and there's approximately a 1% chance they'll reach that, and so if they don't, if they only go not that at all, they can't be reaching out.

Male C: What is the percentage of wells in this country with water coming off the rivers? All our drinking water at the moment is being pumped out of Milo(?) right? It's from river water. The Tyne and Wear pumps the water out from what we need.

Interviewer: Is this specifically in the North East?

Male C: Yeah, well, they pump water out of Wear in the way. In the big tanks, right? Then it's sent down the pipe. If we take three million gallons out of the Tyne, the big reservoir, that's three million gallon goal, that's how they supply the water. So we don't use wells here. So, what part of the country uses wells?

Interviewer: It's a North West where there's lot of potential for this hydrofracutring, there are concerns about ground water there.

Male C: So it would end up the same as Bath?

Interviewer: End up the same as Bath?

Male C: Yeah.

Interviewer: What do you mean by that?

Male C: Well Bath originally was drinking water, when the Romans used plunge in. Now you cannot touch it. Its -

Interviewer: Yes, the concern is.

Male C: Same idea as that.

Interviewer: The concern is in doing this process, can these things, toxic things, get into the water?

Male F: Yeah.

Interviewer: How precisely does that happen? And if it's number two, that makes it quite kind of inherently dangerous. If it's number three, well, then if you do things properly and you regulate the company, that can be managed. So that's this crucial thing. What's going on here is there's this idea, it hasn't been proven either way yet, so we're in a state of uncertainty. So given the, we have this risk, could go either way, how would you perceive in this kind of state of uncertainty?

Female B: Well, with caution.

Interviewer: With caution?

Female B: Yeah. Wait until.

Interviewer: Female B, do you know?

Female B: Yeah, let them check.

(laughter)

Male F: Can I just ask, you've found a contaminant in the surface water?

Interviewer: Ground water.

Male F: Is that being produced or is it something that's there already that's coming out?

Male C: It could be like that. That's going to be a lot of stuff coming in the water and they cannot drink it.

Interviewer: It's.

Male F: Is it in the thing they're reducing or is it the thing that's naturally in the shale?

Interviewer: It's the drilling fluid that they're putting down to fracture the shale.

Male F: So they are actually producing this contaminant?

Interviewer: These are the 0.5% chemical additives that perform various tasks.

Male F: This is what I mean. So they're actually producing the problem rather than just extract what they need to extract?

Interviewer: Yeah it's those chemicals are part of the process. That's how they're getting down there.

Male F: Well, obviously, if they know, if they're a part of the process, they must know the chemicals.

Interviewer: Yeah.

Male F: They're introducing.

Interviewer: Hmm hmm.

Male F: So they're obviously, if they're didn't introduce the chemicals into that, they must know the hazards of each chemical. They must do.

Interviewer: Yeah.

Male F: So why?

Female D: They might ascertain whether it gets into the water.

Male F: What this could, if that's saying this could do that here, could, liver failure, whatever, it doesn't matter. If they know what they're introducing into that system, they must know what the consequences could be.

Female B: Yeah, but it's whether it's getting into the water.

Interviewer: It's whether it's worth the risk [name].

Male F: Or it's simply just mechanical, it shouldn't be there. If you want to extract it, if you want to get the, why use something that's creating a hazard?

Female B: Well, it's the only way of getting them.

Male C: It's the same thing.

Male F: Well, that's got to be a risk then, hasn't it?

Interviewer: It's a risk, the question is, is there a risk worth anything?

Female B: Yeah, and I think at the moment till it's, until we know, until we've completed all the reports, it's impossible to say whether.

(overspeaking)

Male F: People.

Female H: Find other areas, find something that might not be as hazardous until you know.

Male F: People told me years ago.

Interviewer: So, are we really talking about. Why don't we talk about precautions, you might call it, which is wait until you at least have a degree of certainty, okay. Is anybody of the other point of view where you kind of feel a bit a trial and error, you go, you do it until something goes wrong, if anything ever -

(overspeaking)

Male F: That's, you know, the cigarettes that.

Interviewer: Yeah.

Male F: It's like introducing a new drug, isn't it, in the.

Female B: Without the trial.

Male F: Yes.

Female H: What is the trial?

Male F: That's exactly what it is.

Female H: America's the trial.

Interviewer: [name], this is a good point because there's no laboratory complicated enough to replicate what goes on in the real world. So if you don't try it out on actual geology, on you know, rocks, on the specific site, you don't, you know you don't exactly what's going to happen. You probably have a pretty good idea before you try, but.

Female D: It can't cover everything, I mean saying that these three things may happen, three possible ways of contamination, but that might not cover everything until something else happens along the lines.

Interviewer: So you're worried.

Female B: But does that not get into a thing like nobody wants a nuclear waste site or whatever, on their turf. Would you not the people thinking, well, it's happened in Lancashire, it's getting into their water, we're all right. You might get people that think that way, just like we, like there's a lot of people that would think well, you know, Sellafield's over there and it doesn't affect us so I'm not worried.

Male A: There's a lot of things that the Americans that we wouldn't do. The one of the dump of the waste, the nuclear waste. Nobody in the States would have it. But there's one tribe in America, in the Indian states,

Male G: Tucket.

Male A: They said yes, in Nevada, we'll have the dump. And they got paid millions and they've got the dump in the middle of their county.

Interviewer: So more broadly you're talking about cultural difference between here and America. Do you think that's sensible, do you think we're missing out on an opportunity because we're British?

Male C: No, not really. If you've any chance of contaminating the water table in this country, it should be stopped. They cannot contaminate the water system.

Female B: How much are you contaminating.

Male C: Well that's it. They're not going to tell you, are they?

Interviewer: Without extracting.

Male F: You can't tell me the water system in America affects those two states. In this country -

Interviewer: We have to stress that they haven't found and proved that this has happened. Are we being overly cautious?

Female H: You can't contaminate that huge area, surely?

Male F: I don't think it's possible.

Male C: They do contaminate it's all the wells in this country could go at.

Male F: I don't think it's possible to.

Male C: It won't affect us, it won't affect us because I won't let it happen.

Interviewer: So really, the kind of conclusion here is to wait for more definitive answers?

Male B: Yeah, possibly.

Interviewer: What if this doesn't turn out to be the definitive, what if they're still saying, there are still uncertainties, we still need more research. What if this drags on for decades?

Female B: Then they've got worries and rightfully so in that case. Is it worth the risk?

Male G: Technology come up with it.

Male F: You have to be risk free these days. Simple.

Female H: How much risk are you prepared to take?

Male C: It depends on what's your, I'll protect it now.

(overspeaking)

Male C: When you look at that water table, it could affect the entire country couldn't it? What if it does?

Interviewer: Let's go back to this idea of seismicity, so, there's this possibility of earthquakes and the Royal Society and the Royal Academy of Engineers have looked into this and they've actually looked into ground water as well, they've said but are manageable, we can regulate both, we might, I think there's a sense in Britain that we might regulate in Europe as well, we might regulate this a bit more stringently than has been the case in America, so, I mean, this eco report could back and say, there have been issues with regulation, there's been new polls, it's been a laissez faire, if that hadn't have happened it would have all been much safer. But with this issue of seismicity, the Royal Society have said these magnitudes are quite small and they've looked back historically in things like coal mining and they've looked at, because that can cause seismic events as well, and they've looked at the sort of typical kind of magnitudes you get from that, and these are very comparable, in fact there's like smaller what you might be expecting from coal mining, and so they've said, well, this is an acceptable flash, if it's below that, then that's manageable. Do people agree with that?

Female B: Well, I suppose it depends because if they're just doing the fracking in Lancashire, for example.

Interviewer: There are various places around the UK. Lancashire the one, is the one that is people are most interested in now.

Female B: But then they're going to be going on all at the same time, and is it all, is it potentially going to produce massive seismic activities.

Interviewer: Well, that's a –

Female B: Well if they're all going on at the same time at various places throughout the country, it's, what kind of effect is that going to have? Is it going to increase?

Interviewer: So that's the question you have about if we were doing this commercially to produce a lot of gas, so, you know hundreds of wells maybe.

Female B: Yeah, exactly and this, it's like I say, is that going to increase?

Interviewer: So how close should wells be to –

Female B: Yeah, yeah.

Interviewer: Because you might not feel these on the surface, but.

Female B: Underneath what's going on, underneath the ground?

Female H: Well, there's got to be some sort of regulation to that, hasn't there?

Male F: Concern, well, it's not a concern.

Female B: You don't just.

Male F: Just a point to make. You got the, you're making a comparison between coal mining and this, right?

Interviewer: This is how they –

Male F: How long? I know, I know.

Interviewer: Sorry.

Male F: How long, how long have the tests been done on this exercise, what you're doing here? What areas? How long has it, well, you say well it's less dangerous than coal mining.

Interviewer: Hmm hmm. So you'd like to see a longer period of research?

Male F: Yes. Because coal mining in this country, you're going back hundreds of years.

Interviewer: The records probably only go back.

Male F: The last ten years you've been doing research, but I don't think it'll be any more than that. I will be surprised if it is.

Interviewer: These are some advantage be rare, I mean there aren't too many …

Male F: I know, but I'm saying, they compare it with coal mining which is part of this country from hundreds of years and they say, well, got a ten year check and it's less than that. That doesn't mean. It doesn't convince me at all.

Interviewer: I understand you're saying this might be an aberration, this might be.

(overspeaking)

Female H: By comparison with the coal mines.

Interviewer: Well, you know.

Female H: There are seismic events all the time in Britain. The kind that everyone talks about.

Male F: It happens all over the world.

Female H: But the problem.

(overspeaking)

Male C: Well the problem is.

Female B: Who knows?

Male C: What do you take the information off? Is, I've said before, we were told that asbestos is great, it'll stop all your fires. And that. Aw, asbestos is brilliant. All the siders said, asbestos is great. What are telling you now?

Female H: Well, how we, they said smoking was okay. You can only deal with what you know at the time.

Male C: Yeah, well that's what they're doing. You can only know at the time. Ah, it's not going to fire.

(overspeaking)

Female H: Exactly. Whatever you do you can only do with what you know at the time. You can't keep saying, we'll have to wait, we'll have to wait. We'll have do more and more research. You'd never get anything done.

Interviewer: Well, that's interesting because earlier on we were kind of.

Female H: Yeah. You're going to take some risks, and you got to weight it up. That's all it is. You've got to balance.

Interviewer: So whatever –

Female H: What you want and what you can risk.

Interviewer: [name] talking of weighing up, if you think that's the previous problem we have these possible benefits, and how we're looking at the risks, do these risks seem worth those benefits?

Female H: Right now, no. If there is a report on its way.

Interviewer: Right now we're not suggesting this could change in the future?

Female H: Hmm hmm. If the report says, that problem is dealt with.

Female B: Or it's gone, whatever.

Female G: That's fine. Because that's the risk we can't explain now. There may be more in the future, but that's it for that one. So, yeah.

Male F: But there are huge benefits.

Female H: Yes. At that point, when you know the vast majority.

Male E: You, massive, massive benefits. That's progress, you know.

Male F: I'm going to go with that. That's massive benefits to be had with that, but you've got to, you said the bit you've got to weigh up for what, what you want.

Male C: What could happen.

Male F: What could happen.

Interviewer: So, [name] you just, I'm really interested, you just said "progress" there. So for you, this is, does fracking constitute progress?

Male E: Yes.

Interviewer: It does?

Interviewer: Does anybody agree with this?

Group: Yes.

Female B: But what happens if they do all that and our energy bills still aren't cheaper? What?

(overspeaking)

Female B: Well then I suppose they're guaranteeing that we're going to have the energy that we do have for a longer period of time, and that -

Female H: We have technology anyway, don't we. What the council do is put in place a set of rules that says you must provide it at the cheapest you can, and who can do more than that?

Male A: Yeah, but they'll round that you wait.

Female H: But will they? You know. For goodness sake. What you can do.

MaleA: Thatcher sold British Gas off.

Female H: You got to keep closing the loopholes as you go along.

Interviewer: Right well, I think that was very interesting guys, I hope you do find this interesting and it's not a chore to be here. I'll put this last board up. Which is really going beyond risk a little bit because I think there's a bit of an argument in the room at the moment. Which is first on this board. We have been talking about it a little bit. So, once again I'll talk you through this really. So, climate change obviously, we've established this is a greenhouse gas, it's a fossil fuel. How big a role will climate change play in your view towards hydraulic fracturing and conventional fossil fuels?

Male C: Has anybody ever worked out what will happen to climate change? Or are we going for the nice stage, to live warm. It happens every so many thousands of years, nobody can me that all of sudden we've burned all this fossil fuel when say 5,000 years ago there was a lot of more earthquakes going up that burned a lot more fossil fuels that we are.

Interviewer: I think on climate change, I'll just say I don't want to get bogged down in climate change because.

Male C: Well, it's all settled isn't it?

Interviewer: Because we're talking about hy-, we're talking about how it relates to hydraulic fracturing and I don't want this to turn to a focus group about climate change because somebody else can do that research. But I think what I would say is that the scientists have a pretty sure, and when you're talking about something so complicated like global climate systems, they're about as sure as they can be that this is a real, a real threat.

Male C: Yeah, but they've got everybody in the world now saying, oh you've got to, don't burn fossil fuels, Mount Etna's just gone up, how much is that going up and how

much is that burning and how much is that going into the atmosphere? You know. It's –

Interviewer: I suppose the argument is we can't do much about the climate.

Male C: You cannot do anything at all because it's the same, Mount Etna's just gone up.

Interviewer: But that's outside of our control what fuels we burn is actually our choice and it's somebody's choice.

Male C: Yeah, but they're saying we're going any global warming, but it's a cycle. While an ice age, so many million years ago, a thousand years ago in this country, didn't we? Or an ice age. Then it got warm. Then it got cold again. Is it going, is it still that cycle? Nobody can say oh no it's not, or oh yes it is.

Interviewer: Okay well does anybody else kind of assume the reality of climate change and does that effect how they look towards this? So.

Female B: I believe it's happening, but I'm not worried about it, like I said earlier, there's other countries that are causing bigger damage than us, in my opinion.

Male F: All that happens now is we'll get a summer and the winter and we'll get –

Female B: Yeah.

(laughter)

Male F: Simple as that.

Interviewer: So all that is –

Male F: There's a massive change if you look for, I mean when I was a laddie you had spring, summer, autumn and winter. It doesn't happen anymore. You've just got 12 months, you just take what comes your way?

Interviewer: So, Male F, how does it affect specifically your view of unconventional gas?

Male F; It doesn't affect it at all. I haven't got a problem with that.

Interviewer: Haven't got a problem with?

Male F: With the –

Interviewer: With greenhouse gas?

Male F: No.

Interviewer: No problem?

Male F: No. Not a problem.

Interviewer: Does everybody agree? Is there any dis-, and would anybody disagree with that?

Male G: To a degree.

Interviewer: To a degree.

Male C: Knew it's happening.

Interviewer: So again we're thinking about price.

Female H: Well, price and just, we use what we got.

Interviewer: Male F, before you were talking about this idea of these finite fossil fuels and you were very much thinking they look like an unwise investment.

Male F: Well, I think it is.

Interviewer: Because eventually.

Male F: I think that, I don't think I, not in my lifetime, they'll not run up in my lifetime but they'll have to eventually because it's took how many millions of years to make coal out of trees falling, it has to go. We're not going to have that forever. I mean, I'll probably have it forever, but future generations will not have so there's got to be alternatives. There has to be.

Interviewer: So in terms of how unconventional fossil fuels might fit in with climate change, there are various ways you could argue that we could, there's a slightly over transitional view about before and the base load view as well. So in terms of the transitional fuel, it's, the idea is it's better than coal. Which doesn't make, we don't burn that much coal in this country, but in other countries that argument makes a bit more sense. The signal(?) centre again, have got a bit of problem with that argument, this transitional view argument. They're saying that we have these young propagations and Copenhagen Accord and they have their low carbon transitional plan and they suggest that shale gas offers a very meaningful central universally transitional fuel. They're also suggesting if develop this, if we put the infrastructure in place, if we have a generous new catch resume, it's likely to, you know, economically unwise and risk our international reputation. So this idea of it being economically unwise, their issue is timescale. They're saying we have these targets towards say 2050, it's 2013, we'll have regulation and we'll have protest in Europe, if it takes 15, 20 years to get to you commercial way exploitation, well, that take us up to 2033 and 2028, and then there's, you burn it for how long? And you stop burning it but it's still stuck in the ground you can get, just because you've got to make another transition because of the Copenhagen Accord, so that's their issue. You know. Do people, so how do people feel towards this idea of a transitional fuel?

Female H: If they something out that will take it on with it.

Interviewer: Take us over, from where we are now to renewables.

Female H: Yeah.

Interviewer: You don' think we can just make this big leap.

Male C: No.

(overspeaking)

Female B: There's going to be problems. With this.

Interviewer: So you don't really trust this?

Female D: When one stops, the other starts, you know.

Interviewer: Aha. But what if, I mean, what if shale gas was this transitional fuel, we'd get an industry, the industry going up and running, we're enjoying, maybe we have a price drop, maybe we don't. And then we just stop? Do we believe that we could, do we have the self-control to do that?

Group: No.

Interviewer: Maybe we have to stop and we maybe scale down to be pouring the sun's not shining or the wind's not blowing etc.

Male C: It will never happen.

Interviewer: It will never happen?

Male C: No.

Interviewer: So the government couldn't say anything that, no checks and balances.

Male C : No, no.

Interviewer: Would persuade you that would happen?

Male C: No because renewal seems like your typical British Gas originally, the gas supply was from coal, it was coal gas. And all the coal there, making gas out of coal. And then they'd said, oh, we found gas in the North Sea, we'll go to natural gas. Right. If that run out, why don't we get it from Russia now? We've lost all the situations that were making gas, we haven't got any stations now will make gas from coal in this country, you know, now they got to import it.

Interviewer: Gas from coal?

Male C: Hmm.

Male C: That's where you got coal from. Gas from coal. That's why we got our gas from, natural gas.

Interviewer: Yes.

(overspeaking)

Interviewer: Right, natural gas rather than coal then I guess is already almost transition it's.

Male C: No, it's found it in the North Sea. That's was why they used it.

Male G: Coal gas killed you.

Male C: Yeah. That's where you got coal from.

Male G: You haven't the gas with you, no?

(laughter)

Male C:You could smell it. This gas, you could smell it.

Interviewer: Well, I'll just go through the second one, basically. So again this is this idea that you need.

Male C: Coal gas, I'm.

Interviewer: I'm 23.

(laughter)

Interviewer: So has anyone heard of this? This concept of base mode?

Male C: No.

Interviewer: We've been talking it a bit that you need a non-renewable there in the background for kind of peak times and stuff like that.

Male C: You've got to use something, you know.

Female B: It's kind of a backup I suppose.

Interviewer: So could you see shale gas fulfilling that role?

Female B; Yeah, potentially.

Interviewer: Rather than nuclear? Or as well as nuclear?

Male C: No, no, you've got to have to keep them both.

Interviewer: What about this idea from Greenpeace that actually they're not sure that you do need this base load for what they think it, it's kind of sensible management and a mix of different renewables you can kind of.

Female H: You said it's sensible management.

Interviewer: Hmm hmm. Sensible management, you doubt that?

Female H: Yeah.

Interviewer: Okay.

Male A: Cause at the bottom we're using more nuclear than people realise. Because we're using the French nuclear. There's big cables under there. In the channel. We're using their nuclear power stations.

Interviewer: That's about 20% almost now.

Male A: You know, we're using theirs so why do we need this?

Interviewer: Why do we need this? Erm.

Male G: Because it's theirs.

Male A: Well.

Interviewer: Well, there's the extra supply, there's.

Male A: Yeah but if it's, it could contaminate the water table and that's something using the nuclear of the French .

Female H: To an extent.

Male A: You don't actually make anything. Yeah.

Interviewer: All right so.

Male A: Electricity ends.

(laughter)

Male A: I've been into pass it on the place.

Interviewer: So what about this idea of peak oil, is peak oil a concept people have heard of before. It should maybe be called peak fossil fuel again. So we've been talking about a lot, we've talked about it at the beginning actually, I think Male F was saying this idea that we're coming to the end of this kind of era of abundance. So, wake up your (inaudible 01:38:34) production or you're about to fall down. But what has unconventional fossil fuels actually be weren't for care further down here and there was actually plenty more fossil fuels to come.

Male F: It seems that you waste stuff like that though.

Interviewer: You think that's the end.

Male F: I say you got to cope with that situation sometime.

Interviewer: Yes so how –

Male F: It's not an endless pit, it's not a bottomless pit.

Interviewer: So how do people feel towards peak oil? Does it concern them?

Male F: It has to.

Interviewer: There were. About peak production. It concerns you?

Male G: But you can't do anything about it.

Interviewer: There's an inevitability about it?

Male G: Yeah.

Interviewer: And, does it just concern people? Or do people think that it fulfil a purpose? What if it forces people to make decisions you say, well, right, now we've got to do something, we'll plan our energy future based on this notion of scarcity?

Male F: Aye.

Interviewer: So it forces people into making a decision, but if that scarcity's maybe taken away or pushed back further, how do people feel about that prospect?

Male C: Well it's the energy companies that are going to control aren't they? British Gas is supplying me with gas, right, now if they run out of gas, the supply they've got, shale gas works. They're going to take a supply from that and still charge me the

same for my gas. It's the energy companies that are going decide where energy comes from. We're not going to turn on and say, well, we'll do for such and such or we'll get it from shale gas, we'll get it from oil. It's the energy companies that are going to tell you, we will supply you with your gas, they're not going to tell you where they get it from.

Interviewer: Yeah, no, Male C and you're absolutely right.

Male C: I know. (laughter)

Interviewer: But what about this idea, what about more broadly in the future? Do you not feel that you have a stake in forcing people to make wise choices now?

Male C: No, because.

Interviewer: Basically beyond, you're saying from what, tomorrow?

Male C: Yeah. But the energy companies are still going to be there. They know how to make money, they're still going to be leading the chase at the end of the day. In 30 or 40 years' time, they're still going to be there. We'll supply you with gas. We'll supply you electricity.

Interviewer: What about the idea that it's only a good energy company that will make a profit?

Male C: That's work, that doesn't work because they sent it there vegetables. Organic vegetables. They're better for you. Oh definitely. But you pay 20p a pound more. People won't buy it. People aren't going to go out on that and say, oh, I'll spend an extra 50p, I'll spend £300 a year extra because my gas has come from a good supplier.

Interviewer: So back to this idea that.

Male C: Yeah.

Male G: Did it?

Male C: Where?

Male G: All over the place.

Interviewer: Back to this idea of peak oil, so, if, if unconventional fossil fuels could push this back further into the future beyond the horizon, that's a good thing?

Male F: Yeah.

Female B: Hmm hmm.

Male F: It has to be.

Female H: As long as.

Interviewer: Any dissenting voices? As long as?

Female H: People still know it's coming and start planning and really push. Don't just let it go, because it's in the future.

Female B: Yeah. I mean … the next time.

Male F: What, you know, I have to be honest, and I'm copping some stick here tonight, I, me for one, will go out of here and took on board everything that's been said and know exactly what should be done, and what shouldn't be done.

Female D: But you'll still forget.

Male F: But will you be tomorrow morning? Because you'll just carry on the way you've always done.

Female H: Hmm hmm.

Male F: Because that's the way people are, and if they cannot convince ten people, how are you going to convince the whole nation?

Female H: I'm just trying to convince.

Male F: Well, what I'm saying, I'm just saying.

Male C: Which is why.

(overspeaking)

Male F: That's why we're here. Course it is. But we hope.

Interviewer: Talking about people making decisions for us, sorry, I actually want to move on to this side of the board. We've got issues to do with lobbying so there's some stories, one's from the Guardian, there's this one from America in the New York Times, which is about the proximity of industry and government. What do people think about these sorts of stories when you read them? I can predict it.

Male C: Because, pockets.

Interviewer: What about the argument that the government has to have a relationship with industry or science has to have a relationship with industry because if they -

(overspeaking)

Female H: Can't get money anywhere else. To do the research, to do whatever.

Interviewer: Yeah. And so? Do you have a, is there a solution to that because presumably from what's been said in the room, people would be worried about science being funded by the industry. Is there anything that can be done to allay those fears? Is that it? That this has no meaning anymore because it's funded by this company or that company or is this?

Female H: Well, there should be something, it depends on the checks they pull.

Interviewer: Well, they have the peer review system where over academics will essentially mark the work, I know that's kind of a thing, a standard they keep to.

Female H: If that works.

Interviewer: Is that enough?

Male G: Renationalise.

Interviewer: Renationalise higher education, is that what you're talking about?

Male G: No.

Interviewer: More public funding for science? That's –

Male G: Energy.

Interviewer: Energy? That's the, what's, how does that help us? Do you imagine?

Male F: You'd then have a central organisation presumably who would develop and control and investments and so, spend the money.

Female H: Perhaps they don't.

Male G: But the big –

Male ?: Bureaucracy.

(overspeaking)

Male F: I would probably have this.

Male C: That's a perfect example, petrol. I mean, petrol's a certain price. And everybody what, diesel, we can get double the mileage with a diesel car. What the companies do? The doubled the price of the diesel. Diesel is now more expensive than petrol is. And they've done it just so they can make more money. Diesel used to be half price.

Female H: They're a business.

Male C: It did didn't it?

(overspeaking)

Male F: Everybody wanted a diesel car up the road.

Male C: Because they run and they doubled the price. Nobody's said anything about it, the government didn't say oh you cannot do it. No, because they keep the money off the tax. And they're going to do that all the time. It's like big companies are going to control everything.

Female H: I know. That's why capitalist society, we're not communists.

Male C: No, but I'm saying.

Female H: That's, that's, it works.

Male C: Yeah. That's the way at home.

Interviewer: So energy's always going to be really problematic for you guys because there's this idea that these industries just want to make money, they're not in it to help you.

Female H: Yeah.

Male C: And the government wants them to make money.

Interviewer: But what's the alternative to these industries providing us with electricity? Providing our electricity for ourselves?

Female B: Yeah.

Female D: Yeah.

Interviewer: There's a lot of strength of feeling, a lot of strong feelings in the room would that move you to, you know, have your own wind turbine if you can –

Female B: I think every garden should have a wind turbine.

(laughter)

Female B: Or we need, they're so expensive, that you cannot, not every household can afford these things so they need to invest money, more money in renewables and more money in enabling people like ourselves to.

Interviewer: Where do you think that money could come from? We were talking about the tax going forward and –

(overspeaking)

Female B: You know. You sort your money, we're saying, well, spend it like that. You wouldn't mind.

Interviewer: In seriousness, if there was a pledge to say you know, we'll spent 20% of the tax revenues from the next ten years or whatever on schemes for micro generation, increased efficiency of.

Female B: Yeah, that's fair enough. So they gaining it, they're just going be, is it just benefit low income benefits households like the equal affordable warmth? You know, or is it going benefit us working class people who perhaps are just above the threshold, you know, to get any.

Female H: The whole idea of benefits everybody because the reduction of the centralised energy is less because they're doing it where I live. If they just said, right, everybody, it doesn't matter, benefits, whatever, it's every property will have.

Female B: Well, in here, I suppose through the green deal, isn't it? That every household should be able to access renewable energy or at least some sort of energy efficiency.

Female H: Yes.

Female B: Sort of measure, but we're paying for it. Unless you are in receipt of a certain benefit. And disabled. Or have a child under 20.

Female H: It's crazy. Because they're not in –

Interviewer: So if we bring it back to hydraulic fracturing guys and then conventional gas, what are your overall impressions that you come away from tonight with? Does it worry you? Pardon?

Male G: It's very complicated.

Interviewer: Yeah, I think that's correct.

Male C: Basically what's the water jam. That's the main object I've got against it. If it's going to effect that water table, Because once you do it, you cannot bring it back.

Interviewer: So you'd be interested in seeing some research into that?

Male C: Yeah.

Interviewer: The Royal Society think that that can be managed.

Male C: Yeah, but once you do it, it's not reversible. You cannot do the water table against what? We'll take it out again, it's in there.

Male F: There has to be a means of taking whatever contaminants that come up from that process, taking it out the system. And put clean water back in the river. There has to be. There has to be. There has to be.

Male C: No, no, what they're on about is fracking and it's going into the.

Male F: No, what I'm saying is there has to be a means of taking any contaminant out of that process and scrubbing it, if you like, and taking it out of the system.

Female B; Before it reaches the decent water.

Male F: There has to be, there has to be. It's like, what, a filter of some description that can combat whatever contaminant's coming out of that process before the water that goes through it goes back into the water ways. That's the big thing.

Interviewer: I think that's.

Male F: Has to be.

Interviewer: The water comes back up to the top. They will treat it, they will try and recycle as much as they can.

Male F: Will that stop it?

Interviewer: When it's in the ground.

Male G: It's the crack in.

Interviewer: If it does get into the water table, I think what is in there is probably quite difficult, to get a handle on that.

Male F: You're going to be, it's going to be virtually impossible for it get into the water table at the distance you're talking about below, below ground.

Interviewer: That's if it's the vertical propagation, that.

Male F: Yes.

Interviewer: If it's the faulty well construction –

Female B: Which could be quite common.

Group: Yeah.

Interviewer: So what do we think about?

Female D: You just have –

Interviewer: So given this is a big issue, given this is a big issue, what do you think about the regulation of these wells?

Female B: It's going to have to be tight.

Interviewer: It's going to have to be tight?

Male C: It's got to be tight.

Interviewer: Because recently we had the horse meat thing and the FSA, everyone was saying well, what are the FSA dong and they said, well, they cut our budget, and we don't have enough staff so we couldn't testing less.

Female H: At least they found it.

Interviewer: But what about this idea that your regulation is only good as your regulator? Your, the capability that you have?

Male F: Yeah, but that, I have to say that I mean, I've done all the, this is starting in this country yet. But if it does, I'm quite confident that the governing bodies for that sort of thing will not allow that to happen.

Interviewer: Okay, so you're happy?

Male F: I think the structure's there to prevent anything happening like that.

Interviewer: Do people agree?

Female B: Yeah.

Male G: Yeah. I think this country'll be more stringent than America.

(overspeaking)

Male F: I work in a chemical plant and there are restrictions that we work under. The FPA and other and I cannot see that there'd be any way that anything like that would be allowed to go ahead unless the restrictions were in place. I cannot see that happening.

Interviewer: So what about, what about beyond these risks, more broadly, I've got this title here, Tomorrow's Energy Source? Does that sit well with people, do you think this is an energy source for tomorrow? A wise choice?

Male F: Well.

Female B: No, until that report.

(laughter)

Female B: That's not going to till 2014 which is.

Male F: I know but the thing is, it might not be a wise choice in our lifetime, but it's somebody's going to be sitting in the dark in 2050, it might be wise for them. That was why you've got to think of people long after we're gone. They want the same facilities we've got.

Interviewer: What if this report comes out in 2014 and it's inconclusive, it says, we're still not sure, there's still uncertainty. How would you?

Male G: If there's uncertainty something done.

Interviewer: What if this ends up being kind of unknowable for the foreseeable future? What if they can't be kind of understood?

Male F: Well then it became a situation, is it a viable uncertainty or is it not? Because one edge of it it tells you you either have that or you haven't got it, or you take the chance and you've got it.

Interviewer: And who makes these decisions for us?

Male F: Well, that's the thing. That's the thing. That's the big thing, isn't it?

Male C: There's plenty of silence one side and if you buried nuclear waste, what how you seen they're having to word it, how do you seal it? In 50 years' time, we might find out how to use more energy out of it, you've got to be able to let them get in. So how do you actually seal the places, that's the problem.

Interviewer: I think they stopped calling nuclear waste burial and started calling it disposal because burial has –

(laughter)

Male C: Well, that's a point though, innit?

Interviewer: Well, anyhow guys, we have five minutes remaining and so what I will do is bring the discussion to a bit of a close now and I'll just give you a quick debrief, basically. So, thanks all for coming basically. So this research that we, we didn't tell you at the beginning that it's about hydraulic fracturing, that's because we wanted to have kind of grounds of discussion in what we talked about with energy. The hope is that we end up having a kind of a more considered discussion. Two hours is, I guess it goes by quite quickly but the whole point was to try and move from kind of, kind of simple positions that I think a lot of the people assume the public are going to have and try and demonstrate that we can kind of look at these issues as complicated issues, as kind of dilemmas, it's difficult choices, that sort of thing, so that's what I was really trying to do here today. So thank you very much. I think that was a very interesting discussion and I hope, I hope you feel the same way as well. And so does anybody have any questions about our research? No?

Male C: So what are you hoping to be, a scientist?

Interviewer: Well, I did, I'm, I suppose I'm, I did a bachelor of art and I did human geography, so I suppose I'm a social scientist in general. And so I'm looking at the science to look into basically what the public think about this. What they see as being acceptable, how they justify the opinions they form, what sort of factors are playing a role in what they think and so on and trying to demonstrated basically, trying to say something about that the public think about this and whether it's acceptable or not. And so that's what my research is going to try and do. And so I'll be writing a thesis using your words and I'll be writing a academic journal

paper as well. And so, that's hopefully what your words will contribute towards and so I, I have, are people interested in, it's something that academics like to give people the option. Are people interested in seeing a summary of my thesis when it comes out? So I'll get your. Does anybody have an email address actually, I think I talked to [name] bout this before and maybe no everybody does.

(Focus group ends at this point, what follows it general chat about email addresses and passing on thesis details. Disregarded as per instructions)

[End of Transcript]

Appendix 3.2 – Transcript Group 2: Mothers with young children

Interviewer: So thanks for coming everybody. My name's Laurence. I'm a postgraduate researcher at the University at Durham and I've had you all gathered here tonight. We're going to talk, have a bit of a debate hopefully about issues related to your energy and to climate change. Before we get on with that just go over a few things, we're not using that camera, it looks a bit ominous up there I know, and I don't believe anybody's spying on us through the window. But I am just using a dictaphone and I'll just explain what will happen with that. I'll load it onto my laptop and the files will be password protected and we'll pass them onto a company that will transcribe it for us much quicker than I could, but we'll digitally edit the names out before we do that, and so just to keep everybody anonymous and data protection and so on. And then when I use these discussions and write them up I'll be writing a thesis and I'll be writing an academic journal paper. We'll be using pseudonyms and again that's just data protection again. Brilliant. So just by way of an icebreaker if we could maybe just go round and clockwise seems fine to me, and just say what comes to mind when we hear the word "energy".

Respondent: Bills. (Laughing)

Interviewer: Bills. That's a common response. Bills. And...?

Respondent: Yeah, similar. Bills.

Interviewer: Similar.

Respondent: Gas, electricity. And bills.

Interviewer: And [Name]?

Respondent: Yeah, bills. And savings.

Interviewer: Bills and savings?

Respondent: Yeah.

Interviewer: And [Name]?

Respondent: A similar kind of thing I support, solar power and things like that come to mind, but mainly bills and prices going up.

Interviewer: Sure, prices going up. Okay. And [Name]?

Respondent: I think we're all the same, gas, electric. I would maybe think wind power as well, solar power.

Interviewer: So different sources and a lot to do with consuming and the cost. That's okay. Anything different or more of the same?

Respondent: There's nothing other than energy, like if you just said to us, "What do you think of energy?" jumping around like you've got loads of energy. If you're thinking in the context of electricity and stuff, solar power, things like that, same thing.

Interviewer: And finally?

Respondent: And also just what we use in the future.

Interviewer: Okay, so the future?

Respondent: Yeah, so looking at potentially which way to go, or is it a combination of things or not. Because you can have so much but where does that stop, how is it going to stop?

Interviewer: So is energy something people worry about? We have worries about price has come up already.

Respondent: Yeah, I think it's definitely something that you think about, the future of what's going to be used and how it's going to be used.

Interviewer: More fears about energy?

Respondent: Yeah. I suppose I'd go to the future maybe inevitably more nuclear energy, the safety issues around things, we clear up and it's all going to be cleared up but we won't know that until later if there was a accident, you know, perspectives. That's my view I think.

Interviewer: Am I right to assume that we kind of all appreciate what energy enables us to do in our day-to-day lives, so whether that's petrol or whether that's electricity?

Respondent: Yeah.

Respondent: Yeah.

Interviewer: Some of these are to do with the future or to do with price, and to do with that being constrained in the future?

Respondent: Possibly. And if you look back and compare what you used to use, and now you have like hair straighteners, mobile phones on charge, laptops on charge, and that's something that we didn't have as kids, so a lot more usage, so perhaps in the future what's that going to look like?

Interviewer: So you think we're using more energy generally?

Respondent: I would have thought so, yeah.

Respondent: Yeah.

Respondent: Take it for granted as well.

Respondent: Yeah.

Interviewer: Take it for granted?

Respondent: Yeah.

Interviewer: So for instance when you flick the light switch on it's taken for granted, so does it ever cross people's minds, where is that coming from?

Respondent: It's more, I think, turn the light off because it's going to cost you money.

Respondent: Cost you money.

Respondent: Yeah.

Respondent: Rather than I know that's a really bad thing to think but it's more that than, "Ooh, I'd better turn this off because we're using more than (inaudible 00:06:03)."

Respondent: Yeah.

Respondent: Yeah.

Interviewer: So there's this idea that it enables us but maybe that can't be taken for granted for too much longer? Do you see that coming to an end?

Respondent: Not for a long time. Certainly not in my lifetime.

Respondent: No.

Respondent: No.

Interviewer: Not in our lifetime.

Respondent: Also on balance with that, for me I always wonder about how say for example car manufacturers or big businesses buy ideas so that they actually govern that. So I know electric cars are coming through now but they're really, really expensive and it's sort of slowly catching up but there's a certain amount of money that they've invested in that technology that has to be paid back. So, you know, ideas that cars can run on, well they can run on vegetable oil for example, it's not gone that way because the money has already been invested one way, so they sort of hold back, I think. A bit cynical.

Interviewer: That's a really interesting point. So there's..?

Respondent: Why the whole dependence on oil? We could actually run without oil, if technology was put that way or money was put that way, but then it wouldn't benefit the people that are already in business that probably run a lot of things.

Interviewer: So I think there's quite a few interesting (inaudible 00:07:27).

Respondent: Yeah, but you know what I'm trying to say. I'm not saying it very clearly but that's...

Interviewer: So there's this idea that kind of decisions we make now, it takes quite a long time to feed through.

Respondent: Because it's governed by business.

Interviewer: So there's also that idea that the kind of choices we make when we talk about energy...

Respondent: I don't like it.

Interviewer: So you're saying the main logic that's driving that if you like is business? Where there's a market for it?

Respondent: Yeah, definitely.

Interviewer: Would others agree with that? In terms of technologies with energy that might come in useful at some point in the future, what's the motivation behind people advancing those technologies?

Respondent: I don't think it's people inventing. Somebody could invent stuff and get bought out by somebody that's got a vested interest in that not being introduced. I think that happens. I can't say hand on heart that I know for a fact but –

Respondent: They make more money without that invention.

Respondent: Yeah.

Interviewer: So there's this idea of some people called it "lock-in".

Respondent: Right.

Interviewer: So you build up all of this infrastructure and you get used to a certain... say it's cars and roads and so on, and then it's very hard to get off that because this kind of incumbent interests are all kind of wrapped up and our lifestyles become wrapped up in that. So is that a dynamic that people see? Is that something they recognise?

Respondent: Not necessarily.

Interviewer: Not necessarily? So what do you think about, so we have electric cars which a lot of people might think sound like a good idea.

Respondent: Yeah.

Respondent: Yeah.

Respondent: They're using different energies as well though, aren't they? Different source of energy so it's still...

Interviewer: Yeah, they're not unproblematic.

Respondent: Yeah.

Interviewer: But it's this idea that we have all the infrastructure already in place and so making a transition to electric cars is a bit of a hassle, we'd have to build all new petrol stations, well obviously not petrol stations.

Respondent: Plug in stations. You can only do so many miles, can't you, and there's not that many places you can charge them up and I think at the minute do they take so many hours to charge them up, so that you couldn't logistically do a long journey that you could probably do with an ordinary car at the minute.

Interviewer: There's always the question with technology about could it be improved? And we had this with wind farms and all sorts of things. Do you think they're blocking those technologies from becoming better?

Respondent: Yeah. I think as well it's a bad way of thinking but you sometimes think what difference is one person doing that making a change going to make? If everyone doesn't make this change what's the point kind of thing, and I think society just goes along and you get carried and wrapped up in your own day-to-day business and you forget about the difference. So if it could be made easier and could be made more global people would probably recognise it more.

Interviewer: That's an interesting point. So these changes, these choices, they kind of have to happen at the level of the whole society or maybe a global level?

Respondent: Yeah. We shouldn't think like that but you do think like, well one person changing isn't really going to help.

Interviewer: Do others go along with that view?

Respondent: No, I don't think what's the point, but sometimes there's difficulties with... there's always something there that would kind of distract you from doing it I think. It's not that I say, "What's the point?" I don't think like, "Oh, I'm not going to bother," but it's just there's always something that you think, "Oh, that's the..." Like for instance the cars and having to plug them in at night if you haven't got a plug-in source so there's always something to try and deter you. The price of them, why would you pay so much more? And it isn't because you think, "Well why should I bother?" it's more like, "I haven't got the money, so that is why I'm not going to do it." The same as the solar panels on the roof, they've now stopped doing... why the government haven't just told everybody to stick them on anyway, whether they look bad or not, just do it. Put them on. Then you make the money off what the sun can provide.

Interviewer: That's interesting. So there's a lot of things that constrain us from doing these things. So we've been talking about electric cars, maybe if we go on to solar panels, what would it take for people to... does anybody have a solar panel on their roof?

Respondent: Well the government schemes did start running but very few people had it and you didn't have any back up as I say for these people to be coming putting stuff on your roof, so you had a knock on the door, "Do you want to do it?" and then no follow-up, and then the next time you ring up about it it's, "Oh, the government funding's ended," and then it's a costly process, so it doesn't like work.

Respondent: Yeah.

Respondent: Yeah.

Respondent: And then they go around telling you this, but unless you do it you're not going to know it but you're not going to do it unless it's proven that it's going to reduce your electricity bill.

Respondent: It's a good idea.

Respondent: It could maybe be made more known. You don't see any adverts about it or nothing's advertised about it, it's just you see them cropping up every now and again.

Interviewer: So that's interesting this idea of proof. Do other people feel that, thinking about changing, so that's say more renewable sources of energy, there's kind of a lack of proof, a lack of clarity out there?

Respondent: I think so, yeah.

Respondent: Yeah.

Respondent: There's no guarantees and I think it's an era of experiments, and there's no factual at the end of it.

Respondent: I think it's a hard time because everybody is having to cut costs, so to enable you to do these things you have to pay for them outright, for instance solar panels, but it's something that you don't want to pay for unless you actually are going to get the

benefit from but you're not going to know if you're going to get the benefit from it until you've done it, but it's the cost in the first place.

Respondent: Yeah.

Respondent: It would be in thousands, it would take quite a few years to even start recouping the money.

Respondent: Yeah. And in this day and age we want to see results now, quick, not in five years, ten years, recoup what you would have spent in whatever. I just think it's a vicious circle so you're stuck on it because you don't want to step outside of that and then end up with something that's not as it's said it's going to be, and it's jumping off the bandwagon.

Respondent: We're all stuck on it.

Respondent: Yeah, we're in a little hamster wheel.

Respondent: It's outside the box. You've got to either take that step and take a risk or you stick with what you've got and kind of just keep plodding along.

Interviewer: So you do see these new technologies as a risk?

Respondent: To start with, yeah, on an everyday basis unless you've got the money to sort of put into the idea. I think until it's proven, it's more widespread that it's available, easier without the cost in the first place, I just think it's too easy, well in my life, to stick with what you're doing and –

Respondent: Yeah.

Respondent: Yeah.

Respondent: – you're so used to using gas and electric and you've done that for so long to then change to something completely different. And that probably will change in the future but at the minute I think times are hard so you don't want...

Respondent: To risk.

Respondent: – to risk it, yeah.

Respondent: And sometimes you probably trust word of mouth better than you trust things that are written down. When a friend's had it done and you think, "Good, maybe I will do that," rather than reading things on the internet and trusting everything you read.

Interviewer: Talking about reading about things on the internet or maybe interest in kind of a neighbour or something like that, this issue of proof and being persuaded that stuff works comes up quite a lot, and people are always very sceptical. What would persuade you? Because you said looking on the internet maybe wouldn't persuade you, it's a bit of a minefield, you don't really know what is a reliable source and what isn't. How would you go about figuring out if this was for real or if it was maybe being over-hyped or something like that?

Respondent: You'd have to really research it, wouldn't you, and get examples of how –

Respondent: Yeah.

Respondent: Yeah.

Respondent: – (inaudible 00:16:23).

Respondent: Yeah.

Respondent: Yeah.

Respondent: And guarantees.

Respondent: Yeah.

Respondent: Yeah. Guarantees.

Respondent: Incentives. Something like not like you're going to get this in ten years' time, you know, you're going to gradually over the years recoup the outlay. Instead of saying, right, you're going to save this in ten years' time, this is the amount you're going to save, why else do you have that initial outlay, you're going to save this much back on an annual basis during that period of time.

Interviewer: And see it written down and worked out?

Respondent: Mm-hm.

Interviewer: I mean this idea of doing research, can anybody imagine spending hours trawling through websites doing this research?

Respondent: I'd want to see somebody's energy bill who's had solar panels, proof to say, look, this is what it was prior, this is what it is now, I am saving. But it would have to be somebody then that you would know and trust because you could Google it and come up with all sorts.

Respondent: Yeah.

Interviewer: Well I'll change the topic ever so slightly and just talk about stories in the media about energy. Is this something people notice a lot? Is it something you pay attention to?

Respondent: Yeah, they're going to hike the prices up and then they're getting investigated by like (inaudible 00:17:53) like that and what have you.

Interviewer: Okay, so stories about the energy industry, and...

Respondent: Yeah.

Respondent: How much money they're making.

Respondent: Yeah.

Interviewer: There have been a few of those recently.

Respondent: Yeah.

Respondent: More than anything.

Interviewer: Yeah, so how do those stories make people feel? That's an obvious question.

Respondent: They feel ripped off.

Respondent: Yeah, completely hacked off, yeah. I think it's all about greed, isn't it? These big companies just –

Respondent: (Inaudible 00:18:22).

Respondent: – yeah, and kind of like advertise a little bit more.

Interviewer: So you associate the energy industry with greed?

Respondent: Yeah.

Respondent: Mm-hm.

Respondent: Mm-hm.

Respondent: With any kind of major large worldwide international company it's all about greed and making more money and getting bigger, fatter bonuses, isn't it?

Respondent: (Inaudible 00:18:45) rang me before, just because I'm savvy at switching my energy and have been for years and I was rang he said, says, "Oh, you should be on this tariff."

Female: Yeah. Aha. Yeah.

Interviewer: So you say you do switch tariffs?

Respondent: Yeah.

Respondent: Oh God, yeah.

Interviewer: Because there's been stuff about how they're complicated and...

Respondent: Definitely.

Respondent: Yeah.

Respondent: I don't get the tariff thing.

Interviewer: Well that's part of the problem.

Respondent: I know it's part of the problem. Surely it costs an amount to give you so much electricity. Why is it different rates?

Respondent: Yeah.

Respondent: It's like petrol, it's not different rates at different times of the day or like that, the weekends or... I know it does change because of tax and so on and the cost of oil but it's not as bad as you have certain out of this, certain out of that, it's like a phone bill, it's crazy.

Respondent: Just going back to greed again.

Respondent: Yeah. Because they can do it.

Respondent: And because the petrol station which is slightly more remote can just charge you whatever they want and it shouldn't be the case, they should charge throughout and it's mad.

Interviewer: So that's interesting. I've head this sort of stuff before. We had some older guys sitting here last night actually, these two seats, and they were a bit older, they were all giving us tails when...

Respondent: I was a lad.

(Laughter)

Interviewer: This sort of thing was centralised, the government kind of ran this sort of thing and it was much simpler. There wasn't choice.

Respondent: Yeah.

Interviewer: And some people are seriously talking about this, I don't know how seriously it would be taken at the very top, but about returning to a time when there is a supply and that's the price. Now that price could be a touch higher because there isn't the competition. So what do people think about this trade off?

Respondent: I think it's a difficult one, isn't it, because if you went back to like, we've got British Gas and what was Northern Electric I think at the time you've then got, like you said, they haven't got the price wrangling, but then you may find that they have a loyalty to you, and because everyone's using them they maybe offer better deals, I don't know, but I can't see it returning to that personally but...

Interviewer: It's a bit faceless, isn't it? It's a bit remote?

Respondent: Mm-hm.

Respondent: Why would it increase the price?

Interviewer: Well that's the counter argument. I don't necessarily know that it would.

Respondent: Because surely you've got all the property getting everybody's money surely they should then reduce it.

Respondent: Mm-hm.

Respondent: Definitely, put the money that they profit into other things. It would be another revenue, wouldn't it, rather than...?

Respondent: Yeah. You're right.

Respondent: But because they've got no competition they wouldn't. It wouldn't matter. They'd price it at whatever they want.

Respondent: But then if they govern it to say, well you can't. Because I can't understand why it would be more.

Interviewer: I kind of agree with you, it's a bit counter-intuitive. This isn't necessarily my position, I don't quite know enough about that side of things, but I suppose the argument is that there's the wholesale price that they buy it at but then they have these other costs, the customer service stuff, the staff, and so I guess they're

competing on those kind of profit margins if they are. I guess that's the argument. It is difficult.

Respondent: The only thing I can think of is like the mail. Now it's open to anybody Royal Mail have had to up their prices because they had competition, it's the other way around. They've upped it because of the competition rather than keeping it at a low because there was only Royal Mail.

Interviewer: I think it's hard to predict how it would go. I think that's part of the issue. So there seems to be kind of a sense that energy is this very fundamental thing, we all have to have it, and it's kind of too important to leave it to the energy industry alone to sort it out. Is that fair to say or am I putting words in people's mouths? So would there be kind of support to see the government get a bit more involved in this sort of thing? Because they like to try not to do that if they can possibly help it.

Respondent: Because then it becomes political though, doesn't it? It becomes like, yeah, it's fighting for like –

Respondent: Power.

Respondent: Votes.

Respondent: – yeah, which isn't energy and trying to save money and make the world a better place, it's about who has got the best ideas and who's going to win the election. Yeah, it becomes political.

Interviewer: For me that takes us back to the beginning of the conversation, I think it was you, Kylie, when you were saying it's very much about the future and the decisions we make now, they'll have big implications and it kind of works on a long timescale. So if we say that and we have elections every four or five years or whatever, saying that do you think politicians are well placed to be making decisions about energy?

Respondent: They're intertwined with business, everything, and I saw Al Gore on Newsnight, I can't remember what he was saying now but it was brilliant. But it was trying to take out the business and the politicians and it's the only way that we can progress because it's so intertwined with making money, the way people make the decisions and it's so short-term because it is about getting votes, but we're not thinking about the future because it's literally here and now, staying in power, and how do you move on from that, because it is difficult, isn't it?

Interviewer: I don't think that we do have an answer to that question.

Respondent: No.

Interviewer: So that's very interesting guys, thank you. I want to just talk a bit about different sources of energy now and how you view them, what you see as the negative side, what you see as the positive side, and how you weigh them up against each other. So the different sources of energy, we have what we traditionally use and what we still use quite a lot of and I suppose would say fossil fuels, oil, gas, coal, I didn't need to tell you that I'm sure. How do people view these sources of energy?

Respondent: Coal is a dying commodity now, isn't it, because it costs more money to dig it out of the ground than what they actually sell it for. Is that not why they don't mine it anymore? So there's loads of it there, but...

Interviewer: In the UK I think you might be right that they've got all the stuff out that was easy to get out, and so you think coal has kind of had its day? Is that purely because it's not economically feasible or are there other reasons why people might see coal as becoming an energy source of the past?

Respondent: Well I think for that reason, because in the UK they can't dig it out for less than they could sell it for so it's just left doing nothing unless they mine it and sell it possibly abroad or something.

Respondent: And also it's bad for the environment I think, it's just I think it would be an absolute (inaudible 00:26:40) to come back to coal, because of the environment

Interviewer: Yeah, I think you may be right.

Respondent: (Inaudible 00:26:46).

(Laughter)

Respondent: I think that's what would happen.

Interviewer: So in general terms fossil fuels...

Respondent: They're worried that they're not going to last forever as well –

Respondent: Yeah.

Respondent: – because, you know, at some point they're going to run out, aren't they?

Respondent: Yeah.

Respondent: And it's to think what could be used instead of or environmentally friendly, but they're not going to last forever.

Interviewer: So at some point...?

Respondent: Obviously a long way in the future. I'm sure there's enough to sustain for a long time but...

Respondent: You do worry about your family and the future, what it's going to be for them.

Respondent: Yeah,

Interviewer: Okay, that's interesting. And so the coal and gas we currently burn for electricity which is still a fairly significant proportion, at some point or other we're going to have to make a transition.

Respondent: But this could be, you know, it's not instant, it's obviously a long, long way in the future, but things are going to have to start being thought about now, which they are obviously, to think of other things now there's wind turbines and solar power and that kind of thing, so it is starting.

Interviewer: Are people glad this decision making process is starting? Should we put it off for as long as we possibly can? Should we do it as soon as we can?

Respondent: You've got to be prepared.

Respondent: Yeah.

Respondent: Yeah.

Respondent: I think it should start sooner than later.

Respondent: For what was said before. Once it starts it's expensive when it first comes out. The longer you have it obviously the more cost effective it is to like more people, so obviously the sooner it's done like in future generations obviously it'll be more readily available.

Respondent: It's probably as stupid as like people didn't used to have cars, did they, but now everybody's got a car. So people didn't used to have solar panels and although I'm saying I would want to see a result it's not to say in the future that I'm not going to have to get them, because that what happens, society moves on.

Respondent: The thing that frightens me is that we're such a small part of the world –

Respondent: Yeah.

Respondent: – and then the whole developing world comes along and picks on the technologies that we have that are available and we turn round and say, "You can't use them." They're becoming developed and if we had technologies that were cleaner that we could actually introduce, we do need to get a move on. And I don't think it's that, I can't remember what's our gas reserves, it's not that long. I mean I can't remember but I know I remember thinking, "That's not a lot."

Respondent: What isn't?

Respondent: 30 years or 40. You know, it's not... well I'm not sure but it's not that long. And I think they have to work on making it achievable for every day people rather than it being something that it's a minority who can build the houses that are all self-sufficient.

Respondent: Eco-friendly.

Respondent: Yeah, it's not something you're seeing all the time. Before you'd see the programmes about it but it's people with a lot of money. But that's my opinion of it, you've got to have a lot of money to do the right things.

Respondent: To start it. Yeah.

Respondent: And they've got to maybe think about making it a bit more cost-effective for every day people for it to take a big effect.

Interviewer: So we had the idea that it maybe starts off expensive and then you kind of get better at it, the kind of technology and stuff like that, and we've had this idea about these kind of long-term future decisions. There's this tension, isn't there, between these maybe painful decisions in the short-term that kind of pay off in the future, and they're quite difficult decisions to sell to people, I mean they're not vote winners I don't think.

Respondent: No.

Respondent: No.

Interviewer: So what do you make of our prospects, our current politics and how we have debates in society? Do you think we're well placed to make these sorts of decisions, kind of proactively?

Respondent: No, not really. We're not given the right advice and the long-term solutions. We're not given those choices as yet. Possibly will be in the future, probably not the too distant future either, but at the moment I don't think we're given enough information, advice, to make decisions about renewable energies and things like that.

Interviewer: How do other people feel? Does anybody disagree? Does anybody think we can do this, we're going to make wise choices?

Respondent: I think if you're helped by, you know, you need councils to be environmentally friendly, you need them to be striving to do it to make it accessible to everybody else, you need that. I mean if I look back when I was 18/19 I was quite environmentally active and I was quite worried about the future. And recycling, I couldn't believe why we didn't do it, and I used to write to supermarkets and things like that to try and get them to do it. But now it's just the norm so you can see how things have progressed –

Respondent: Yes.

Respondent: Yeah.

Respondent: – but you have to enable people to be able to do that on a day-to-day basis. But I do think it's the duty of governments to provide, and then the whole education through schools.

Respondent: Yeah. Definitely.

Respondent: And to get society to change, because you can (inaudible 00:32:25).

Respondent: But I think they're behind as well with that because I remember being in Australia with family when I was 18 and they were really, really strict on which bins we use, they had four different colour bins then, that was... not that long ago but –

(Laughter)

Respondent: – and I remember thinking my auntie was really quite aggressive when I used the wrong bin, I was like, woah, you know, and like we didn't have that, from many, many years later and even still now, it's only two bins we've got –

Respondent: It's only recent, isn't it?

Respondent: Yeah.

Respondent: – and they're very sort of, just much more ahead I think over there, and in America as well, and I just feel we're slightly behind with everything.

Interviewer: So you think we're lagging a bit behind. Do you think there could be consequences of being a bit slow on this?

Respondent: Possibly consequences, yes, but I think for an educational piece I think we could have been breathing that into our children. So if this doesn't start until later on then I think there will be consequences later on, possibly not for my age but possibly for my children's age.

Respondent: You're saying about Australia, I think all their washing powder, it's only because I did my washing powder and everything's washed on cold.

Respondent: Yeah.

Respondent: Yeah. Everything. They don't use bags in the supermarkets or anything.

Respondent: It's the came company. It's really because there's no pressure for us to do that yet and that's why it needs to come from governments to get that.

Respondent: You can't even buy bags there, you just can't buy them so if you go shopping you can't copy your shopping home if you don't take your own.

Respondent: They did start that here.

Respondent: A while back, didn't they? They said they weren't going to have any bags and then it's crept back in again and now –

Respondent: Now they just give you bags, let you put your shopping in them and it falls through them anyway because they're rubbish.

Interviewer: So do you think we leave these sorts of things up to the individual a bit too much?

Respondent: (Inaudible 00:34:45) and then it goes. It's like an idea and then it's like a phase.

Respondent: Like the green bin, wasn't there an outrage because people were going to have to pay to get the green bins?

Respondent: Yeah.

Respondent: Oh, the garden?

Respondent: The garden.

Respondent: Yeah.

Respondent: Brown ones.

Respondent: People just think, "Well don't bother," and not bother putting stuff in.

Respondent: But I think it's not consistent throughout the country.

Respondent: Yeah. But this was like a £10 bill.

(Overspeaking)

Respondent: The government's changed their mind.

Respondent: Yeah. That's what I thought. I thought to myself, "Why are you doing this to people?" Because they will just say, "Well I'm not going to pay that £10."

Respondent: It's not collected as frequent though, is it, so they're not kind of encouraging people to use it frequently.

Respondent: But it's different throughout the country –

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Respondent: – my husband works away like he's actually in the energy business and works all over the country at like power stations, so we rent houses all over depending on where he is and every council's different. Like in Cheshire they've got three bins. In Wales you have to buy carrier bags, there isn't such a thing as a free carrier bag, every carrier bag they charge you for at Morrisons, and literally Chester's still in England you go two miles over the border into Wales to a different supermarket and you have to pay for carrier bags because the Welsh law's different. So we're a tiny country but we've got every council within there's no consistency.

Respondent: No. Different coloured bins even like across the borders like they have different colour bins to ours.

Interviewer: These are only small issues we're talking about bins and plastic bags, but...

Respondent: It all adds up.

Respondent: But if it takes those things to get you thinking about it, isn't it? It's on a day-to-day basis you're actually...

Interviewer: That's definitely true but what I was going to say was, the alternative to giving people choice and leaving it down to the individual is to kind of force people, which that's a difficult kind of balance.

Respondent: It's a bigger level, isn't it? And then you can choose to do more. I think –

Respondent: Yeah.

Respondent: – but there must be a level that we need to maintain.

Respondent: Yeah.

Interviewer: So you think it's feasible?

Respondent: Because we borrow it from our kids, don't we? We borrow the earth from our kids and my daughter hopefully she'll have children, and if we don't do a bit...

Respondent: What's going to be for them? Yeah.

Interviewer: Before I go into this, just to reiterate, I don't think anyone's arguing that we don't want to, you know this expression, keep in the wide zone, and nobody is arguing against that, are they? That's non-negotiable I suppose. So we have, I suppose, these difficult choices where if you imagine a pie chart and where we get our electricity from say about precisely what proportion from what sort of source, and so I mean what's your guys' impression of how would you like to see that pie chart looking in 10, 20 years time? So at the moment it's about, let's say it's a quarter nuclear, it's maybe about a half from coal and gas combined and then we have the remainder from these various renewables. So how would you like to see that pie chart change?

Respondent: More renewables.

Respondent: More renewables.

Respondent: Yeah.

Respondent: Yeah.

Respondent: Nuclear, it's just (inaudible 00:38:19).

Respondent: Yeah.

Respondent: Yeah.

Interviewer: While making that decision what factors would you prioritise? So you're saying more renewables, even if that meant even higher energy bills?

Respondent: Hmm.

Respondent: It becomes a cost.

Respondent: To be fair, if somebody says, "Oh, we're putting our things up by 10%" you go, "Oh God," and moan about it, and then you deal with it, don't you?

Respondent: Because there's nothing you can do.

Respondent: Because there's nothing that you can do. But if I knew, okay, it's going to go up by that much and this is exactly what that's going for and this is potentially... you know, for the future and I know it's going there, sometimes it's about knowing where it's going. I'd rather pay for that than I would pay Npower because they've put the bloody thing up again or I've got to (inaudible 00:39:10) and go to another. I don't know.

Interviewer: The energy industry is a bit of a strange one in terms of choice, because if you compare to the food industry and if you say, "I only want to buy organic, free range chicken," you can go and get that chicken. If you say, "I only want to have renewable electricity," that's not an option, just because of the way the industry works, so as consumers of the energy industry I suppose there is a degree of powerlessness.

Respondent: I think it's like, I wouldn't know, my energy company I don't know what they're using, I just pay my energy company. I don't know how much of it's renewable and how much of it is sources, so maybe that's what needs to be more aware of. So like the company that I use, if I knew more about it and if I knew so and so used more renewable but it was slightly more expensive then maybe you would be more inclined to change because it is a renewable source. I don't know. I haven't got a clue about my energy company so that, to me, says I don't know where it's coming from, I'm just paying for it, but I don't know what it is I'm paying for, I'm just paying to turn my lights off. So do we need to be educated about like whichever company you're using, where it's getting its energy from? That would help you make a decision and turn people more towards renewable energy, I think. Does that make sense? Yeah. Like, as I say, I just have no idea, not an inkling where my...

Respondent: I don't think many people do know.

Interviewer: I don't think anybody does.

Respondent: But that's what we maybe need to be educated on. What actually are we paying for and what percentages are renewable, and if what your percentages are right, like what you said, I wouldn't have a clue.

Respondent: No.

Respondent: I would go, "Oh yeah, really?"

Interviewer: It is interesting because usually in a market the consumer would have a degree of power because you can take your custom to a different product and you can tell the companies what you want there. It doesn't quite work like that.

Respondent: Just go from one to another, hopefully you get a better tariff.

Respondent: And they can hook you in then once you've got the bait they put the price up months down the line anyway.

Respondent: Yeah.

Respondent: You get your bill, it's so complicated you never quite understand what it is you're looking at.

Respondent: You hear about nightmare stories.

Respondent: It's hard because you pay more, you obviously use more energy through the winter, so like I pay by direct debit, the same amount all the way through, but then if I changed to a different company at a certain time of year I'd owe them more.

Respondent: To settle up.

Respondent: Yeah, to settle, so it's not sometimes worth changing because you then have the bill from winter to pay to go to a different company. So you have to time it right as well. It's just that extra hassle, which people don't want these days.

Interviewer: So when you were saying before about the energy industry, you were really talking about big business in general and saying it's about greed and I don't really trust it.

Respondent: Right, yeah, how often do you get a phone call from an energy supplier saying, "Oh, we've been overcharging you. We've been looking at your tariff"? No, they wait for you to say, "Right, let's look at my energy bills and let's look at saving some money." It's like insurance companies, you get your kind of annual quote through, don't you, to see are your premiums going up or whatever but until you start shopping around, then they offer you a cheaper rate or the same rates, do you know what I mean? So I think this is all about making money.

Respondent: And then the magic deal, which they didn't offer you in the first place.

Respondent: Definitely.

Respondent: Yeah.

(Overspeaking)

Respondent: If you go, "I'm leaving," "Oh, you can have it for free."

Respondent: Yeah.

Interviewer: So all in all just to kind of summarise...

Respondent: I think we just distrust them all.

Respondent: We do. You know what I mean? It's just like the guys with insurance, your car insurance, your home insurance, your energy. It's everything.

Interviewer: So not a particularly consumer-friendly industry?

Respondent: No.

Respondent: No.

Respondent: No.

Interviewer: How would you change it?

Respondent: Well you would say govern it, wouldn't you, but you can't.

Interviewer: But hypothetically speaking, let's throw realism out of the window for a moment.

Respondent: Govern it and make sure the people aren't abusing people.

Respondent: Why have so many tariffs? Just offer everybody the best possible.

Respondent: If you have got a piece of chicken and you want an organic piece of chicken, you choose that organic piece of chicken. Or you want to pay a little bit less, you choose. And you want to choose to go elsewhere, you know the prices there and then and then you choose, there you go, and you know where you can go to get the cheapest. Here, you would never go in Asda and go, "Actually, Morrison's has got it a bit cheaper, I'm going to go there," and they go, "Okay then, we'll give you it for a little bit less." It's just not right. Charge what it's worth, and have a decent amount of profit yeah but not stupid amounts.

Respondent: Extortionate.

Respondent: How can they offer you something and say, "Well actually we will give you it a little bit cheaper, because you're going to leave." It's not right. Offer what you can. Make it right.

Interviewer: That's interesting. Well I'm going to ask you one last question before we move on to the next section, and usually this is a fairly smooth transition just because of the way the conversation often goes but we've gone in a slightly different direction. I apologise if this seems (inaudible 00:45:05) now but I have a hypothetical question for everybody. So if tomorrow there was a vast new supply of fossil fuels was suddenly discovered underneath our feet, underneath Britain, and there were people saying it could be commercially exploited, there could be economic benefits come out of it, so what would people make of that?

Respondent: It's the environment, straightaway.

Respondent: Yeah.

Respondent: Yeah.

Interviewer: So the environment is a big...?

Respondent: Yeah.

Respondent: Yeah.

Respondent: I think it's just becoming apparent this last couple of months how scary the environment has been –

Respondent: Yeah.

Respondent: Yeah.

Respondent: – like this weather is scary. It is.

Interviewer: So is the whole idea that we don't really have like autumns or springs anymore, it's just winter and then summer and it rains and then...?

Respondent: Yes.

Respondent: We don't have summer, we just have autumn and spring. But this year we've just had winter.

Respondent: Winter, yeah.

Respondent: We'll just get winter then autumn.

Respondent: Yeah.

Respondent: It makes me realise that the environment has really been affected. And that it's that big now.

Interviewer: You note the change in the weather and what makes you confident about attributing that to human induce climate change?

Respondent: Oh yeah, you're right, because I've just believed something that somebody said, yeah, so yeah.

Respondent: It's on the news.

Respondent: You hear about things.

Respondent: Yeah.

Respondent: I think so.

Interviewer: It's okay, don't worry. So this hypothetical question, so immediately you'd be thinking, "Oh God, the environment." Any other feelings towards that prospect?

Respondent: How would they mine it? What would the cost be? Like if it's there is it instant? Could it get exported, is it only for our country?

Interviewer: So these are all questions you'd ask.

Respondent: What level of choice would we have anyway? If it was economical, where does our choice fit in?

Interviewer: So would you like to have a say, have a choice? You can kind of see how they have implications for everybody. They're not usually at the top of manifestos. I

mean they are big political issues but do you feel like you ought to be having more of a say?

Respondent: Yeah, well, if I probably wanted to have more of a say I don't know whether there's somebody there who would listen anyway, but maybe we're just taken over by the whole day-to-day running of things and we don't make our views away, we're not able to –

Respondent: (Inaudible 00:48:07).

Respondent: – yeah, to get out there and say our piece and life's just going on and days are going on and on and it's...

Interviewer: Gets in the way a bit.

Respondent: Yeah.

Respondent: So there's other things that get in the way.

Respondent: And then it comes to all the voting and all that kind of thing and I don't really think we even get any information about it. We get a leaflet through the post about who's coming up for voting and you don't really find out much about things like that.

Interviewer: So you'd be worried about being able to have your voice heard about whether you were going to be excited or concerned about this. You'd want to know that there was an avenue that you could make those feelings –

Respondent: Channel those through to, yeah.

Interviewer: That's interesting. Do the others agree with this? What if there was a scientist who was saying, "I've got a PhD, I'm a doctor, this is a complicated technical issue." You know the sorts of arguments I'm getting at. Because you usually have a government minister and then you have the scientific advisors, and you have this very sound science will inform policy. How would you counter that argument, if at all?

Respondent: I think if it is sound science and the advisors are right in saying that this is the way to go then you would trust that science.

Interviewer: So you would trust the scientists if they said, "We've got the facts"?

Respondent: I think I would, yeah.

Interviewer: Do people agree?

Respondent: I'm a little bit sceptical.

Respondent: Yeah.

Respondent: Yeah.

Respondent: I was going to say if they're able to give you that information in a user friendly way and not a scientific jargon way.

Respondent: Because there always tends to be another scientist that has a different view on it –

Respondent: Yeah.

Respondent: – the same as climate change. There's like massive arguments saying that the emissions are creating this problem and other people saying actually there's no link to it at all. Like heating the planet up, you just think, surely to me, science has, there's an experiment and then there's like an end, there's a conclusion to it and there's a result, so for there to be different findings it confuses you. I'm not a scientist.

Respondent: Yeah.

Interviewer: Because that is common when two different scientists or two different academics from different disciplines, so a geologist might say something and then a physicist might say, "Hold on," when those kind of disagreements become apparent in the press, and I think they do occasionally, how do you feel about that?

Respondent: Shouldn't be there.

Respondent: Yeah.

(Laughter)

Respondent: I don't know, because you feel like you need just scientific results but then if there is an argument for and against then you're like, "Well what am I going to know?" You know.

Respondent: Yeah.

(Laughter)

Respondent: Tell us what you've come out with.

(Overspeaking)

Respondent: I can't think what they're trying to get, is it the water? They're fracking or they're trying to release, is it the gas?

Interviewer: I'm not sure.

Respondent: It's where they're drilling and it like vibrates the earth and it caused the earthquakes, and somebody was saying, "Yes it does, it's okay it's manageable," and, "No it doesn't." That was recently. My instinct went, "Oh, what are you doing?" You know, it's like not right, it doesn't feel right.

Interviewer: When there's this uncertainty when there are disagreements and it's a subject that you're interested in and you think is important and you're trying to figure out what's right and wrong, what do you look for? Do you find yourselves in this position? How are you making your judgement on this?

Respondent: Newsnight. (Laughing)

Interviewer: But they have a debate on Newsnight. They always have somebody pro and against, don't they?

Respondent: I feel more informed. I hate watching the news, I don't watch the news because I think you've got ages to go before you have to be exposed to it and sometimes I just think, "Well that's told me nothing, and I really don't need to know about

that," and I don't read a lot of papers anymore, I don't have time, but sometimes I think a little half an hour section, not all the time, I do find news depressing but I find that enough for me to... it's pitched quite well. Because you have to read, I don't know, I feel out of touch now than I used to be. That's probably where I'd look.

Interviewer: So [Name], how do you feel in these situations where there's uncertainty in science?

Respondent: I think you just get a little bit frustrated with it all because you think, "Well I don't really know and if they don't know then who does," and I think that's how you feel, you kind of think, oh well, I don't know now," I'd switch the news off if it got like that.

Respondent: Yeah.

Respondent: That's the danger is if they're not one decision sometimes the choice is to ignore it, and then again you haven't really got anywhere, it goes out the window because you can't make a decision if you've got two different people giving you different views.

Respondent: Or David Attenborough. (Inaudible 00:53:27) David Attenborough.

Respondent: You know when they ask him, he's been to so many different places and they ask him about the future, and he says, "We need to make serious choices or there'll be no future." I think he was on Jonathan Ross not long ago or someone and he said it and you think...

Respondent: Yeah, you think it's serious when he says it.

Interviewer: Because you could call him a public intellectual. I suppose they have a scientific background and there might be academics on that, I guess Professor Brian Cox is another one, I know that's a bit off topic but they're scientists who try and engage with the public, so if it's a trusted face that's been on television and you're looking for whether to trust these people, so that helps when there's people in the limelight like that?

Respondent: Yeah, because you've kind of grown up with him, haven't you, and you've seen him and he's been a trustworthy person. I don't know him but you do feel like you have some connection with him.

Respondent: And he doesn't have a vested interest.

Respondent: Yeah.

Respondent: Yeah.

Respondent: His love of life, isn't it?

Interviewer: What about this idea of vested interests on the science?

Respondent: Yeah, are the energy companies paying those scientists to say what they say.

(Laughter)

Respondent: But no, they are. I'm just too cynical but I think they are.

Interviewer: We might come onto that in a bit actually. I think I'll wait. I'll try and remember that and then talk about it. Well thanks guys, that's really interesting. Can you manage to pre-empt what we're about to talk about actually? So we'll move on to unveil why I actually got you here today. That was really just to kind of ground the discussion, just to set the scene and get the context. And so we are going to be talking about a relatively new and potentially controversial technology to do with energy. And it's called hydraulic fracturing. It usually gets abbreviated to fracking.

Respondent: Oh right.

Interviewer: Is this something people have heard of before?

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Respondent: But only once or twice.

Interviewer: I mean there's no need to have previous knowledge of this at all. This is just a crash course in the technique so we know what we're talking about basically. So hydraulic fracturing is a technique used to get unconventional fossil fuels out of the ground, and these fossil fuels are unconventional because of their source, because of where they're from. So unlike normal natural gas or oil these resources are kind of trapped into rocks deep underground. So probably the most famous example of an unconventional fossil fuel, particularly in this country, is shale gas which is, this is a bit of shale rock here, and it's kind of trapped into this rock underground. So it's the same as natural gas, it's methane, it's a greenhouse gas and we can use it to produce electricity. And so to get this out of the rock we use this technique called hydraulic fracturing. And so what they do is this liquid called fracking fluid, and it's largely water and sand, 99.5% or there or thereabouts. Has this 0.5% additives which are kind of chemical additives that they don't just put them in there for fun, they perform various tasks in the process. But they pump this down a well at really high pressure and this gets perforated down here and it forces these rocks to crack and then the gas flows back out. And so it's these two techniques, hydraulic fracturing and horizontal drilling which is being able to change direction when you get to where the shale rock is. And so that's how they're getting this resource out of the ground.

Respondent: But does it cause earthquakes?

Interviewer: Does it cause earthquakes?

Respondent: Did I imagine this? Is this a storyline on Dallas or something like that at the minute? Does anybody watch Dallas?

Respondent: I watch Dallas, yeah.

Respondent: Was that not what the, what's he called, John Ross?

Respondent: No, not him.

Respondent: Bobby Ewing.

Respondent: His son who's played by Jesse Metcalf. That's what he was doing this energy thing, that was the story last series and that's what it is, it was causing earthquakes.

Interviewer: So you might have heard something about earthquakes?

Respondent: Aha. So when you said that I was thinking, I heard about that, it's off Dallas.

Interviewer: The whole point of the process is to cause cracks in this rock. So there's just a bit of history up here, it's actually not that new, it was first done in 1947 in America and America's really aware this has been kind of developed and people are thinking about doing it elsewhere around the world including here in the United Kingdom. So this is just the very beginning and we'll talk about it more but what are people's initial impressions? That's the question, it wasn't so hypothetical.

Respondent: What could occur because of this? What are the bad sides of it? What are we putting the world..?

Respondent: That's not knowing, they could be doing this thing and oh it's fantastic we've got a new... but then in however many years time it could (inaudible 00:59:07).

(Overspeaking)

(Laughter)

Respondent: Where are we going to have the wells?

Respondent: We don't need them. Is that what you're saying?

Respondent: How do they know? They're everywhere? Or do they have to drill first to find them?

Interviewer: There are various ways of trying to find out where it is and how much of it is there. There is a methodology, some more sophisticated than others, and they can do kind of satellite imaging. GIS type stuff. Or it can be a bit more rudimentary, digging a hole there and then doing one up there.

Respondent: So you're saying it's already happened in the UK?

Interviewer: It's got a fairly long history of being done in America. A lot quite recently in the last ten years it's kind of really taken off there and they do a lot of it now, and people are looking at the prospects of doing it elsewhere in the world where there's this sort of rock.

Respondent: Do we have lots of it?

Interviewer: Yeah, they do have. The largest basin of this rock, the largest one in the UK is called the Bowland shale which is underneath Lancashire, and so that's getting some people excited.

Respondent: So have you started fracking here?

Interviewer: It's in the research and development phase, not commercial phase, they haven't done that yet.

Respondent: So surely we as the people of the UK should have been informed that this was possibly going to start happening.

Interviewer: It's been in the news a little bit.

Respondent: Well we haven't heard it.

Respondent: Do they not give you a choice? Is this what this is about?

Respondent: They wouldn't give you a choice because it's like they're developing new antibiotics all the time and testing things but they wouldn't come to us, they would just come to us and (inaudible 01:01:04).

Respondent: But you'd think that they would let us know if they were going to test a nuclear bomb somewhere.

Respondent: Yeah.

Respondent: To me, this seems like a massive thing to happen.

Respondent: Yeah.

Respondent: To not have been...

Respondent: I can't actually believe I didn't know, well not the figures but it's been going on so long in the US and 2.5 million and we don't really know much about it.

Interviewer: So what Ann was saying was, because what we've been talking about before which was to do with energy and how it kind of has big implications for us and we maybe don't have much of a say or at least we don't feel that we have much of a say. So when people look at this board do they think, "I would have liked a bit of notice and I might have liked a bit more of (inaudible 01:01:48)"?

Respondent: Yeah. It's a little bit like, okay, so maybe I'm just being silly, but who said, "Yeah, go on, you can go and try this?" The government, I'm guessing.

Interviewer: Well yeah. So in Lancashire the local authority would have given planning permission.

Respondent: So the people of Lancashire, do you know your local government is letting this go ahead, just to let you know for when you vote.

Respondent: And you're (inaudible 01:02:15).

(Overspeaking)

Respondent: (Inaudible 01:02:19) they wouldn't be doing it if it wasn't safe in any way but surely if I know that they're doing it in the fields across the way it would be like, this is what's going to be happening, and this is the government you voted in and this is what we're doing.

Interviewer: So you're pretty confident that they wouldn't be doing it if it wasn't safe?

Respondent: No.

Respondent: No.

Interviewer: Are people confident about that?

Respondent: They're having problems with coal mines from years ago. Is that not an issue now?

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yes.

Respondent: So is this not going to be an issue in years to come?

Interviewer: So you'd be worried that there'd be long-term issues arising from kind of having lots of holes in the ground?

Respondent: Yeah.

Respondent: Yeah.

Respondent: Totally.

Interviewer: And you kind of want to see somebody do some research into this?

Respondent: Yeah.

Respondent: Yeah.

Respondent: Surely, I mean I know the core of the earth is obviously huge, and I don't know, how far is it going down, I don't know how far is it going down.

Interviewer: They're typically maybe two or three kilometres deep.

Respondent: I don't know what the circumference of the... whatever, but it must have an effect on even localised area, like mines years ago, the amount of houses that get build all have to have mine searches and everything like that and that may become issues, so surely at some point this in the future will become an issue.

Respondent: And people are all kicking up stinks about having wind farms plopped on spare land as well, do you know what I mean, so they even have them as well. I just think...

Respondent: I think I'd rather have a wind than –

Respondent: Yeah.

Respondent: Yeah. I know.

Respondent: I think I'd like to know as well because it's been going on since 1947 in the US, where's the results from that?

Interviewer: You'd like to have an idea what was going on?

Respondent: Yeah, and that's a good few years now, if that's been successful and there hasn't been any implications so far there then maybe I'd feel a bit more confident.

Respondent: Is that why they're doing it?

Interviewer: Is that why they're doing what, sorry?

Respondent: In the UK. Are we getting excited because we have a lot of it in the ground so it is like we're getting excited because it is going well in the US?

Interviewer: Some people are getting quite excited, some people are quite concerned.

Respondent: Yeah.

Respondent: Who's the concerned party?

Respondent: The landowners will be getting excited because if they sell the land so they can drill in it.

Interviewer: Why would you be interested in that?

Respondent: (Laughing) Why not?

(Overspeaking)

Respondent: They get the profit.

Respondent: Profit, yeah.

Respondent: What we do, we get money.

Respondent: Get 50 years out of that. Would they estimate how much reserves we got if we went that way?

Interviewer: There are various estimates. Sometimes maybe people are talking to their shareholders, maybe sometimes, so you've got to take them with a pinch of salt but some people think there's quite a few years. Maybe a 30 you're project in Lancashire.

Respondent: How much is it costing to fund that?

Respondent: It's nothing though is it? I think sometimes all that money they're going to invest in that, why don't they invest it in renewables?

Interviewer: In the grand scheme of things an individual company maybe looks at it and thinks that's quite a lot of gas.

Respondent: But it seems a lot just to get 30 years, 30 years to me that doesn't seem a long time, for like you say for a (inaudible 01:05:47).

Respondent: That's only one site though.

Interviewer: That's one estimate. There are different estimates and there are different shale formations so it's really hard to put a figure on it really.

Respondent: Yeah, you can't, yeah.

Interviewer: But I'll move onto another board in a minute and try and answer some of the questions that I can see people are burning to talk about.

Respondent: We're really worried now.

Interviewer: Just before I do that, what do you think about this idea of things going on in this subterranean environment below our feet?

Respondent: That's what worries me.

Respondent: Yeah.

Respondent: Yeah.

Interviewer: It's a bit of an unknown?

Respondent: Yeah.

Respondent: Yeah.

Respondent: What if it explodes or something and you're like above it, the pressure or...

Respondent: It's all about taking oil and odd things out of the earth.

Interviewer: What about it being onshore? Because I know in the United States they're very used to mining oil and gas onshore whereas ours has always been in the North Sea, so there's that difference.

Respondent: And in the grand scheme of things we're tiny, we're just a tiny little island really in comparison.

Respondent: Very delicate.

Respondent: Yeah, a delicate little flower, compared to the big US.

Interviewer: Well without further ado I think I'll...

Respondent: I'll worry and don't sleep anymore.

Interviewer: Just before we do talk about some of these risks and talk about that a bit more, in the interests of balance maybe we'll talk about why some people are quite excited about this. So major gas, question mark. So there are some big claims on this board about what this could mean, this new batch of fossil fuels that is suddenly accessible and also economically feasible because prices are going up. I mean that's why it make sense to go to these lengths to get that resource because the price dictates that it can be done economically feasibly, and so we've had words like game changer, we have the former minister for energy and climate change, he's saying it's worth looking at because of security of supply and economic benefit. We have (inaudible 01:08:13) Time magazine saying, "This well could power the world." We have the Sunday Times saying, "The wonder gas that could cut your energy bills." And Cuadrilla is this company that's currently exploring the possibility of doing this in Lancashire and they're saying the last ten years the price of gas in the US has dropped to just a third of its original price due at least in part to the increase in production of natural gas from shale. And also George Osborne is saying something similar, the chancellor, he's saying he doesn't want to see Great Britain be left behind as gas prices tumble on the other side of the Atlantic.

Respondent: I feel like they're selling me something because it's going to be cheaper and provide jobs, however...

Respondent: Your garden's going to collapse.

Respondent: Yeah.

Respondent: Yeah.

Respondent: I think it's just like the kind of, how they get it, I just think...

Respondent: But how do they get normal gas?

Interviewer: How do they get normal gas?

Respondent: Gas we use now. How do they get that?

Interviewer: It will be in cavities under the ground.

Respondent: I should know this. Yeah.

(Laughter)

Interviewer: It'll still entail drilling a well but it won't entail this process of hydraulic fracturing which is intentionally causing the rocks to fracture. Because the difference, the unconventional factor is that they're going to trap it in these rock formations.

Respondent: Well we can leave it there. It's natural.

Respondent: Will it weaken the rock or will it just remove the gases from it?

Interviewer: That's a question.

Respondent: They don't know.

Interviewer: But in all seriousness you'd want to see some sort of evidence that there were geologists –

Respondent: But surely if they've been doing it in the US since the '40s they've got some kind of research log.

Interviewer: It's remained relatively under the radar for a long time simply because it wasn't cost-effective.

Respondent: Like everything.

Interviewer: Early last decade, early 2000s, it kind of went up a few gears and it really started to proliferate quite a lot around the United States wherever there were these type of rock.

Respondent: Because of the amount they were fracturing? Because they increased the amount? Is that why?

Interviewer: A lot of people started fracking, and then it happened quite quickly, it's really kind of a new issue because –

Respondent: But that in itself says they didn't... I just don't think America would jump in with both feet. And we feel like we're lagging behind but it all goes pear shaped for them. I just think they're willing because of such a massive country, they're willing and they've got the area.

Interviewer: So the prospect of a drop in energy bills, and that can't necessarily be guaranteed, there are a lot of differences between the US and the UK, so we can't guarantee it's going to play exactly the same way it did in America, but that possibility of a price drop, is that enough for you to start wondering –

Respondent: At the expense of what?

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Respondent: I think at one point years and years ago it would be, "Yeah, we're going to do this," but now it's become apparent that it's not always just about the money.

Respondent: Yeah.

Respondent: It isn't always just about, like, what I can save, or how many jobs we can get out of it. Yeah, it's great, it's brilliant, yeah, if you can and it's safe, but I think we're now a little bit sceptical that, you know, it can affect our environment.

Respondent: Does this not go against everything that we're being told to look after our environment now? It goes against all of that because there isn't any restraint.

Respondent: It's unnatural, that's what I think.

Interviewer: What seems unnatural about that?

Respondent: Just fracking.

Respondent: Fracking.

Respondent: Fracking.

Respondent: Yeah.

Respondent: Yeah.

Interviewer: Just intuitively it just seems like a bad idea.

Respondent: Yeah.

Respondent: You're drilling for oil and then you get this horrific oil spill and all these animals and you go, "Oh my goodness, look what's happened."

Respondent: Yeah.

Respondent: But we're too late, we depend on it, so we now depend on this so we kind of have to go, "Right, well we'll have to keep going if that's what we're going to do." But this, we don't know what it's going to do, so...

Respondent: There was a dependence on coal beforehand, wasn't there, and that wasn't far off.

Interviewer: What about this idea of dependency, dependency on energy, dependency on fossil fuels maybe in particular, how do you think that fits into that story? So here's a

load more fossil fuels that we've only just realised we can get. Brilliant. Is that brilliant?

Respondent: Potentially, but I think there needs to be obviously a lot of research done into it to see if –

Respondent: Should it not be more be looking for more renewable than fossil?

Respondent: What about the sea? It's continual, you know, technology for me improves on using the sea.

Respondent: Yeah.

Respondent: I can see that as more positive.

Interviewer: So you're saying it doesn't matter if it's there, we don't have to take it out of the ground?

Respondent: No, you don't have to take it out of the ground. But unfortunately I think what's happened is we've just gone along this route and we haven't invested in something like (inaudible 01:14:06) and then you have to depend on it because we've got no history..

Respondent: How long have they been thinking about..? How many years?

Interviewer: In the UK?

Respondent: Yeah, in the UK. It can't be relatively new if the –

Interviewer: I don't have the exact time for you, but Cuadrilla have been in Lancashire for maybe something like four years. So pretty recently.

Respondent: Cuadrilla?

Respondent: What's that name? Cuadrilla?

Interviewer: I'm not sure.

Respondent: It doesn't sound good.

Respondent: Doesn't sound (inaudible 01:14:48).

(Laughter)

Interviewer: Alright, well I'm going to move on to some of the risks now. I'll put up a new board. Because these are supposed to be the opportunities. You weren't too happy about the opportunities so I don't know about the risks.

Respondent: Is that not a good thing that we are (inaudible 01:15:09)?

Respondent: When I get home I'll be Googling "Cuadrila Lancashire".

Interviewer: What I really sensed was people were kind of thinking that price and convenience weren't the only logics that should be applied in making this sort of decision. What other logics would you like to see take a permanent role? What kind of motivations in this decision making process?

Respondent: For this particular..?

Interviewer: Yeah.

Respondent: I'd want to see the future of it, is it long-term, is it worth investing in?

Interviewer: So it could end up being an unwise investment?

Respondent: Short-lived, yeah. Is it a lot of hassle for a short-lived environmental (inaudible 01:16:04).

Respondent: You'll look back and go, "God, those frackers."

(Laughter)

Interviewer: Unsurprisingly people that protest against this have lots of (inaudible 01:16:14) proximity to...

Respondent: So are there people protesting?

Interviewer: Not massive but maybe unsurprisingly whenever a company turns up at a meeting at the village hall or something to try and get local support –

Respondent: There's people chained to trees.

(Laughter)

Interviewer: It's usually quite a difficult conversation for them basically.

Respondent: Which is why I suppose it's got to be kept so quiet until it's ready for...

Respondent: It's probably it's where they are, isn't it, as well. If they said they were doing it in Newcastle –

Interviewer: Because I'm going to do some of these groups in Lancashire so I think when I do them there probably everybody will have heard of it and some of them will have read up on it a lot. Because we're maybe quite far away from this issue up in the northeast. There might be little bits of coal bed methane up here which is another type of unconventional fossil fuel but I don't think anyone's really seriously thinking about exploiting that at the moment.

Respondent: Be warned.

Interviewer: These are some of the potential hazards, the ones that grab the headlines really. Seismicity. So Cuadrilla did, we're fairly certain, cause two small earthquakes.

Respondent: There. Says it all.

Interviewer: In 2011, about a month apart. They were magnitudes 2.3 and 1.5 which you might just about feel on the surface. They're unlikely to do structural damage on the surface.

Respondent: Yeah but that's just one (inaudible 01:17:45) isn't it though? One global site, so you've got all of these pockets of activity going round all round the country, we'd be shaking like bloody jelly.

Respondent: But then just because you can't feel it on the top doesn't mean to say it's not doing something underneath.

Respondent: Was it a realistic test that they did, was it? On the scale, was it... did they test it to the degree it would go in when they set it up realistically down the right level and everything?

Interviewer: Yeah, that's what they did. Yeah. And so the Royal Society looked into this, a very well respected scientific institution and they've concluded that these risks, thinking about seismicity in particularly at the moment, that was manageable, and the reason why they said that was they kind of looked back at the kind of seismicity we had in this country to do with coal mining looking back a few decades and beyond and they said, well you get similar seismic activity at similar magnitudes with coal mining, so they kind of used that as a threshold and said, well as long as it's comparable to that we think that's acceptable. Is that something people go along with?

Respondent: It's historical data.

Respondent: Yeah.

Respondent: I would say if that's what the experts say.

Respondent: Isn't that older damage maybe that's already been caused?

Respondent: I think we should be moving away from that now and onto renewable energy.

Interviewer: So there is this idea that just because it was acceptable in the 1950s –

Respondent: Why should we need it? And if you've done damage then, why should they do more damage now?

Respondent: It's different now as well, wasn't it? So you should be more informed, anyway, given that the technology in comparison with what they had in the '40s for instance, you'd think they'd be more informed on the risks or what the potential damage could be.

Respondent: But even the ground would be different surely because of the climate, like rain would then affect the surface of the ground from what it was in 1940 whatever so that would make a difference as well, the ground's not as firm as what it used to be because of how much rain we've had because of the climate change. So surely all those things, it's not just the 1940s, whenever it was, exactly the same as it is now so it'll just not make any difference because it's exactly the same. It's not exactly the same.

Interviewer: So it's a very complicated picture, isn't it? This other big risk is groundwater contamination. And so remember when I was talking about the fracking fluids they had about 0.5% chemicals added? Those chemicals, you wouldn't want them getting into drinking water basically, they're toxic, carcinogenic, things like that.

Respondent: What?

Respondent: Oh God.

Respondent: Are you for this?

(Laughter)

Interviewer: Well I'm studying what people think and hopefully some people will read what I say about what people think.

Respondent: Right.

Respondent: What do you think?

Interviewer: We can talk about that later. So ground water contamination, so...

Respondent: It's going to (inaudible 01:20:58) the animals again and we're going to scar up the whole thing, even the animals and we'd probably die then.

Respondent: Yeah.

Interviewer: The issue with groundwater contamination, I mean I hasten to add that we haven't proven that this has taken place, we haven't proven that it isn't related, because there are instances of contamination. There's this film, Gasland that was made about it by an American environmental documentary film maker, and this is the most famous scene from that film. It's somebody in America just turning on their tap in their kitchen and lighting it with a lighter and it's flammable.

Respondent: Oh God. And that's right? That's real?

Interviewer: That's real.

Respondent: What?

Respondent: What?

Interviewer: There are various ways in which that could happen. That doesn't have to be hydraulic fracturing causing that, and so it's how you prove that that was definitely fracking causing that.

Respondent: Okay.

Interviewer: So scientists are having a debate about this at the moment, and they're saying there are three ways that this groundwater contamination could have occurred, and number one is kind of natural methane migration, in certain parts of the world the geology is just unstable and that sort of thing can happen, but that's rare, most of the world isn't like that, most of the geology isn't like that, so they come down to these two other possibilities which is, it's another very user friendly phrase, but vertical propagation resulting from induced hydraulic battering. So you have the depths they're doing it at, about 3km down say, and they're causing fractures, and those fractures can go horizontal, they can go vertical, upwards, downwards, and so if they're going vertically upwards the question is are they going far enough upwards to reach where the aquifer, the groundwater where we get drinking water out of from? And so if there's a distance of 2.5km what some scientists are trying to look at is how we find out the maximum vertical height they could reach, and then if we know that we can set a safe distance between them. And so we have a geologist here saying that actually the possibility of them going beyond 350m up, which is nowhere near tall enough to reach the water, it's saying it's approximately 1% and higher than that it gets ever and ever less likely. And then they're having a debate, we were talking earlier about what you do when the scientists disagree and when there's uncertainty. There's some other geologists have written back and this is a debate going on in German, and they're saying, you know, you're right, we haven't proven that hydraulic fracturing has caused this, but at the same time you

haven't proven that it hasn't. And so in this situation of uncertainty when something really bad and potentially terrible might be happening but we don't know whether it is, what kind of approach do you favour? I guess there's kind of two different... I mean how do you go about deciding whether that's okay to continue on that?

Respondent: I think that's just an informed choice you have to make at the time. You have to weigh up each argument I would suppose.

Interviewer: So on one hand you could just kind of say trial and error, we'll assume it's fine until it's proven it's not. So innocent until proven guilty if you like. So until this definitely happens we'll carry on doing it. And then the other extreme is, until we've proven that this isn't happening we just won't do it. So where do you sit on that? Which side?

Respondent: I probably would say on the first one initially because don't knock it until you've tried it kind of thing. Obviously we do need to find some sources of other energy because the gas will run out, so we need to look at other avenues. So I think some experimentation and stuff like that has to happen but not just –

Respondent: But not in the UK.

Respondent: – but not in the UK.

Interviewer: Well this is interesting. Earlier on we were talking about experimentation a bit and I think you said something about do it in the laboratory first.

Respondent: Yeah. They have to have tests.

Interviewer: But with this, you can't really imagine a laboratory big enough.

Respondent: Well obviously it's a totally different thing, you couldn't do that in a lab, you have to do it in the field kind of thing.

Respondent: It's just a shame they can't do it where it's less populated and it's a bit more of a test site.

Respondent: But if they're prepared to spend all of this money doing all this research and development and all that on that, why can't whoever it is that's investing invest more money in kind of like solar?

Respondent: Solar.

Respondent: Do you know what I mean?

Interviewer: So you think it's just going down completely the wrong route?

Respondent: Yeah. I do, yeah.

Respondent: It must obviously be a massive amount of it and it must have massive potential. One of them said, what was it, five to six billion in corporation tax, there must be an absolute mountain of stuff there and they're just being greedy.

Respondent: Yeah.

Respondent: Yeah.

Respondent: It's for them.

Respondent: Yeah.

Respondent: A quick fix.

Respondent: Yeah, and is it cheaper in the long-run than investing in longer-term renewables?

Respondent: Yeah. And it's doing more and more damage.

Respondent: Just like wind farms, people go, "Oh they're ugly." How much electricity does it actually generate? Solar panels, not many people have got them so it's like... if the gas runs out and we don't invest now, what's the alternative? Nuclear? Because they can make electricity with nuclear quite easily but obviously then there's the environmental issues of it.

(Overspeaking)

Respondent: Problems.

Respondent: There's going to be environmental problems with that though as well, isn't there?

Interviewer: So what concerns people most on this board, if you had a decent chance just to kind of skim through it?

Respondent: The fire.

Respondent: Drinking.

Respondent: The drinking water.

Respondent: Yeah.

Respondent: The earthquakes, the drinking water, the whole lot I think.

Interviewer: So the EPA which is the regulatory body in the United States that are in charge of this, they're currently conducting a big study into this and it's coming out in 2014. The New York Times says it thinks it's found a case where it definitely happened. We might have to bear in mind that what counts as proof for a journalist might not count as a scientist, but that's from 1987, so if that's from 1987 then the EPA's report doesn't come out until next year.

Respondent: How much contamination has there been in that time?

Interviewer: Yeah. What do you think about that timescale?

Respondent: Yeah.

Interviewer: Because the science and the industry and things like this moves very quickly. Do you think we can keep up with it?

Respondent: I don't know, have we got the funding and everything to keep up with it, or big enough to do this kind of... on this scale? Is this just too much for us maybe? Don't know.

Respondent: Are we going to wait until 2014 to find out what happens or are they just going to do it? They'll just do it, won't they? They'll not wait.

Interviewer: They're doing it in America right now on a commercial scale.

Respondent: Commercial?

Respondent: Just for that report to come out, so they're not bothered really what the results of it are because they're still doing it, aren't they?

Interviewer: They're trying to figure out what's gone on.

Respondent: But will that affect what they're doing when this comes out?

Interviewer: Well presumably if this report comes out and it's really damning and they say yes –

Respondent: Are they going to do it in this country prior to that report then? So are they going to wait to actually find out or are they just going to do it and then suddenly in 2014 when it comes out and says oh actually it has really affected a lot of water supplies and –

Respondent: Well if you think, the film, Erin Brockovich.

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Respondent: That's what, pollution and all the people had cancer and all the stuff like that and it had been going on for years, and obviously because the corporation was so massive they just tried to buy them off to kind of buy it, and they've already done it in this country anyway, haven't they, so that report really, it'll be hindsight. Ah well, maybe we shouldn't.

Respondent: Yeah.

(Overspeaking)

Interviewer: So Fiona, from what you're saying would you prefer a kind of cautious approach?

Respondent: Well yeah, I mean we are probably going to have to do something like this I would imagine if they're looking for other ways, but I think you'd still have to kind of go down every avenue to make sure it's not going to affect people because it's the same as everything, it'll come back and it will have affected somebody and then they'll be a huge case over it and it'll be hindsight.

Interviewer: So is that a concern of people that there might be unknown unknowns and there might be a possibility of surprise if there is uncertainty at the moment?

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Interviewer: So that's something that worries people. Water consumption is another thing, as well as there being a risk of it contaminating water it takes a lot of water to get the gas out of the ground, and I mean I had this (inaudible 01:30:16) up fairly quickly but the map of where it is they were places like Algeria, South Africa, Australia where they already don't have that much water.

Respondent: It's a massive environmental issue.

Respondent: It is.

Respondent: So they've already started in places that they've let the water using this?

Interviewer: No, they haven't already started. They have deposits there where they could do it.

Respondent: But companies are obviously looking into doing it in places where there wasn't even enough water for the people to drink but they're willing to flush it down the holes thousands of gallons of water to drill.

Interviewer: What about the speed of this, because as I said, they really started to take off in 2003, something like that, and by 2013 it's kind of changed energy in the US because suddenly they're producing so much of their own. They built a load of facilities to import gas from places like Qatar and elsewhere and they're lying under-utilised and they're seriously considering, they export coal now, the US, because we usually think of the US as being a somewhat country that grabs in energy from all over, and they're seriously considering building the facilities to export gas as well if this continues going like it's going. So that's happened in a decade which is not that long. Does the speed worry people?

Respondent: Mm-hm.

Respondent: Mm-hm.

Respondent: Mm-hm.

Interviewer: What's the problem with speed?

Respondent: Because it's governed by money as well, isn't it? Because they're considering exporting it, it means that they can export the money. It's not just for themselves to consume. Their motivation is money.

Interviewer: With knowledge that the regulator hasn't actually reported yet, have things gone too quickly?

Respondent: Mm-hm.

Interviewer: The last thing I will just draw your attention to on this board on this list of other risks, there's this scale up of risks for a fully developed nationwide industry. So I think it's probably worth bearing in mind that to produce the volumes of gas that it would take to produce the benefits that people are talking about, price drops, self-sufficiency, energy security, that would mean a lot of wells, and as people have said, it's a relatively small island that we live on. So the idea of there being a lot of them, maybe hundreds, maybe thousands packed together quite tightly.

Respondent: Is it not going to affect the green belt and animals, everything?

Interviewer: So you want to know about the planning process as well, it sounds like?

Respondent: Yeah. Because I mean America, they can probably handle it because there's vast areas of nothing, isn't there? There's not that much left in our country.

Interviewer: So there's quite a lot of concern. Just to play devil's advocate, the kind of arguments you hear is, well it's not been proven to be dangerous and it's this big opportunity that could provide jobs and economic growth, lower energy prices. How do you weigh these risks up against those benefits? How do you make that kind of decision, that calculation?

Respondent: It's just really too early. And like I said before, you're not informed enough to make the right choices we're going off on our (inaudible 01:34:10) so I think it would be definitely something that you'd have to research. But like you say there's no proof to say that it... and there's risks with what we're doing now, the drilling oil, so is there more risks with this to the earth that we live on or is there still are risks in what we're doing already. So it's having the information to make those decisions.

Interviewer: So you'd want more information about it and then presumably you'd want your voice to be heard around the discussion table?

Respondent: Realistically. But certainly to have a lot more information about it, because I think you're not informed, it's kind of like just with everything, you go along and pay the bills and do what you're doing and that's that, but I think where there is potential risk then I think you should be more informed about it.

Respondent: But who's going to do this for them though, it's going to be the companies that are undertaking it and they're going to paint a glossy picture, aren't they?

Respondent: But then it's similar to the way that we live now though.

Respondent: Yeah, but I think over the last however many years we've been educated to think, don't be just sucked in by the glossy picture, look beneath what is going on, and now that's what they're trying to do, and I think it's good that we are saying, well yeah that might be great but what about these risks and why can't you give us more information now before you start doing it?

Interviewer: Talking about information and trust, because I find this really interesting, what if I said I had a colleague who wanted to spend a load of money doing lots of research on this around Europe, trying to answer some of the questions that have come up tonight, but to pay for that at least some of that money is going to have to come from the oil industry.

Respondent: But then it's biased, isn't it?

Interviewer: Does that automatically make it biased?

Respondent: Well I think so, yes.

Interviewer: Is there anything he could do to persuade you that it wasn't going to be biased?

Respondent: If the money to pay for what he's researching is coming from a company that is for or against what he's researching then yes, he can come back with... but then they wouldn't be putting the money in if it wasn't going to benefit them, would they?

Respondent: But where would the money come from to have the opposite study taken?

Interviewer: So the alternative is public money.

Respondent: Might be government then.

Interviewer: He might get some from the EU, he might get some from research councils here. But he thinks he's going to have to have some from the energy industry so can you think of anything that would make you be able to trust that?

Respondent: I think that might be a good thing. I suppose it might identify the real bad things.

Respondent: They could possibly then invest into this source of energy, because then it might be something that they could use but then you'd be back to the whole, which company do you go with because it's all using this source of energy?

Respondent: I think they'd probably already be doing that. The oil companies. I think they're already investing in things like this, because this could make them money. But then I suppose it's whose opinion do you trust?

Respondent: Yeah. Unless you have some recognised figure again like Mr Attenborough.

Respondent: Yeah.

Interviewer: So you' want to see a trusted..?

Respondent: Yeah.

Interviewer: What about this idea of a group like this of members of the public who could kind of meet with them once every month or something?

Respondent: Us, you mean?

(Laughter)

Interviewer: But seriously, what about just members of the public being involved in that sort of thing to look at things like where does the money come from, were there any strings attached, what was the wording of the contract?

Respondent: Independent.

Interviewer: You know what worries people about these sorts of things. Could you be a kind of arbiter?

Respondent: Yeah.

Respondent: Yeah.

Respondent: I think that would be worth doing if you knew that your views would make a difference on this right now.

Interviewer: I mean if you saw there had been a group of just members of the public, not scientists, not from the government, would that allay some of the fears of bias?

Respondent: It's about distrust again, isn't it? How do you know they're a genuine member of the public unless it's somebody you know? It's really bad but you do.

Respondent: That's the way it is though, isn't it?

Respondent: I think it's hard on this as well because it's just been in that part of the world. If you're saying yes to it so quickly then it could potentially spread really quickly, and then we don't know the consequences of that globally. Because I think as small as it is but once that's doing it at the same time, then we can't go back.

Interviewer: Well I'll move on, I've got one more of these boards so I shall move onto that. So kind of talking globally and kind of going beyond those immediate risks, the title of this I managed to pre-empt some political writer, called it Tomorrow's Energy Source? There is a question mark. And today I don't know if you noticed there was the Budget today.

Respondent: Yeah.

Interviewer: And George Osborne did talk about shale gas in the Budget and he said, "Shale gas is part of the future." So Tomorrow's Energy Source? We'll talk about that now. So obviously something that's been in the background, we've talked about it, is obviously climate change. And so can you see a way in which this could fit in with responding to climate change?

Respondent: What do you mean?

Interviewer: Well the argument is that it doesn't have to be mutually exclusive. This could perform kind of either and/or two roles. So there's this idea of transitional fuel which is, okay so it's cleaner than coal, so we replace coal with this for the next, if we get the industry up and running in 15, 20 years and then we burn this for 10 years or however long, I don't know how long, and then we go from this. It's kind of a step in between.

Respondent: While they find something else?

Interviewer: While we get the technology of kind of wind and solar better so it can meet our demand if you like, because people are sceptical about that. And then the second one is this idea of base load which is that you kind of need a constant supply for when the wind doesn't blow and the sun isn't shining and kind of for peak times so you need a bit there and it could be nuclear, it could be shale gas, to kind of back up a predominantly renewable energy mix. And so they're the two ways in which this could fit with the idea of responding to climate change. Now there are counter arguments to both of those things, the Tyndall Centre which is a climate change research centre at Manchester University, they had a report that's quite sceptical about this idea of transition fuel. They say that shale gas offers no meaningful potential even as a transitional fuel and any significant early development of the industry is likely to prove economically unwise. And so their argument is basically about timescale, because we have these targets that we need to reach and 2050 is a significant date, the Copenhagen Accord, things like that, Low Carbon Transition Plan. So they're saying, well we're on 2013, it's not going to develop as quickly here as it has done in America for various reasons, this is their argument, so even if we do it relatively quickly for Europe and it takes two decades, well that's 2033 and then there's 17 years until 2050 and so we have all the infrastructure in place, the industry is up and running, we're burning it, it's working, there's no earthquakes, there's no groundwater contamination, brilliant, and we're getting cheap fuel out of the ground, and we do that for 10 years and then we have 7 years and then the maths doesn't look great, there isn't that much time, that's what they're arguing. What do you think about that argument? I suppose the question is, do you trust us if we do go down this transitional fuel route, do you trust us as a society or our government or whoever to come and say, "No, we have to stop that now and go on to this"? If it's all working fine.

Respondent: It would be too easy to stay.

Respondent: Yeah.

Respondent: Yeah.

Interviewer: Would you fear that that decision would just keep getting put off?

Respondent: Potentially because it would become the norm, as well. And they don't like change. If it is the norm we (inaudible 01:43:48) well nothing's happened there.

Respondent: And if it is cheap enough and nothing's happened then do we go, well, we don't want to have prices hiked right up because we're used to what it cots?

Respondent: It'll all be down to at that time what's happening in the economy.

Interviewer: So it is difficult to predict whether that's a realistic decision that someone would be able to make?

Respondent: Yeah.

Respondent: And what if something was to go wrong with the whole process? What if there was a massive earthquake caused because of what they were doing? That would then surely affect the price of it, as a company, and shares, well the whole environment.

Respondent: And then are you too far into something different?

Respondent: A big negative.

Respondent: And the prices rise higher because we need it, we're going to be dependent on that, because nothing else has been updated.

Interviewer: It seems like a bit of a beehive, is that what you're saying, it's a bit of a diversion?

Respondent: Yeah.

Respondent: Yeah.

Respondent: It may end up being really costly. It may not but...

Interviewer: That's what the Tyndall Centre is saying, they're saying we have tax breaks for these companies to get them up and running and the infrastructure they get needs to be built, we have to make the roads bigger around Lancashire to fit these big tankers on, and then it's only for 20, 30 years.

Respondent: I mean, but why do the government start ploughing money into giving so many people solar power and then all of a sudden stop and shift direction?

Respondent: It's money, that's why. That's a good point actually.

Interviewer: Some people do argue that they fear that this is going to take people's minds off renewables and funding is going to go into this and then not into renewables?

Respondent: Then surely renewables is what people should be –

Respondent: Yeah.

Respondent: Yeah.

Respondent: In an ideal world.

Interviewer: Can anybody accept this under certain conditions, and crucially what would those conditions be? What would persuade you, if anything?

Respondent: A lot of it has to come down to, for me, safety and by the time this gets up and running our kids will be that bit older and it'll be them that it'll have a big impact. I mean I'll hopefully still be around then. It's the next generation that it'll have a big impact on as well, so it's safety for our future.

Interviewer: So you'd have to make sure it was safe?

Respondent: Yeah. I think it's been mentioned about it being done in the US but the fact that it's took so long to get a report out about that drinking water incident, that's quite scary.

Respondent: Have they had earthquakes in America?

Interviewer: There are no reported cases so what happens in Lancashire is actually seen as being pretty unusual and they're not quite sure why it should have happened in Lancashire.

Respondent: That's not good, is it?

Interviewer: And not have happened elsewhere.

Respondent: If it's not happening in America and –

Respondent: But then it's probably because it's a vaster area though, do you know what I mean?

Interviewer: There's two possible ways of responding to that. The first is that this goes back to the idea of the subterranean environment being something that we don't really think about, just like what's above the ground, what's below the ground is actually really complicated and (inaudible 01:47:22) specific sites. And the second thing to think about on that I think is, you know, we have the example of the EPA report where it's taken a long time to figure out what's happened. A lot of where this has happened in America is quite rural. Because of the mineral rights law the companies just deal with the landowners, so here it will be the crown you'd have to... it's a bit more complicated here. So there is the possibly that things could have slipped under the radar and nobody –

Respondent: It just gives the landowners a little bit more money.

Respondent: Yeah.

Respondent: Yeah.

Respondent: Yeah.

Interviewer: No, that hasn't definitely happened but...

Respondent: But it probably has.

Respondent: There's a good chance it has.

Respondent: It's unpredictable, isn't it? We can't predict an earthquake's going to happen.

Interviewer: I think earthquakes are notoriously hard to know and I think it's certainly true to say that there are unanswered questions.

Respondent: I've been in a big one and it was really, really, really frightening. But it's not just the one, six months afterwards you're still getting big jumps.

Interviewer: They think it's very unlikely that you'd get high magnitudes from this sort of activity.

Respondent: But that's only one place that they're doing it, isn't it?

Respondent: Highly unlikely, not not.

Respondent: But it just would worry me that they've done loads for years in America and there's nothing, and they've done it a couple of times here –

Respondent: But America get a lot more earthquakes than us because they're on plates. We're right on the boundary.

Respondent: You'd think in which case it would knock the plates.

Respondent: But it might be that we get them (inaudible 01:49:00) where with us we don't really get earthquakes.

Interviewer: What about this idea of peak oil, is this an expression people have heard before?

Respondent: No.

Interviewer: It should probably be called peak fossil fuel, that makes a bit more sense. It's this idea that we reach maximum production of these sorts of resources.

Respondent: Get it all out and then...

Interviewer: And then after that production is going to get less and less and less until we get down to the other side of that where we've used it all up because they're finite. And so for a while I think we've been getting used to the fact that we might be here and we might be about to go down the other side as we were talking a little bit about earlier, or at least we've got 10, 20, 50, maybe in our lifetimes, certainly in the kind of not outrageously far off future. Some people are starting to rethink about this with the conventional fossil fuels. They're starting to say, we were kind of adapting to this idea that we're going to live in this world of scarcity. The kind of world of abundance that we've become used to might actually be prolonged. How do you feel about that as a prospect? Pushing back this date when we have used everything up?

Respondent: But should we not then instead of using it like have an abundance should we not then be everybody trying to not use..?

Respondent: So much.

Respondent: Yeah. So trying to turn little things that make a big difference, if everybody's doing the same, so turn your lights off, turn your electricity off, like all of the little things that would mount up. Then we'll get used to a non-abundant life that we've had, does that make sense?

Respondent: Yeah.

Respondent: Yeah.

Respondent: But also at the same time technology at the same time is developing that we won't have to use as much, because they're making things more efficient.

Respondent: Yeah. That should be on our shoulders as well, they should be trying to promote us so you're not having to be abundant with it if you know what I mean.

Respondent: Yeah, helping.

Respondent: Educating people. Educate them from school onwards.

Respondent: We don't need as much. We don't need the lights on and that of these buildings for example.

Respondent: Yeah.

Interviewer: So this idea of peak oil going back to an hour and a half ago when you didn't know about unconventional fossil fuels and if I was to say that's 30 years away we're going to see, we're going to see it in our times, how would you have felt towards that? Fear? That could be a huge kind of change, there could be all sorts of unrest if we don't adapt to that.

Respondent: You have to change. If you think like our, well I haven't got any grandparents now but if you think in their lifetimes what's changed, like we didn't used to have tellies, they didn't have cars, like things change and I think moving forward you have to accept change but it's at what cost of course.

Respondent: Yeah, I was going to say, I want to change because it frightens me, that.

Respondent: Is everything always fearful? They were feared a lot of things and yeah okay some of them did come out wrong but then some of them didn't. No, they were alright. We're just fearful, we are fearful.

Interviewer: So what about this idea of, if we really were here our decision makers it would be time to make a decision, there'd be no more putting it off. But if we're not actually there and we're there, or further down somewhere..?

Respondent: You could wait for the reports to come out, couldn't you?

Interviewer: The rationale, if that date gets pushed back further and further and further on the horizon and then you can't even see anymore, the impetus to make a decision, do you feel that that gets weakened?

Respondent: Mm-hm.

Respondent: Mm-hm.

Interviewer: And you could just kind of muddle through?

Respondent: And develop the wind and the solar, stuff like that.

Interviewer: If we were worried about the scarcity we'd be forced into...

Respondent: Making the decision.

Interviewer: That's the argument, before there'd be no choice, we'd have to do it, but when we're given a choice are you confident we'll make a good choice?

Respondent: You mean if we're rushed into a decision are we going to go the right way? No, if you're not rushed into the decision. Like, are you saying if you're at the point of no return you have to make a decision so do it now, or what you're saying is, right okay, let's think about this. Are we going to still make the right decision?

Interviewer: Well yeah, what I'm saying is –

Respondent: We've got more time to research into stuff like that but obviously if it takes 27 years to get a report out...

Respondent: But then do people get more lenient and think well it's further away, we don't need to worry about it at the minute.

Respondent: I suppose you've got all the information haven't you, to use if you have to.

Respondent: Yeah. If you have to.

Respondent: If you're forced to you would have done the research, wouldn't you?

Respondent: Like, what's it called, fracking in a panic.

(Laughter)

Respondent: Because is that what they're doing? Is it? Is that why they're now, right, because we need something?

Interviewer: Well this was starting to play a role in how we thought, I think, but if actually we're not that far along and we've got 250 more years...

Respondent: People find out more about what we're doing.

Respondent: Yeah.

Respondent: Well yeah, surely you don't rush into it, cheaper and potentially, we don't know, we're kind of assuming it's going to make big holes in the earth and we're going to have earthquakes and sink but potentially it might be like the (inaudible 01:54:58) the nation.

Interviewer: But in the context of climate change as well...

Respondent: Only marginally higher than those on conventional gas sources. So it's higher on that but less on the electric.

Interviewer: It's like if people do it properly it's likely to be cleaner than coal and maybe marginally worse than conventional natural gas but comparable to conventional natural gas. Well there's more we could talk about but we have less than five minutes less, so I think I promised to tell you what I thought and things like that, so we're start winding down into a debrief I think. Yeah, nine o'clock. So thank you all for coming. I hope you found it interesting. I'm not going to give you that.

Respondent: Everything of what we've seen, are we just going to –

(Overspeaking)

Interviewer: I'll tell you about my research. So I did a degree in human geography and I have a background in science so there was this opportunity to do this Master's, and what I want to look at is, there's uncertainty about whether to do this and some people, there are potential positives or potential negatives but we're just not sure, so in that context I think its really important that we focus on how the decision gets made, who makes the decision according to what logics and what sort of motivations are behind the decision. So that's what I'm interested in and I want to kind of demonstrate that talking to the public about these issues is worthwhile. There's this rather old fashioned idea which is dated now and it's becoming extinct I think but it's still kind of lingering that this is a technical matter, scientists will figure it out, they'll tell the government what to do, the government will do it. Now I think that's outdated and to an extent that's come to an end, that's a very modern kind of 20th century way of thinking, but I think it's really worth, you know, I was trying to probe you, I think it's worth having members of the public talk about these issues, it's certainly worth asking them what they think, so that's kind of my research, that's what I'm going to try and demonstrate and that's why I'm going to all this expense and all these lengths to have focus groups around the country. So yeah, just checking I haven't missed anything out. I kept folding this up and I lost my place.

Respondent: So have you done groups previous before?

Interviewer: This is the second of six.

Respondent: How different were the first and second then?

Interviewer: So last night and you're all mothers of young children, that's your group, I don't know whether you've figured it out, there was certainly a gender bias in the room. Last night we had kind of allotment owners, so we had different theories about who would be interesting to talk to. We thought you guys were interesting to talk to because the theory at least is that because you have young children you think about the future, that plays a role in your every day. And that could go one of two ways, and probably both as a dilemma. You could be saying well we want jobs, we want energy, we don't want them to live in this age of scarcity, but at the same time you want to bestow a reasonable environment on them, and so I was kind of interested in seeing which positions people are taking of how we're kind of justifying that. And so last night the garden, the allotment gardeners. You were more concerned about it, they were a bit more kind of technically minded, they were being quite pragmatic, and that's not insulting what you were saying, but they were looking at it and they were a bit more receptive about it than you are and you were more concerned I think on that one.

Respondent: They might get bigger leeks.

(Laughter)

Respondent: Did you not assume that would happen, having a group of people with young children that would be more concerned that people who you had last night?

Interviewer: Yeah, you don't want to try and predict these things too much, but yes, the reason why I wanted to talk to you was because of the future, and I suspected that would play out in a particular way and it kind of did I think on the whole.

Respondent: So are you for or against fracking?

(Laughter)

Interviewer: Well as I said before, I'm –

Respondent: You know lots more about it obviously than we, we just say, "Ooh, panic," but you obviously have...

Interviewer: I think these things are more important than those things and people focus on these things, but I actually think it really comes down to how it fits in with them, because these kind of dominate and this gets left out a little bit, and I think there's things beyond risk, because when (inaudible 02:00:13) I don't know how useful risk is, so as I said before, I think it's who's making the decision, how they're making it, who they're talking to, who they're not talking to, what sorts of opinions are at the table, which ones are being marginalised, so as a social scientist that tends to be what I think about. Anyhow. We're past nine, you could have gone three minutes ago.

Respondent: Thank you.

Interviewer: One last thing that I would say actually is I'll be writing a thesis about this, I'll be writing a paper about this as well. If you want to see a summary of that thesis just so I don't come and talk to you and then never speak with you again, then I'm happy to send that around.

Respondent: Ooh yeah.

Interviewer: I don't know if Sylvia has your email addresses, so on your way out if I could just get you to just, if you are interested in reading that if you could just write your email down there that would be brilliant.

[End of Transcript]

Appendix 3.3 – Transcript Group 3: History society members

Interviewer: All right, well, welcome everybody. This is a nice informal session, actually. I've done... this is the third of six of these groups that I'm doing. This is the first in Nottingham. We've been up in Newcastle and this seems to be a nice atmosphere. So it's just very relaxed. I'm a post-graduate researcher at Durham University and I'm doing some research into energy and climate change. So that's basically what we're going to have a discussion about, more or less, for the next two hours or so. And so, if I could just ask, by way of an icebreaker, if we just maybe go round clockwise and just say what springs to mind when you hear the word energy.

Male A: My dislike of energy discussions at the moment are the wind type turbines.

Interviewer: That's your pet dislike at the moment?

Male A: Yeah.

Interviewer: And what's the reason for that dislike?

Male A: I think it's just the disfigurement of the landscapes.

Interviewer: Okay, so the visual impact. All right, well thank you, [Name].

Male B: The proliferation of solar panels: should I have one or not?

Interviewer: Oh, so that's the dilemma: you're not sure?

Male B: I'm undecided. I've been looking into it and collecting information and watching all the other (inaudible 0:04:56). I'm thinking perhaps I should.

Interviewer: Okay, that's interesting. [Name]?

Male C: Yes, I was thinking about solar panels myself. Also the cost of energy that you have and the constant battle that you have with providers to get the cheapest provider, say, NPower and all those people. And the insanely complicated bills that they have for an extremely simple thing. It just seems extremely complicated.

Interviewer: That's interesting. Do other people recognise that sort of position?

Female A: That's my... a gripe at my energy. Yeah, the cost of energy to heat the house, particularly in these cold winters we seem to be having. Yeah, that's my particular gripe.

Interviewer: Okay, thank you. [Name]?

Male D: Yeah, energy, gas and electricity companies, the cost of it. I think this winter's the first... this prolonged winter is actually the first I've actually deliberately tried to keep everything turned off to save money and, yeah, the difficulties with having to constantly think about transferring from company to company to get the most reasonable deal. Although I think there's some sort of legislation in the pipeline to deal with that (inaudible 0:06:11) suspicious of it as to whether it will work.

Interviewer: There's been something about that in the media, I think. Is switching providers something people do? Is that something (overspeaking)?

(General agreement)

Interviewer: Every year? Okay, that's interesting.

Male B: I'd say, yeah, once every year to 18 months (inaudible 0:06:34) probably, yeah. It's quite easy to do just to go on Moneysupermarket or whatever it is, type your details in, bingo, there's your comparison; they'll sort the switch out for you and you can get a cash incentive for it sometimes.

Interviewer: Okay, so that's something that's become easier in... with the internet and so on? Okay. [Name]?

Female A: [Name].

Interviewer: [Name], sorry! I'm really sorry. It's just because the biro's a little bit faint on some of this (laughing)!

Female A: Yeah, similar, really: the expense of gas and just greedy companies. (Inaudible 0:07:06) research to do, blah, blah. But they all seem to put it up when the weather gets worse and if you switch providers sometimes there's a penalty. And there's so much small-print, I just can't be bothered. I just ring British Gas up and say, look, I'm really pleased with your company, but I'm thinking of swapping so what are you going to do? And they say, (inaudible 0:07:29) into your account if you're still there six months. And I keep doing it every year. So at least I'm £50 better off.

Interviewer: So you said greedy companies there?

Female A: (Inaudible 0:07:43) saying to you I think they're greedy companies.

Interviewer: You think they're greedy companies. Is that something people can empathise with that position?

Male A: There seems to be a lot on domestic... or struggle to make a profit on domestic and (inaudible 0:07:58) industrial that they do make a profit on it. I think I read an analysis of it.

Female A: Yeah, but they've got loads of profit (inaudible 0:08:11) so much profit this year and I'm thinking (overspeaking).

Male C: I think they say that they make a loss, but I don't really think that they'd stay in business if they were making a loss. Because they're not in it for the charity, are they? For the social good, you know.

Interviewer: One of the accusations - I don't know how accurate it is - is that if the wholesale price goes up, but if it goes down - and it does fluctuate - then they're not so quick to go (overspeaking).

Male C: (Inaudible 0:08:39) pass on the savings, do they? But they always pass on the increases.

Interviewer: And so I don't know how accurate that accusation is. But that, certainly, when you talk to people (overspeaking)... Yeah.

Male A: Perhaps it's because we've still got a memory of the thing, one company for each fuel. Whereas now it's a free market and we're still getting used to that, maybe.

Interviewer: Oh, that's interesting. So that's one possible explanation of why you might see what we have at the moment as being greedy or being unsatisfactory in a sense. Does anybody else have an idea of what this sense of dissatisfaction with the

energy industry, what that might be down to? Can anybody pin that down to something else?

Male A: What I can't understand is, if they're so competitive, how can one company be more expensive than another? Then everyone would go for the cheap company, wouldn't they, and (inaudible 0:09:30) out of business and that's market forces. So why aren't they all the same? But then, we wouldn't have an issue, would we?

Interviewer: I think there's a question of complexity with prices. I think what you're saying there, [Name] - sorry, conspicuously looked at your name badge before I... Sorry about that, [Name] - is that it's hard to figure out where the figure has come from, the price. There's no transparency? Would that be accurate?

Male A: No, I was thinking more when there was one company, it was one price, wasn't it? (Inaudible 0:10:10) remember that. But in a competitive market, if they want to be so competitive, you can't really afford to charge more, because you won't be very popular, will you? So you've got to balance it all out and I think (inaudible 0:10:22) one puts it up and the other puts it up to match it. And I think that's (overspeaking).

Male C: It makes you think there's a, sort of, cartel going on? (Overspeaking) Price fixing.

Male A: (Inaudible 0:10:29) supposed to be competitive by many companies, but they all take it in turns to put it up and the others go along with it and you think, oh yeah, oh right, you know.

Male D: I think they blind you with science to a certain extent with the number of different products there are, which presumably are aimed at certain niches, different types of people, as with car insurance that certain products are aimed at certain types of people.

Female A: Yeah, but they all come from the same (overspeaking), doesn't it? (Overspeaking).

Interviewer: (Inaudible 0:10:55) switch people don't switch they subsidise people do switch. So if you care enough to switch, effectively, you get a really good price that might actually be a loss leader for them, but people who don't switch then...

Male C: And the other thing is, also, that you're paying different amounts for what's obviously the same product; you don't get a better quality of electricity from British Gas. Your telly doesn't look any better! (Laughing). It doesn't make your house any warmer, does it? You're paying for the same product, just paying a different amount to different people.

Interviewer: It's just customer service and price isn't it?

Male C: Exactly, yeah. (Inaudible 0:11:30).

Interviewer: That's interesting (inaudible 0:11:35) is that another...?

Female B: [Name].

Interviewer: That's [Name], thank you.

Female B: (Inaudible 0:11:40) we're locked into one company because there's a very old type of electrical system we've got in our house and it's only particular to one provider, E.ON. So I'm in a position where I can't switch, unless I change... take the meter out altogether and then go shopping for something. Yes, (inaudible 0:12:03) for us.

Male E: (Inaudible 0:12:06) anything related to energy, yeah?

Interviewer: Yeah, what springs to mind? Because we've been talking about the energy industry or the suppliers, the consumer and things, but...

Male E: (Inaudible 0:12:16) wind-power, fracking of gas, that kind of thing.

Interviewer: Okay, so I was... if you hadn't pre-empted me there, [Name], I was going to say, how about we take a step back from British Gas and things like that to sources of energy? So if I was to ask you the same question, but (inaudible 0:12:37), what... Is energy something that worries you? I'll phrase it like that.

Male A: I think it worries me because there seems to be a damaging impact on the world at large by consuming certain types of energy. We've been doing that more recently in the last 50 or 60 years. (Inaudible 0:13:03) if we keep going at the same rate, the deterioration's going to be potentially catastrophic.

Male A: There could be a considerable global threat somewhere down the line when developing countries become more and more determined to grab their share of what could be a finite resource. The amount of energy being used by countries like China and India at the moment...

Interviewer: China's opening a new power station every week.

Male A: And then we've got to look at other (overspeaking).

Male C: And it's consuming coal, I'm guessing?

Male A: And other areas, such as Brazil, are going to emerge as well. And they're going to be fighting for the energy that, to a certain extent, we take for granted.

Male C: And there was an interesting thing I remember seeing at some point about environmentally friendly turning mobile phone chargers off at night and saying, well, what impact is that going to have when you've got countries like China opening one power station every week and the amount of energy that's going to consume? (Inaudible 0:14:03) unplug my charger (inaudible 0:14:05) 12 hours. There's a balance there, isn't there, somewhere?

Interviewer: There was a lot of interesting ideas, but I'll come back to this idea that maybe it's taken for granted here and now, in this country, at the moment. Is that something we would recognise, this idea that we take it for granted?

Female A: Well, I (inaudible 0:14:27) works in Kenya and I go out there for three weeks at a time. And every time I come back I'm on the soapbox about our energy use because it's ridiculous. I mean, they are so poor, they don't have streetlights. The lights in the houses are very low and when I come back it's just, like, (inaudible 0:14:51) a dazzle. We've got so much excess energy. It's ridiculous. Well, we use it. We use excess. (Inaudible 0:15:01).

Male D: The Council just installed some new lamps on my street and they're like floodlights. I don't know what they're thinking behind it is. But anyway, I think, for me, it's one of those things where you feel like you should... there's an underlying feeling you should be thinking about it more in an ethical sense, but it's quite difficult, as with things like, why are clothes in Primark so cheap and animals being reared for people to eat and all this kind of thing. So I know it's something I know I should be thinking about but I... actually, there's so much else going on that

I don't really get round to giving it a proper thought and actually doing anything practical about it.

Male F: But that's why, when prices go up, people automatically start turning things off, that's the beauty of prices going up, because we stop wasting it.

Male C: That's an interesting idea from [Name], because... So it's this balance between... price is obviously incredibly important to people, more so now than in maybe the recent past, certainly. But also there could be positive consequences to that sort of thing.

Male F: I would say so, yeah, because we do waste it. And you can say, oh, it's awful that we waste it and then you forget. The price means you won't waste it, because you'll think, it's too expensive, I'll turn the light off. I don't need the hall light on when I'm in the living room. So it's a good thing.

Female B: (Inaudible 0:16:27) with food, it loses its value if it's suddenly incredibly cheap and the same with energy. My concern is where is this...? If it can continue to be generated in generations and generations... I'm not old enough to remember there being lights going out or anything like that. But I can imagine... it wouldn't surprise me... you sometimes hear of some Councils try to save money and it's interesting that you've got floodlights, there are some areas where the lights seem very dim now, along the highways, motorways. Lights are just... they've just taken some lights out altogether to save money.

Male C: Well, our streetlights sometimes go off in the middle of the night and you look out and it's pitch black, because they've switched off every two of three lights in the street to save (inaudible 0:17:11) which is interesting.

Interviewer: Do you think that's a price... saving thing, or do you think that's an energy saving... (overspeaking)?

Male C: (Inaudible 0:17:17) essentially, yeah. Both essentially. I should imagine they'd market it as being an energy saving thing because, certainly, as a Council, they want to be seen as being energy conscious, environmentally-friendly. So it would certainly be marketed to people as an energy saving thing but, obviously, the bonus of that is that it's also, for them, a price saving thing.

Interviewer: Just out of interest, you said you weren't old enough to remember lights going out and that sort of thing? Is anybody... does anybody have memories like that?

(Agreement - inaudible 0:17:46)

Male B: Get the candles out.

Female A: Oh yeah.

Interviewer: Can you ever imagine that happening again?

Male A: Well, I think the cause of that was more of a trade union issue than an energy issue.

Male C: I would say that could happen in the next five years because... if inflation takes off (inaudible 0:18:10) then we'll have wage disputes and then strikes...

Male A: And then we go back to that.

Male C: So we'll have a winter of discontent again, maybe.

Interviewer: So this taken for granted way we relate to energy might have an expiry date, it might not go on forever.

Male C: Also the amount of power station's they're not building at the moment (inaudible 0:18:33) 15 year lead time before decommissioning the ones that are falling apart now. (Inaudible 0:18:39) sorted it out (inaudible 0:18:41).

Female B: (Inaudible 0:18:41) you think, well no, we shouldn't be building anymore, we shouldn't be involved in this fracking business. But then you think, well, where are we going to get it from? Are we then going to start shipping it in from places that then can have big control over us? You hear all sort of horrible things going on in Russia, controlling usage into various countries. If they don't agree with something politically, they might just switch things off. Do we really want ourselves in that position or should we be more...

Male B: Self-sufficient.

[Name]. More independent.

Female A: But shouldn't it start in the home. I think we're very indulgent of ourselves and our children nowadays. We've got two or three of everything in the house, sort of thing; you know, computers, televisions, radios, everything. Obviously, it's costing twice as much per household to maintain that.

Male B: Well, we've got a history of expecting science and technology to provide us with the answers all the time. And, looking back, it always has done - or it seems to have. Do we assume it continues? Well, we've grown up with that notion that it will.

Male C: And gadgets are marketed at us now as being energy saving, obviously. That's one of the prime concerns for people, isn't it, you know. People will buy the energy saving... the thing that says on it, green.

Male B: Especially white goods.

Male C: Especially particularly white goods and things like that. Although, ironically, I know there's an issue (inaudible 0:20:07) that, in terms of your energy saving television, far more energy is consumed making the television than it's ever going to use in its lifespan. So, if your television has a lifespan of, say, five years, the amount of energy that's been used making the television is huge compared to the amount that it's actually using in its lifetime.

Interviewer: So we've come onto technology a little bit... Sorry, is it [name]? So you posed the question earlier on tantalisingly: we've always assumed that technology and innovation and science would, kind of, solve our problems and can we carry on assuming that? What are people's responses to that question?

Male A: If you look at the 20th century then you could say there's been a massive leap in the standard of living, for example, and if you look back you can see that most things have evolved and many issues with everyday living have been solved - I mean, at what cost I'm not sure. But it gives you a, sort of, optimism that there's that progression in human endeavour and that we are capable of anything, when you compare the current information age to how we were living pre-computers. A massive sea change. So, for me, there's that element of, yes, (inaudible 0:21:28) there's an underlying thought that human will and intelligence will provide the answers. But, I think, also, underlying that, there is the feeling in most people, I

imagine, that the clock is ticking somehow and that perhaps we are going to come a cropper at some point. But it's such a massive problem that it's difficult to approach it, because there are no easy answers. And is the political role to do with some of those issues because (inaudible 0:21:59) and it raises many other associated problems.

Female A: (Overspeaking) Sorry! (Laughing). Looking back when I was younger, can we not be re-educated to think we don't need all this heat. I mean, I'm sitting here now and I'm absolutely roasting. At home, I've just got used to turning it down, wearing something woolly and keeping warm. And people nowadays expect to walk around in their shirtsleeves in the middle of winter. If everybody just cut back a bit, surely that would help to lessen the amount of fuel used. I'm not saying we don't need any more technology to advance what we have now. But surely we could help ourselves a bit more.

Interviewer: Okay, so the demand side, rather than the supply side?

Female A: Yeah.

Male D: There's one simple point which is, there's more scientists and engineers alive now than have ever been alive in the whole of history. So you've got more people thinking about to solve these things than ever before.

Interviewer: This is why I wanted to talk to you guys (inaudible 0:23:11).

Female B: It's also... are they being properly incentivised somehow to develop that research? Do they think, well... are companies thinking, well, that's a lucrative market we need to plug into, let's put more money into that? I don't know if that's (inaudible 0:23:25).

Interviewer: So you have a suspicion that maybe market forces and the motivation of profit are playing a role in the way science is going, the direction of science?

Female B: I think it probably is - very cynical of me - but yes.

Interviewer: Is that something else... other people see, or...?

Male C: Ultimately, it's going to drive everything, isn't it, because companies aren't going to invest in a certain area of science unless, at some point, it's going to give something back to them. With the best will in the world, big businesses - a bit like we were saying about the power companies - they don't operate on philanthropic terms, do they? They only really invest in things that are going to give them a return. They're not going to invest in a particular technology or invest in research towards particular technology unless there's something in it for them.

Interviewer: I suppose the counter-argument to that is business is not the only thing that could conceivably fund scientific research; the taxpayer, public money. Was that not the norm...?

Male A: It seems to be an increasing option. I've got the University of Nottingham Innovation Park on my doorstep just down the road in Langton and I think (inaudible 0:24:43) open. But is it GlaxoSmithKline have built a new facility there in association with the University.

Interviewer: Yeah, that's certainly now more common. So I suspect that... and I might be wrong here and you might be able to correct me, it might have usually... it would have been public money that would have funded scientific research. And it's a fairly

recent change. So, going back to [Name]'s worry about the direction of science, being pushed where money might be able to be made, uh huh.

Male A: Yeah, the suspicion is that the cynicism is there, that there is an ulterior motive and there is that spin. Because, with any commercial organisation, there is always the ability to take an area in which they're going to profit from it and to actually make it look like it's some sort of philanthropy gesture.

Male F: But there's profit in saving, there's profit in doing something better or more efficiently. Profit is just the lever.

Interviewer: So you think the market will right itself?

Male F: Yeah, the market isn't like a monolithic thing. The market is made out of thousands of millions of individual players. And, individual players, they will see a niche and they will exploit it. And if they can make a profit from giving people something that people want, be it energy saving appliances, or low energy light-bulbs, whatever, they'll do it. It's blind in terms of that. It's like evolution, isn't it: it's blind but it goes in a direction.

Male A: Look at - slightly related - look at Formula 1, which consumes vast quantities of money and is quite horrifying in terms of the energy sources they use up. But they produce a lot of innovative technology which helps with issues like road safety and efficiency in producing cars and all this type of thing. So, yeah, there are a lot of positives.

Male B: On a bigger scale, aerospace and the American development of (inaudible 0:26:57) generated knowledge which has fed back to the benefit of others at great costs.

Interviewer: So, overall, the sense I'm getting is that people seem to be fairly optimistic about the ability of science and research to come up with some answers to the sorts of problems we were talking about just before. Is that accurate?

(General agreement)

Interviewer: And also that the kind of processes we have that drive this innovation are also, kind of, functioning well?

Female B: You mentioned political will, didn't you, and I think that's... I mean, it's whether it's something that people in charge really value and see there's a real benefit. And you think they would, but whether that's sexy enough on the... when it comes to the elections, whether they think that's going to be a vote winner.

Male A: We suffer from short-term (overspeaking).

Male B: It's a short-term view, isn't it?

Female B: Yeah. And we... it needs to be long-term, really. I mean, you'd think they would be... it would be more of a priority.

Interviewer: So it's maybe politics which is maybe getting in the way of these things, because it works on a short-term cycle. Is that something people would go along with?

Female B: I do worry when I hear that budgets for universities are being cut for research and you hear about the brain drain, young bright things heading off... going off and doing something completely different, where they could be focused on important energy products, for instance.

Male C: I also think... I agree, but then again I also think that, talking about budgets, the budget of a multinational investing in energy is stratospheric compared to the budget of, say, a taxpayer (inaudible 0:28:46) university, or a taxpayer funded equivalent of the same thing. You know, a big business has more investment clout than the taxpayer, I think, (inaudible 0:28:55) the government.

Interviewer: Okay, well that was an interesting discussion, guys, and I'll maybe bring us a bit back towards energy. Because we did have an exciting journey there, I think. But that was very interesting. But, do you notice stories about energy in the news? I mean, is that something people look out for? Is that something people will read?

(General agreement)

Interviewer: And, on the whole... So, do you have examples of recent stories that have made you sit up and think, or that you saw - I don't know how you consume your media - that really grabbed your attention, basically?

Female A: That fracking.

Female B: It's a concern, isn't it?

Female A: Really concerns not only me, but...

Interviewer: Okay, so that was almost universal around the room. Has everybody heard of this fracking?

(General agreement)

Male C: The other thing is, (inaudible 0:29:55) asteroid mining thing (inaudible 0:30:01) is it James Cameron and (inaudible 0:30:03) are trying to... interested in. But I suppose that's not energy, as such, is it?

Interviewer: Um, well, yeah, I don't know. That seems like quite far off in the future. But I suppose it's to do with exploiting resources and about the issues that come along with that. Maybe thinking back towards the energy industry, because I think we touched on it to start with, and that's in and out of the news at the moment. Do people notice these stories?

Male A: I read a story that... I travel to St Ives in Cornwall quite a lot. I love the A30 until I get to one particular point where you turn the corner and then there's this enormous array of turbines. And then I read in the paper that they're going to reduce that. And I thought, oh, that's good. So they are. But the ones they're going to replace as twice as tall (inaudible 0:31:00). I overtook two on the way down to St Ives (inaudible 0:31:06) overtaking a long vehicle and you're thinking, am I ever going to get past this? They are enormous! And they're going to make them twice as big, but less. But, to me, that means you can see them from further afield than what you can now.

Interviewer: It's interesting, [Name], because, at the very beginning, you said you were concerned about environmental issues. And so, how do you square this hatred of...?

Male A: This is why I mentioned it, because it's one of those imponderables, isn't it? It's a wonderful concept that the wind should produce energy but, in return, you get something that... I don't know if anyone here agrees, but I don't like the appearance of them and I do think it does interfere with the country that we should

love and look after. But it's a clean method. There's not lots of smoke, is there, and waste and ash and all that sort of stuff, so...

Male B: I'm actually in two minds about it. I think when they intrude onto a much-loved landscape... I mean, for example... much-loved, I don't know if it's the right term, but Skegness I haven't been back to for many years, but I gather there's some offshore wind turbines there. Which, to me, I like to look (overspeaking) feeling of infinity and you've got (overspeaking).

Male C: (Inaudible 0:32:25) some inland ones as well. There's quite a lot round that way. (Inaudible 0:32:29) Skegness or anything.

Male B: But, by the same token, I find them visually impressive. They're quite sublime and quite awe inspiring, but in the right place...

Interviewer: Okay. There's tacit approval around the room for...?

Female B: I've heard a few stories from people who live near them, very near them. And they're having problems... well, they want to sell their property, or move (overspeaking) problem.

Male C: There's a lot of noise (overspeaking).

Female B: Yes, there's a lot of noise.

Male C: (Overspeaking)... think of being fairly silent. But, again, they do make a lot of noise.

Male D: They also chop up birds. (Overspeaking).

Male B: A lot of things that we're told and a lot of things that appear in news reports... There's far greater emphasis these days on justifying things on environmental grounds, on the grounds of saving energy, which is why we have vast amounts of money being spent on (inaudible 0:33:30) of railways, why we're told that the tram locally is a much more environmentally-friendly form of transport, it's cleaner energy. We can stop using diesel engine-powered buses. We can have the electric tram. I think there's this greater emphasis now to be able to justify it. And I think, eventually, even things like the wind turbines... somebody's going to start trying to justify it to us, saying that it is a price worth paying because of the benefits of more energy from a sustainable source, etc, etc. And I think... I'm not suggesting there's a conspiracy to soften us up to this kind of thing, but we are getting to that stage, I think, where's there's this constant justification, whether it's ruining the landscape or not; one day somebody will say, oh, that's a price worth paying.

Interviewer: And so do you find those justifications persuasive? Is it a price worth paying?

Male B: I'm not convinced it is, but I think there's going to be more and more emphasis in that direction.

Interviewer: Because these sorts of decisions about sources, we obviously don't make them in a vacuum; it's not about whether we do this or we don't do this, it's about the mix. And so, if you're not convinced that's a price worth paying, what's the alternative route? And wind doesn't make up a particularly huge percentage of where we get our electricity from at the moment.

Male A: I don't think it ever will, but we might end up with a wind turbine every 400 yards apart. (Inaudible 0:35:16) make it viable then how wonderful will that be (inaudible 0:35:21).

Male C: The other thing that did catch my eye in the news was the new nuclear power station they're planning to build on the south coast near...

Interviewer: Is it... it's down in Somerset (inaudible 0:35:30).

Male C: Yeah. I mean, that's a huge, huge undertaking in itself. I think it's 2024 it's planned to be operational. And, of course, to do that they've got to decommission the previous ones and then that's before you think about what happens to all the decommissioned stuff. So we just ship it up to Sellafield, you know.

Interviewer: So is this not good long-term planning? Is this not politicians looking beyond the next election and (overspeaking) given the go-ahead for this?

Male C: Well, you'd like to think so, wouldn't you, but, I mean, nuclear fuel's even more decisive than wind turbines. A wind turbine, the worst thing that's going to do is probably kill a bird. Whereas nuclear power station, the worst thing that's going to do is you've basically got Chernobyl, haven't you? It's an entirely different kettle of fish - quite literally in some cases if you get it wrong.

Interviewer: So, do people agree over here? What are your thoughts towards nuclear energy, basically?

Male D: I'd say renewable's better, because you are left with this idea of, where do you put it all? (Inaudible 0:36:25) rid of the waste with the half live of 250,000 years. Long after the word Chernobyl has disappeared out of the language, there'll still be people having birth defects in that area of Ukraine. And they won't know why. Because, that's... think about how far... the Egyptians were 7,000 years ago. 250,000 years from now...

Interviewer: So if I was a... I'm not, but if I was in PR for the nuclear industry, or if I was... if that was my job to try and persuade people, I'd say well this was shoddy regulation, this... we have so many nuclear power plants all around the world, this hasn't happened... Well, we've (overspeaking).

Male D: Yeah, exactly, Fukushima. The Japanese are normally very good at doing these sort of things. It turns out they have a bit of a dent on the pressure vessel so they decide to jack it to make it the right shape, but it weakened it. And that was (inaudible 0:37:22).

Male B: For me, they can make it as safe as it could possibly be, but I... as with fear of flying, I know that statistics say that it's safer than c[Name]ing the road or driving or whatever. And, for me, I'm afraid of the idea of nuclear power and I just think of the disasters, as you would think of air disasters. And no one will ever... no nuclear power industry PR person could ever educate me - or whatever the word is - otherwise, because I have that primeval fear of the thing going off and there being horrific consequences.

Interviewer: So you think you can have all the regulation you want, you can have all the health and safety stuff in place, but there's always going to be... it's innately dangerous, there's always going to be this - even if it's slim - this possibility.

Male D: Well, we haven't had nuclear power for, what, 60 or 70 years. We've already had a fire at Windscale (inaudible 0:38:18), we had Three Mile Island, Chernobyl, Fukushima. So it's not just one or two. There's lots of things that have happened.

Male C: And when something does go wrong it goes big style. It's a huge, huge cataclysmic events, rather than, like I say, a blade falling off a turbine. Obviously, again, the yields are slightly different, because I should imagine a nuclear power station generates a heck of a lot more power than the comparatively sized wind-farm. But, obviously, again that's because it has a much bigger environmental impact. Of course, what would be wonderful is if somebody could put a huge amount of investment into clean fusion, rather than fission technology. But, obviously again, you're talking huge amounts of investment there.

Interviewer: Okay, maybe a bit too long-term, a bit too uncertain about whether it's going to pay off. So, we're not... generally, we're not sure about nuclear. In fact, it's probably a bit stronger than that. Certainly some in the room are not sure about wind and there's plenty of people sceptical about the capacity of renewables. What are we left with? Are we sure about anything here?

Male C: Tidal power.

Female B: I was going to say, we're an island. Surely (overspeaking).

Male C: But then again, if you're doing that, it's the same as the wind-farm, you know, interfering with nature to a certain extent, putting a big tidal barrage ac[Name] somewhere. And you're going to have a big visual impact on the sea, aren't you, essentially, on your view.

Male D: And migrating fish and things like that.

Male C: Yeah, exactly, yeah.

Male D: You've got geothermal, that's quite low impact.

Interviewer: I think what's definitely coming ac[Name] is there's not... there obviously isn't... This is very obviously, but I'm going to say it anyway: there obviously isn't a choice that is the obvious choice because there are just positives. Everything has its drawbacks, everything has its pros and cons. So it's this balancing act.

Male A: But if prices keep on rising for energy, it'll become economically viable to start mining coal again.

Interviewer: Well, I mean, we haven't mentioned fossil fuels in this section of discussion. Why hasn't anybody brought that up? Is (inaudible 0:40:30)?

Male C: I should imagine, yeah. I think the natural information of people is to think that fossil fuels are something of the past. Because, historically, you think of fossil fuels you think coal mine. You think big early power stations, big coal-fired power stations. But then again, having said that, (inaudible 0:40:51) I'm not sure what the percentages are - you'll probably know - how much percent... I'm guessing 70% of energy in this country, something like that?

Interviewer: Electricity?

Male C: Electricity generated via fossil fuel means.

Interviewer: Coal and gas 70%. 2011. UK Energy. That's from the Department of Energy (overspeaking).

Male C: So again, that's three quarters of the power in this country still comes from fossil fuels. (Overspeaking).

Interviewer: Sorry - but how do people feel about that 70% in 2011. It might have come down slightly since then, but I wouldn't have thought significantly.

Female B: I'm quite surprised it's so high. I don't know what... I thought it was probably about 50%.

Interviewer: Renewables 9.4%.

Male C: (Overspeaking)?

Interviewer: Nuclear is fairly significant. So nuclear's about 20% and then there's other ominously named (inaudible 0:41:47). (Laughing).

Male D: Nuclear's quite high, because we import a lot of power from France and they have a lot more nuclear than we do.

Interviewer: What do you think about this argument that, you know, a while ago, the French government put a lot of effort and a lot of money into developing the expertise and the capacity in France to do nuclear. And now, it's French companies that build our nuclear power stations, if we build them.

Male A: That's an interesting point.

Interviewer: Is that an opportunity? Not for nuclear, necessarily, but, you know... (overspeaking) being an early adapter, if you like, and then exporting that knowledge and expertise.

Male C: It's an interesting point, but it's a bit like the Russian power-lines, isn't it; again, you're putting your faith in another country, aren't you, so politics can come into that. Not that I'm saying (inaudible 0:42:33) war with France, but there's (inaudible 0:42:36) allowing... passing on the burden (inaudible 0:42:41) somebody else.

Interviewer: Hmm. And so we've been talking about these difficult choices and there's... right and wrong goes out the window, there's drawbacks to everything and I suppose each has their own positives and their own plusses. What sort of rationale, what sort of factors do you think it's important to prioritise while making these decisions. What do you think it should be...? So, is it price, is it something else? What should be at the forefront of decision makers mind?

Female A: That we're going to have something left for generations to come, with regards where are we going to get it from, what's going to be the impact of it?

Male C: Sustainability.

Interviewer: So it's... so that would be a top priority?

Female A: Yeah, as long as it's not... as long as we're sustaining the welfare, as well as...

Male C: Sustainability in terms of the environment, rather than sustainability in terms of the resource itself, is that what you're saying?

Female A: Yeah, because if we've got a sustainability in the resource itself and we're not concerned about the environment then we don't need energy, because we're all going to not be here anyway.

Male C: Exactly.

Female A: Well, yeah.

Interviewer: Okay. So, does everybody agree that sustainability would be the top priority.

Male B: Damage limitation, as I was saying (inaudible 0:44:08).

Interviewer: So, in terms of the environment...

Male B: Yeah, what are we going to damage by choosing this methodology usage or consumption and try and balance an awareness of doing one against the other (overspeaking).

Interviewer: And so would there be a condition to do with price attached onto... Because, surely, at some point, hypothetically-speaking, if it just went like this - I'm not suggesting that it necessarily would - but if price just rose and rose and rose, surely, at some point...

Female A: Well, this comes back to what I was saying earlier about educating people to use less. So that, if the price did go up, and we're using less then it's not going to be so bad. Shall I talk about when there was frost on the windows when I was a kid. (Inaudible 0:45:01) central heating and, you know... And I think my generation were quite healthy as youngsters and we know how to look after ourselves now and I have to wonder how my grandchildren are going to be when they're older, will they be able to manage when it's cold when they haven't got the heat? Because I can see that they won't have like we have today, or this that we take for granted.

Interviewer: This is a side of the argument that... side of the debate, really, that sometimes we forget about which is the... The suspicion is demand's only going to go up. But there could be lifestyle changes. More simply, there could be better efficiency and stuff like that, that could mean, you know...

Male C: Isn't it... I think (inaudible 0:45:52) build a house... if you were to build a house the way it was built in Sweden in this country, you wouldn't need heating. I'm sure I read that somewhere. In Sweden and in Norway and Scandinavian countries, they're built so energy efficient that if you were to build them in this country you just wouldn't need heating.

Male B: The temperature of people just being in the house and (inaudible 0:46:17) is enough to keep warm.

Male C: Yeah, there's enough things in there, there's enough insulation, essentially (inaudible 0:46:22). So that simple solution... But then again, you've got market forces because, obviously, that's a lot more expensive to build a house. And the last thing people need nowadays is more expensive housing. So, again, it's market forces.

Male B: My son's got a Swedish girlfriend and I asked her the other day if she lived a wooden house and she said, yes. There are other sorts in Sweden but everyone lives in wooden house because they've got plenty of wood. But they must consume an awful lot of wood.

Male A: But as long as it's renewable - it grows as fast as they use it - that seems to be an excellent idea, doesn't it. So if we can have loads of trees that are renewable and build wooden houses. But we never seem to do that, do we? The budget today (inaudible 0:47:14) helping the development of new builds, either the builders or people to buy them, there was no mention of wood! (Laughing). No mention of super-thermal insulators (overspeaking).

Male D: (Inaudible 0:47:23) houses that are wooden framed with a brick skin on. (Inaudible 0:47:30).

Male A: Yeah, not quite the same as the Swedish concept of, you know... That's like going halfway, isn't it, (inaudible 0:47:36).

Male C: Well, the other way is the houses that are built in the big sheets (inaudible 0:47:41) somebody I knew had a new build in Scotland the house of made of big two foot thick sheets of insulation that they just cut the windows into. (Inaudible 0:47:54).

Interviewer: What do you... I mean, there's lots of interesting ideas flying around and most of them have been done somewhere else but not here. What do you think prevents us from doing these sorts of things?

Female A: Well, I'm just a cynic! I just... probably totally stupid, but I think there's nothing in that for the government as regards energy and... Oh God, I get this train of thought and it just disappears, I'm sorry. (Inaudible 0:48:23) get planning permission for such things in this country. I mean, it is a viable proposition?

Interviewer: Okay, so there could be constraints in the planning.

Male A: Cultural consideration, tradition maybe.

Interviewer: Okay, well back to this idea about fossil fuels and they... someone's getting (inaudible 0:48:44). Don't worry about it, it's fine. That's fine don't worry. So, this idea about fossil fuels. We still use quite a lot of them. There was maybe the sense that they were a thing of the past. I mean, what are people's overriding feelings towards fossil fuels.

Male C: Well, it's like a necessary evil, aren't they?

Interviewer: A necessary evil. How?

Male C: Because you're so culturally used to using them and the whole of our society is geared towards the use of fossil fuels that they're so ingrained (inaudible 0:49:29) to imagine without them would be completely alien to us.

Male A: Production's been a very strong part of our culture as well, in terms of the coal mining industry, north sea gas and that type of thing. And that's still relatively recent past. So, yeah, it's something that probably hasn't yet (inaudible 0:49:50).

Interviewer: Communities grew up around coal mines, but not... I mean, nobody's really mining huge amounts of coal anymore in the UK, are they?

Male A: There's a lot of it imported. But, obviously... I don't know, it's obviously a subconscious thing. I know (inaudible 0:50:08) is there, I can see it from all manner of different positions... situations in Nottingham that I find myself in (inaudible 0:50:14), but I just don't (overspeaking).

Female B: I think we've still got some pits in Nottingham open. I'm pretty sure we have. I'm sure I heard that one reopened. One started up again.

Male A: I think there are always proposals sometimes on the table to reopen this bit or that bit as well.

Interviewer: Yeah, it was my understanding that it was only small scale stuff that was still going on in the UK.

Female B: But they obviously think it's profitable (inaudible 0:50:38) that. Interesting to compare our discussion to another county where there is no relationship with coal mining.

Male B: I had (inaudible 0:50:47) pit on my doorstep when I was a kid and you'd wake up with coal dust on your windowsill and it's still quite ingrained, even though I'm 47. So, in my generation, that's still quite an ingrained thing. And I'm aware that the industry's gone to a large extent, but (inaudible 0:51:08) assumed that somehow something else took its place and there's not been any great sea change in how we... (overspeaking).

Female A: Why did they actually go? Was it that they'd run out of this resource, or was it closed down?

Interviewer: It was a complex mix of factors. Just, I suppose, most of what was easiest to get out had been gotten out, to an extent. Maybe there was stuff to do with price around the time. There was certainly political (overspeaking).

Male C: The argument was that, throughout the 70s, the coal mines stopped being profitable. So 60s, 70s (inaudible 0:51:45) industry subsidised. And the mining unions were so powerful because they'd held the government to ransom. They held the Labour government throughout the 70s... (inaudible 0:51:55) held them to random, because (inaudible 0:51:58) very political there. And then, of course, the big killer of the coal mines were the coal mine strikes of 1984 and Margaret Thatcher, exactly. I mean, if you ask... again, interestingly enough, you're in Nottingham, in Nottingham there was an area had the UDM - is it UDM. (Overspeaking). As opposed to the NUM and so, of course, Nottingham were ostracised by a lot of the other areas, because we didn't... I say, we, the coal miners around here didn't strike but as all the others ones did... If you ask most people outside of Nottinghamshire they would say it was Thatcher that killed the mines (inaudible 0:52:37) fairly certain of it.

Female A: But if there's still coal down there, is this not something they can (overspeaking).

Male A: It would cost more now, I think, to get it out (overspeaking).

Interviewer: What happened since the 70s and 80s, of course, was this kind of environmental consciousness, this idea of greenhouse gasses. More recently Al Gore went around the world with An Inconvenient Truth. So there's a sense that that's culturally unacceptable. Do you think that coal's culturally unacceptable? Do you think? (Overspeaking).

Male A: (Overspeaking)... on the table for some opencast mining around... is it Eastwood area? (Overspeaking). (Inaudible 0:53:24), yeah, and I think (inaudible 0:53:24) there are all sorts of enquiries going on and a big public reaction to it and it would make a huge difference to the landscape. And, of course, the people who want to do the opencast mining have put forward a vision of, you know, they will restore it afterwards. So I don't really know which side to believe myself. But I don't

generally believe in nimbyism generally, but I don't know. I suspect perhaps if that was on my doorstep I might feel differently. (Laughing).

Interviewer: So what do people think in general, fossil fuels and, you know, could you accept that in 2013?

Male C: I mean, the contrary side to that is, of course, fossil fuels, because they've been around for so long, they've had all this time to refine the technology. And, again, I can't remember what programme it was, it was the... was it the Genius of Engineering programme that had... (inaudible 0:54:18) modern version of Tomorrow's World (inaudible 0:54:22) power station and they were talking about how a modern coal-fired power station is x amount more efficient than the equivalent power station 20 years ago. So the flip side of the fact that you've still got a coal-fired power station is it's a coal-fired power station that's a lot more efficient, because it's had the years of tweaking and efficiency.

Interviewer: I suppose the counterargument to that is unless you perfect carbon capture stuff, which hasn't happened yet, you can be as efficient as you want with coal, but if the counterargument is climate change, then...

Male D: And if you were comparing it to something that was hideously dirty and saying (inaudible 0:55:06).

Male B: Still dirty, but (inaudible 0:55:08).

Interviewer: So (overspeaking).

Male C: (Overspeaking)... unlike, say, wind-power, which hasn't had quite so much tweaking. That's had a lot of tweaking, a lot of development put into it.

Male A: It can be quite a compelling argument for the companies to put forward to the general public who don't really have much of an idea of the fact that (inaudible 0:55:29) it was really (inaudible 0:55:32) now not quite so bad, but still fairly horrific, you can spin that, can't you. And you can put it ac[Name] as a big thing. If supermarkets reduce the amount of fat in their foods, they can put the statistics forward in such a way that it actually seems quite impressive when, in actual fact, there's still a hell of a lot of fat in (inaudible 0:55:54).

Male C: But not as much as there was.

Interviewer: I think we'll just move on to the next session. I have some visual prompts, some board of information. And so we were talking about fossil fuels in 2013 and what do we think of that. Some people have mentioned this before, but we're going to spend the rest of the last hour talking about this. And so apologies if you've got to strain your neck to see that. And I will talk you through this, just in case you can't see. So that will go there. Okay, so hydraulic fracturing. I'm going to be in your way, aren't I, a little bit? I'll read it out. Not exactly word for work but I'll make sure you all know what we're talking about. So this is hydraulic fracturing. Have people heard of this? We were talking a bit about it before. Has anybody not heard of this? Everybody's at least seen something in passing. So, fracking. So, at the risk of patronising people - I don't want to patronise you - but I'll just go through it, just in case. So the idea is that there's unconventional fossil fuels. They're unconventional because of their source. They're trapped in various sorts of geological formations. Most commonly, at the moment, people talk about shale gas (inaudible 0:57:32) it's methane caught up in shale. And so, it's the same fossil fuel that's unconventional, just refers to where it's come from, basically. And so how do you get that gas out of that rock? Well, you pump fracking fluids into it at

high pressures to intentionally cause fractures in the rock so the gas can flow out. And so, it's actually got a longer history than a lot of people realise. It goes back to the 1940s in America, but it has a lot of column entries at the moment and increasingly so. It really took off in America about 2003/2004, something like that. And partly because these two... (inaudible 0:58:21) those two things: horizontal drilling and the fracking itself. Horizontal drilling is obviously changing direction from vertical to horizontal and that's just maximum surface area within the shale, that strata. So you go down into it and through it. But crucially, also, gas prices meant that it was economically feasible to go to those sorts of lengths to get gas out of the ground. So that's what's important on that board. I'll talk about the fracking fluids a little bit: largely sand and water. 99.5%, something like that. The rest are chemical additives that perform various functions in the process; they keep the sand suspended, they keep the cracks open, there might be bioscience in there, that sort of thing. And so, what are peoples...? These aren't exactly initial impressions, since people have heard of it before, but what impression do people have of fracking?

Male C: They should have chosen a better name! (Laughing). I think whoever the marketing team is (inaudible 0:59:29).

Interviewer: Because of its proximity to (overspeaking)?

Male C: (Inaudible 0:59:34) expletive, you know, (inaudible 0:59:39) something - it's damage isn't it? You know.

Female A: Basically, it's just damage, isn't it?

Male A: Least they're telling the truth, they're not pulling the wool over our eyes, are they? (Laughing). (Inaudible 0:59:51).

Male B: Wasn't it used as a term in war context, military context, fracking, in the 50s or 60s?

Male C: Oh, I'm not sure. I don't know about that.

Interviewer: Possibly, I don't know.

Male B: Seems like a destructive way of going about things (inaudible 1:00:07).

Female A: Sorry - I don't want to be really rude.

Male B: I've reached the end of what I was going to say.

Female A: So, this fracking, talking about in this country, lots of mining areas in the country, how would that work with disturbed ground?

Male C: (Inaudible 1:00:31) doesn't it? You only have to drive down certain roads around here to see the subsidence cracks in the roads, to see the cracks in people's houses. Huge amounts of places have subsidence problems. I mean, talk about subsidence on a stick! We're going to destabilise the ground.

Interviewer: So you'd... I mean, it sounds like you'd be very interested in making sure that people had, what, looked at the local geology very careful, made sure there weren't all sorts of holes already.

Male D: Well, they're blaming an earthquake (inaudible 1:01:07) Blackpool.

Male C: Yeah, that's right, that's what it was, wasn't it?

Male B: You'd hope that was a given.

Female A: Yeah, I was going to say, yeah, I can't believe that... I'd have to think about (overspeaking).

Male C: How far down are we talking?

Interviewer: It's typically about... the shale is typically about... Geology (inaudible 1:01:25) what's above the ground, I suppose. But, typically, about two to three kilometres down.

Male C: That's a lot deeper than coal mines.

Male D: (Inaudible 1:01:32) surface.

Interviewer: Pardon?

Male F: It's way outside of the zone of influence to the surface.

Male C: Because coal mines were...

Interviewer: That's a question you'd want to ask. You'd want to see a safe gap.

Male F: No, I'm saying it is. In kilometres (inaudible 1:01:49) zone influence.

Male C: But, then again, you're still destabilising something, aren't you, you know. By very nature you are destabilising something.

Interviewer: Yeah, earlier on, somebody said it just seemed destructive. It is much more destructive than what we've done in the past to get this sort of thing out of the ground?

Male B: It seems the kind of method where it might have some sort of knock-on effect somehow. I don't know why I think that. Maybe it's some sort of influence if it's not at ground level at some sort of structure or level of the geology beneath that (overspeaking).

Interviewer: You suspect there'd be a degree of uncertainty about what would happen as a consequence.

Male C: And nowadays we're a lot more savvy about this sort of thing. Whereas, again, 150 years ago when all the big coalmines were dug people just accepted, oh we're just digging a hole in the ground, you know. I don't imagine there was quite the level of public fear that there would have been about digging holes in the ground and making (overspeaking).

Interviewer: So do you think there's a different threshold of what we might call social acceptability?

Male C: Unquestionably. (Inaudible 1:02:52) Victorians and, again, (inaudible 1:02:56) had no qualms about building socking great chimneys and filling them full off massive amounts of smoke that filled the atmosphere.

Male F: They've had problems in the US, haven't they, will mobilising gas into groundwater, which then comes out the tap and you can light it. (Laughing). You

can light the water. I think it's on Youtube - just type in fracking, groundwater, you'll find it. (Laughing).

Interviewer: So, just go back to this idea of a surprise or there being uncertainty about this, is that a concern that others would share?

Female A: Definitely. What about drought areas, because it needs a lot of water.

Interviewer: So that's another question (overspeaking).

Female A: At the moment, we're not in a drought.

Interviewer: It's hard to believe it, but part of this... England are in drought, aren't they, at times. (Overspeaking). At certain times of the... Yeah, (overspeaking) it doesn't seem like it, but the records (inaudible 1:03:53).

Male A: So we could drain water, could we, into these fractures? Is that an issue? The water table could fill the holes that these fractures (overspeaking).

Female A: Well, it could affect the water table... (overspeaking).

Interviewer: We'll talk about the risks in more detail later on, but I think a bigger concern is this fracking could somehow make its way to the water, to the ground table. So what sort of confidence do you have... We're talking about uncertainty, you know, somebody's making decisions about this. People are doing research about this. How certain would you want people to be about the implications of causing these fractures and how they behave, how far they go?

Male B: Cast iron certainty.

Male C: Yeah, 110%, you know.

Interviewer: Can you get cast iron certainty when you're talking about complex things like...?

Male F: No, but you have cast iron certainty that they'll rectify anything that they... (overspeaking). (Inaudible 1:05:07) with resolving it, no matter how much it costs.

Male C: But is it going to have implications beyond that that it can be dealt with by insurance companies? If you're going to do it and cause an enormous earthquake then, you know, that's beyond an insurance company's remit to deal with that, isn't it? And, again, the figures... going back to coal mines, if there's a coal mine underground you can physically go down and fix the issue with the coal mine, because there's people down there. There's going to be nobody down there. It's all going to be a completely automated system.

Interviewer: It is interesting, this idea of insurance, because insurance is a.... it's almost, by nature, quite a quantitative thing: it's numbers, it's adding up. Is there anything that escapes that? (Inaudible 1:05:55) I think you were worried of this idea of insurance being a kind of... or did I misread your facial expression, maybe I did?

Female A: Oh yeah, insurance. Insurance doesn't come into it. I mean, this is something that can't be insured. It's something that's a natural element beneath the ground. How can that have a price on it?

Male F: I'm talking more about sorting environmental damage or material damage to buildings or whatever. Subsidence, you know, coal mine subsidence, they cover that.

Interviewer: So there could be mechanisms to deal with...

Male C: But, then again, insurance can't counteract environmental damage. Like the BP thing, the BP oil (inaudible 1:06:45)...

Male D: Deep Water Horizon.

Male C: Deep Water Horizon, yeah, no amount of insurance is going to undo that, is it. It's similar technologies, isn't it? It's technology that's obviously deep underground, under the sea. It's such a big thing that, again, I think it's... No amount of insurance is going to fix what could be a potential environmental catastrophe in terms of comparing it to Deep Water Horizon.

Interviewer: We do broadly seem to be quite negative about this. Have people heard rumour of promised riches? Have people heard the other side of the argument being put ac[Name] of possible benefits?

Male D: It's really cut the price of gas in the US by like a factor of, like, 4 or something.

Interviewer: I'll put the next board up, because that's exactly what that deals with.

Female B: I think I'd say that I hadn't really heard many positives about it.

Female A: No.

Female B: But then (inaudible 1:07:41) press that I'm reading, I don't know.

Interviewer: Yeah. So, golden age of gas - question mark.

Male D: It's even responsible for re-shoring of US industries back to the US from other places because it's become that cheap. They're competing with China now in terms of manufacturing because of the difference in energy price.

Interviewer: So, it has had implications for energy in the United States. So I said there was... fairly early in the noughties... That's a bad expression, isn't it, the noughties, but never mind. When they really started to take off... and so... has everyone heard of this company, Quadrilla.

Female A: No.

Interviewer: They're a company exploring the possibility of doing this in the UK.

Male C: (Inaudible 1:08:31) research.

Interviewer: No, they're (overspeaking).

Male A: Sounds like a sort of radioactive monster that will be produced (laughing) (overspeaking).

Interviewer: This came up last night, people were saying this isn't a good name! But they're saying, you know, in the last ten years the price of gas in the US has dropped to just a third of its original price and the Sunday times in 2011 are reporting that (inaudible 1:08:52) wonder gas that could cut your energy bills. What do people make of that prospect?

Male C: The automatic cynic jumps to, has Rupert Murdoch got shares in it?! (Laughing).

Female B: Well, I'd be thinking something quite similar, actually. (Inaudible 1:09:07) interesting, yeah.

Male A: Is there damage that can be measured to offset this benefit?

Interviewer: So, before you wanted...

Male A: Is there any mention of that?

Interviewer: Before, you wanted to conclude about what you thought about the benefits, you want to see what risks came with that?

Male A: (Inaudible 1:09:24) it's cheaper, but (overspeaking).

Male D: So it's not really about subsidence, it's about burning more fossil fuels and creating loads more CO2 without any way of being able to store it or capture it.

Interviewer: So, looking at the benefits alone isn't enough, you've got to weight them up. Sure, I apologise (inaudible 1:09:45) too linear for you, I think. We'll move onto that next. And so, you know, people are looking at this and here's a depiction of where there are, kind of, shale formations - and I apologise again, that's going to be small - but it's spread out quite equally... fairly equally around the world. I mean, there are places we don't have much data for. I say we, but I don't really mean we. Well, I mean we in very general terms. So, there's a lot of it in North America. There's actually quite a bit in South America as well. All over Australia and China, South Africa, Algeria and it's dotted around Europe as well. And so people are really seeing what's happened in American as a bit of a blueprint that could be followed elsewhere and think, yeah, cheaper gas prices, we could do with that as well.

Female A: Yeah, that's a bigger landmass and they're going to need more wells for fracking than they do for oil, apparently. So England hasn't got that space.

Interviewer: So you'd be worried about how tightly wells might be packed together?

Female A: Well, they're going to be near where people live, aren't they?

Interviewer: So there's a population density difference as well, isn't there?

Male C: They can do them in the middle of a desert in Texas or something and it's going to affect the lizards. Whereas, if they're going to do it in Lancashire, it's going to affect (overspeaking) (laughing)! Whereas, if we're going to under Lancashire it's going to affect a lot of Lancastrians, yeah.

Male A: I think that's what the people in Lancaster were saying, weren't they, this fracking's going to affect in this small area. So the rest of the country might say, oh that's a good idea (inaudible 1:11:29) (laughing)!

Interviewer: Just for those that can't read over here in this corner, Quadrilla, again, are saying that they expect to be in Lancashire for 30 years. They're trying to persuade people they're in it for the long-haul - whether that's a long time or not, I'm not sure. But they're saying £5-6 billion in Corporation Tax. And so we also have this quote... we have a couple of politicians. We have this quote from George Osborne from the Conservative Party Conference last year. He also said yesterday in the Budget that Shell Gas is part of the future. So he's quite interested in that. And he's saying

here that he doesn't want to see Britain left behind as gas prices tumble on the other side of the Atlantic. How do people respond to that?

Male B: Is this 30 years so that they can measure any damage that might occur? (Inaudible 1:12:26) for 30 years we're onto a winner, sort of thing.

Interviewer: I don't know why the figure 30 years.

Male B: I just think it's fed into the system to say, well, we'll be here and we'll (overspeaking).

Male D: I guess they've just worked out an estimated amount of actual resource in the ground before it's depleted. (Inaudible 1:12:46).

Interviewer: And then their estimate is two hundred trillion cubit feet of gas, which I'm assured is a real significant amount of gas up there underneath Lancashire. But I can see you're itching to talk about the other side of this. So, without further ado.

Male C: But, again, as we were saying earlier, gas is still a fossil fuel, isn't it? I'm not sure about in terms of the carbon dioxide produced compared to... because is it methane? Is shell gas essentially methane, isn't it? Which is different to north sea gas.

Interviewer: We'll come onto this a bit later, but it's... in terms of its greenhouse gas effect and its carbon footprint, it's a bit difficult to measure because of this process called fugitive emissions, which is stuff that escapes during production that wasn't meant to escape, basically. So, if that's really high, that obviously takes it in one direction. If that's much better... And whether that's just down to sloppy practice, or whether that's something that's maybe out of our control, we're not 100% sure yet. But if those fugitive emissions are high, it's up there, not quite as bad as coal, but it's not much better than coal.

Male D: Methane's, what, like, 24 times more efficient at warming the...

Interviewer: It stays there for a lot less time, but when it is there it's more efficient. But if you get the fugitive emissions and the control of them, it's only marginally worse than conventional natural gas. So that's the climate change side of things. And so we have these hazards and risks - and, again, I apologise - I'll talk about the ones that grab the headlines: seismisity, earthquakes. You were quite right, there were two earthquakes, actually, almost a month apart near Blackpool and that was in 2011. The magnitudes were 2.3 and 1.5. In the grand scheme of things, they're low magnitudes, in fact, you might not even feel them on the surface.

Male C: But what level of fracking had been taking place to warrant that?

Interviewer: That's a question you'd want to...

Male C: Yeah, if that was only an exploratory amount of fracking, if there was a huge amount of fracking that went on, what effect would that have on the magnitude of the earthquakes that were going to happen?

Interviewer: The Royal Society and the Royal Academy of Engineers have done a study into this and they think this risk is manageable. And part of their reasoning is they went... We don't think of Britain as a place that has earthquakes but... I mean, for instance, to do with the coal mining industry, there were earthquakes that came from that. And what they've said is that the earthquakes that would have come from that are very comparable in terms of magnitude. And so they're saying that's

a, kind of, threshold and this is actually below that threshold of acceptability. And they say if we have this traffic light system of early warning type thing, we can manage this risk. So, first of all, there's a few ideas in there. What about this idea that... of this threshold that they've come up with, that that magnitude of earthquake is okay?

Female B: So, if it went above it, well, they would just stop? Considering how much money they've been making and...

Interviewer: Well, they had stopped voluntarily.

Male C: Earthquakes are notoriously difficult to predict.

Male F: (Inaudible 1:16:34) PR to stop voluntarily. That's just basically saying, we're doing all we can.

Interviewer: So we have a quote down here from the Department of Energy and Climate Change and they say it's not possible to say categorically that no further earthquakes will be experienced during the similar treatment in the nearby well. In the present state of knowledge, it's entirely possible that there are critically stressed vaults elsewhere in the basin. So they're saying, we can't say there won't be more earthquakes. What I would say is, they've been doing this in America quite a lot recently and this is seen as a really rather a rare case to have caused an earthquake. But they're saying, we can't say that there won't be another earthquake. Is that good enough reason to stop this straight away, don't do it?

Female A: They've already been doing it, or trying for it in Poland, haven't they?

Interviewer: Poland are quite interested in this.

Female A: Yeah, there's lots of big player pulled out. Yeah. So what's to... why... (overspeaking).

Interviewer: As far as I know, I don't think they've had an earthquake there in Poland. So is the fact that we've had an earthquake, is that a warning and we should just pack up and go home?

Male D: My point of view is that I question the actual end reason for it anyway, which is just more CO2 emissions. It's just, like, you're going down a road which is just a stupid thing to go down.

Interviewer: Okay, this is all by the by, because the bottom line is...

Male D: Exactly, you're asking what's the value of doing this. And so, well, the value of it is increasing CO2 emissions. So the means... the end of it is the means don't seem to have any (overspeaking).

Interviewer: Would others agree with that, or could you see some kind of use for this?

Female A: Well, I think that's why they pulled out in Poland, because they were realising that it wasn't economically viable and also it was fossil fuel again at the end of the day.

Male C: I mean, ultimately, the carrot is the prices, isn't it? But, then again (inaudible 1:18:38).

Interviewer: There's also stuff to do with energy security and self-sufficiency which we were talking about. I know, for instance, Poland that relying on Russia is something

they'd like to get away from a little bit and so there's that side of the argument as well: if you can make more of your own energy.

Male A: I think if there was cheap energy here, we'd only end up taxing it anyway. Well, we would wouldn't we? It would only be cheap for so long and then the government would say, oh, it is popular this gas stuff, we'll tax that. And they will.

Interviewer: So should they... I mean, George Osborne's idea is to get a generous new tax regime to get the industry up and running.

Male A: Yeah, because you need it up and running so you can tax your new consumer (laughing). (Inaudible 1:19:28).

Interviewer: But should this be taxed highly? Should this not be taxed highly?

Male A: It will be, because it's lucrative... it sounds quite lucrative, doesn't it, at the price?

Interviewer: If things go to plan I suppose it could be lucrative.

Male B: And what if people become very dependent upon it? It's a perfect target for taxation.

Interviewer: I suppose in a sense we already are quite dependent on natural gas. This is just increasing the supply. (Overspeaking).

Female A: Is it - sorry.

Interviewer: No, please, go for it.

Female A: I was going to say, what... where's the evidence... or what evidence have they got that the coal mining caused earthquakes?

Interviewer: I think that's quite well established. I don't have it in front of me right now. But that's certainly what the Royal Society were saying. They were saying, these earthquakes are similar to what we'd expect from coal mining accidents.

Female A: What they'd expect. But I can't... I was brought up on a coalfield.

Interviewer: And you've never heard of that.

Female A: No. I mean, I used to go and play on the pit tip when it was smoking. It was great fun! (Laughing). And no, never had, never ever. The first earthquake I experienced was a few years ago in Nottingham.

Female B: Oh gosh, yes.

Female A: (Overspeaking) (inaudible 1:20:42) was in Wales, was it?

Female B: Yes. I was in Wales at the time.

Female A: Oh wow.

Female B: I didn't feel it.

Male A: Frightening that was. My bed was shaking like a scene out of the Exorcist.

Male D: (Overspeaking) lots of earthquakes are too small to be actually detected at the surface. So there might be earthquakes, just it wasn't on the news.

Female A: Yeah.

Male A: I heard they were putting some sort of research into this, or some (inaudible 1:21:06) this has happened, okay, let's get some researchers ont he case and try and figure out why it might have happened, what contingencies we can put in place. (Inaudible 1:21:22) happening, rather than, oh, we'll manage it without actually trying to find out anything more about it.

Interviewer: Okay.

Female A: They're talking about building now - coming back to that argument before... why are they not building more homes which don't need the energy. Why are they not doing that?

Male D: They are. Environmental standards in home buildings have increased massively in the last 10-15 years.

Female A: You know like these wooden houses, why can't we go further with it?

Interviewer: So looking at this board basically makes you think...

Female A: Don't let's go there. Let's draw back. Let's do something that's more sensible.

Male A: It's quite scary, really, I think, yeah.

Interviewer: Just to kind of... I'll talk you through, because we've only really talked about earthquakes, actually. So groundwater contamination, somebody said earlier on setting your tap on fire. So, we're not... I mean, there are people in America that can set their tap water on fire. There was this film, Gasland, by an environmental documentary filmmaker and that's the most famous scene from that. We haven't attributed that to fracking yet. We haven't proven that's why that happened. There are various ways in which that could happen, scarily enough. It would be very... depending on the geology, depending on all sorts of things there are various mechanisms how that could happen. And so the Environmental Protection Agency in the US who... this is their... of course, they're the regulatory body, they're doing a big report into its effect on drinking water that's coming out in 2014. There was a progress report from December last year that I read that doesn't give anything away. Given that this started getting very serious in America in 2003, a lot of wells popping up everywhere, really changing the game in America. And it's just coming out in 2014, kind of means that our knowledge about the one case study we have is partial at the moment. We don't actually understand it that well what's happened in America. And so how... the idea that people are exploring the possibility of doing this in the UK when knowledge is incomplete about what's happened in America, how does that sit with people?

Female B: Is that ten years? The study, or...?

Interviewer: I can't remember when they set out on it.

Female B: It's just that, initially, I'd seen something about the year 1947 and Kansas. I thought is this an accumulation... are there reports, accumulation of knowledge that people have been looking at in the last 30 years and is that why they've picked that 30 year period out?

Interviewer: No, well, I think the last ten years in hydraulic fracturing, it wasn't really in the consciousness that much prior to that. It just wasn't economically feasible, I suppose. The technology was kind of there ready to be used. But what I would say is the New York Times think they've found a case of groundwater contamination that they think is from hydraulic fracturing. But I think proof for a journalist and proof for a scientist are slightly different animals. But that's in 1987 and so that gives you an idea of timeline. So science has started discussing this, they are looking into this, of course. And they think there are three ways in which these fracking fluids could get into the groundwater. And so one is natural migration, which would have nothing to do with hydraulic fracturing. And they think in most geological contexts that's extremely unlikely. The second is vertical propagational fractures. So the fractures that you're intentionally causing to get the gas out, once you've caused them they grow upwards to a height that reaches from the depth of where the shale is, to the much shallower depth where the groundwater it. And there is a geologist who's looked at this, reviewed a whole load of literature on this topic of fracture propagation and he said, actually, the chance of a stimulated fracture extending vertically beyond 350 metres is approximately 1% and any more than that gets increasingly unlikely. And so, given that the distance between the shale and the groundwater is usually maybe 2km, maybe 1.5km, so he's suggesting that it's actually very unlikely that's that (inaudible 1:26:11), which leaves him to suspect the third mechanism is most likely, which is faulty construction of wells.

Male D: So they haven't grouted around the actual borehole properly.

Interviewer: Essentially, it's a shoddy building job, or is hasn't been maintained properly. And the point about that is, you know... that doesn't mean it's inherently dangerous necessarily, it means if we maintain the well properly, this shouldn't happen.

Female B: Would that be down to cost-cutting again, or saving money?

Interviewer: Well... So this is the question that comes from that: how do we... I mean, if it is number three - and we don't know for sure, but if it is - then presumably you need a really good regulator to make sure that avenue isn't possible. How did... do people have confidence in (inaudible 1:27:02) to go around doing this. Do they expect they are going round doing this?

Male D: (Overspeaking) (inaudible 1:27:08) making sure the (inaudible 1:27:09) don't implode.

Male A: I was going to say, I've got confidence in regulation generally, but not in that particular area. (Laughing). Yeah, so in terms of technical regulation, rather than financial services, I would say I have faith in our country's technical regulation. Whether that's misplaced, I don't know.

Male B: There'll always be people taking the cynical view, however, that where there is profit to be pursued, there is the possibility of people cutting corners. This is perhaps an over-cynical view, but... (Overspeaking).

Interviewer: Okay, so just to, kind of... There are a few other just listed here that don't get as many column entries. And there's this idea of water consumption that somebody brought up from before. And the map from before, there was places like Australia and China and Algeria in there. Various states in America as well, of course. Stuff to do with this... the by-product, this water that comes out at the other end, how much of it can they recycle, that which can't be recycled, where's it stored, how's it disposed of? So there are risks that come from the whole life cycle of these sites. There's stuff to do with visual impact and stuff like that and traffic, which are maybe getting a little bit down the list (inaudible 1:28:37), I don't know. But

there's also this idea of scale-up of risks for a full developed nationwide industry. So that's the idea that, you know, we have about three wells in Lancashire at the moment, but if we were going to make as much gas as it would take for £5-6 billion to be paid to the Exchequer or for energy bills to drop by a third. That would require hundreds, maybe thousands of wells. And this maybe goes back to what we were saying earlier, it's a small island, so they might be quite tightly packed together. So that's that risk. So what concerns people most on this board, after having a crash course (inaudible 1:29:20)?

Male B: Groundwater contamination for me.

Interviewer: And do you know why that... why would that be?

Male B: Well, I'm not exactly too clued up on groundwater procedures and where it goes to and where it comes from and (inaudible 1:29:39) and what processes it goes through. But, very simply, all I drink at home is water, for example, out of the tap.

Interviewer: Yeah, we're reliant on non-saline water, aren't we?

Female B: Water's a massive commodity (inaudible 1:29:53).

Male B: I don't filter it, I don't like bottled water. I just drink it straight out the tap.

Interviewer: That's really interesting, actually, because at the beginning we started talking about energy and it's this thing we have to have. We could have a very similar discussion about water, couldn't we?

Male B: Another taken for granted, another cheap resource we assume will always be there.

Male A: Yeah. I visited a sewage treatment plant in (inaudible 1:30:20) recently and that was a real eye-opener. It made me think about the... It's invisible. It's one of those invisible things, isn't it, as you say, we don't really dwell too much upon.

Female A: Well, again, looking back to being in Kenya, my daughter has to go and buy the water. And we flush our toilets with drinking water. Absolutely crazy. So if we're going to get contamination of the source of the water, I just... I'm sorry, it's beyond my thinking that anybody could even consider doing something that could cause that!

Interviewer: We should stress that it hasn't been proven.

Female A: No, it hasn't been proven.

Male D: Doesn't mean it's not going to happen, does it?

Female A: Absolutely.

Interviewer: So there's a balance to be struck here, isn't there, because... just because there's a risk that something might happen... I mean, there's loads of things that we do in our day-to-day life where there's a risk that something might happen.

Male C: But I think when you're talking about water, you're talking about something that's so... everybody's need. And it's not something you can live without and it's not something that you can cope without. And if you're going to say that you've got flammable taps then you're hitting... to such a big point to everybody. It's like, talk about panic. If the people in Lancashire were to watch whatever video again - and I'm not sure about the legitimacy of that documentary - you think about the panic

that would hit if people were to think that that was going to lead. Even a 1% chance of having... again, I keep coming to the phrase flammable tap, you think about the panic that that's going to have.

Male A: Especially if you live in a wooden house!

Male C: Exactly, yeah. (Laughing). Imagine if you've got hosepipes, it's going to be a flamethrower (inaudible 1:32:17) wash your car!

Male D: (Inaudible 1:32:17) earthquakes, contamination of groundwater and the upside is burning more fossil fuels.

Interviewer: And that's just not a very balance equation.

Male D: You don't really have those downsides with photovoltaic or other forms of...

Male A: But it'll be sold on... cheapest price and everybody is susceptible. We're very easily seduced by that. If somebody says, your gas bill is going to be cut by two thirds (overspeaking).

Male D: (Inaudible 1:32:49) find ourselves eating horse. (Inaudible 1:32:51) people look at, oh, how many products are cheaper this week compared to the other supermarket and we go for money, money, money. We don't look at anything else but the price.

Male B: The average person won't drill down - sorry, excuse the pun! - to the level of detail we're looking at here.

Male A: And it is short-term gain, isn't it, that other people can worry about the problems, as long as we're okay this week and next week and it doesn't cost us as much. You know, (inaudible 1:33:20).

Female A: So what we've said earlier about sustaining the environment, that's just gone out of the window, basically.

Male B: Well, it's a slow process of change though, isn't it? And, as generations come along, there is a change. 40 years ago, nobody talked about recycling, let alone did anything about it. And now, we've got a separate bin to put our recycling stuff in (overspeaking) that's becoming a natural thing to do now. (Overspeaking).

Male A: But we didn't have so many things to recycle, did we?

Male B: No, probably not.

Male A: Well, we didn't. We didn't have the massive volume of plastic bottles, did we? So we didn't think about recycling, because there was nothing to recycle. Things weren't ever packaged. (Overspeaking) bought things in brown bags (overspeaking).

Male B: There was an incentive to recycle in the sense that you take your bottles back and you get the deposit back (overspeaking) financial incentive as well to recycle in that way.

Interviewer: It seems that - and please tell me if I'm putting words in your mouth - in the room there's this sense that precaution might be a sensible option here?

(General agreement)

Male D: Yeah, precautionary principle.

Interviewer: And so you'd want to apply that?

Male D: Yeah (overspeaking).

Male C: Mmm.

Interviewer: Is there another risk of missing out on a big opportunity here that others might take up and we don't?

Male C: I can live with that!

Male B: That's just another way of selling it to us, isn't it (overspeaking) might get left behind.

Interviewer: So, how do you think...

Male D: Our deficit of £89 billion a year (inaudible 1:34:57) £6 billion.

Interviewer: Could you imagine something they could spend it on that would persuade you that it was worth these risks?

Male D: No. There's downsides to it. The upside is something that I don't think is actually worth it (inaudible 1:35:16) and the Exchequer are just wasting money now. The deficit isn't our debt. The deficit is how much we're overspending every year. £6 billion compared to £89 billion. That Exchequer amount is less than one month.

Male C: And that was over 30 years, yeah.

Male D: Of overspending.

Male C: That was over 30 years, that wasn't in a year.

Male D: Yeah, so that's less than one month of overspending overall. It's just pointless.

Interviewer: Okay, I'll put the last board up, which is we were talking a little bit about... we've talked a little about climate change. And so this is how this fits together with that, I suppose, in a sense, in a bit more detail. And some of the other issues around it, really, that go beyond risk. So this last one (inaudible 1:36:01). So I guess we'll start on the left hand side as is the custom, I suppose. So, there are two ways that you could make this fit into the narrative of responding to climate change. So the first is the idea of transitional fuels, which is we're here, we're using 70% fossil fuel still, but a fossil fuel is not a fossil fuel is not a... Some are better than others. So, if you were to replace all of the coal that we burned with this, that would be an improvement. So it's a step on the way of a much longer journey. That's the idea of a transitional fuel. Now, some of you are probably already reading that the Tindal Centre is a climate change research centre at Manchester University and they've done a couple of reports on this. Just a slight sidetrack, this is their other report which is about how US coal exports are up because they're burning their natural gas from fracking. So that hasn't... this is part of their argument, this hasn't meant that the US... The US is burning less coal, but they're not mining less coal there, exporting more coal.

Male D: It's not offsetting, is it, it's just increasing.

Interviewer: So this is part of the Tindal Centre's argument to this transitional fuel argument. The other side of it comes down to timescale and so there's things like the Copenhagen Accord and the Low Carbon Transition Plan and 2050 is a significant date for those sorts of things and, in general, people see it as... people who say if you want to prevent the worst side of climate change then 2050 is a big bookmark there. And so they say between now and 2050, we don't have that many decades, do we? And they're saying to get this industry up and running it would take... it wouldn't just happen overnight, of course, it would take longer than it did in America, because of various differences, all sorts of stuff. There's likely to be more regulation here. We probably need to be more civil disobedience and protest here, in Europe as well as in the UK, Europe more generally. There's difference in mineral rights law. There's differences in tax. There's differences in the infrastructure and the expertise that's already there. So they're saying (inaudible 1:38:28) Deutsche Bank, actually, down there in the bottom right, actually this won't happen as quickly here as it did in America, so maybe 10, maybe 20 years to get the industry up. And so that takes us to 2023/2033 and then there's not that long to... We've got all the infrastructure in place, how long do we burn it for? If there are no earthquakes, no groundwater contamination and prices are falling, how long do... do we burn it for as long as it's left. They're saying they don't trust us to make this step and then make another one after that, basically.

Male D: Yeah, so you're making steps when it's imperative to do so and that just basically puts off doing something more important and much more valuable for a future day. (Inaudible 1:39:19) we've got something cheap right now. Burn all that first.

Male C: Short-term solution, hmm.

Interviewer: And then, so the second way you could go about saying, no Shell Gas and climate change aren't mutually exclusive... responding to climate change I should have said, of course, is this idea of base load which is when the sun isn't shining and the wind isn't blowing and at peak times you need a constant fuel source in the background, maybe 20%. How much you need varies from estimate to estimate. And so, that could be nuclear, or that could be natural gas. If it's not nuclear then natural gas (inaudible 1:39:58) fossil fuels would be. Now, over here, Greenpeace actually have a report where they say you actually don't need a base fuel, you can be a bit clever about it and have a mix of renewables that all kick in at different times and stuff like that.

Male D: Yeah, you can. For instance, you can pump water up a gradient while you've got excess energy, then release it to fall down a gradient to create hydroelectric.

Interviewer: Okay. So they're the arguments of how this could fit with climate change and the counterarguments as well. How big a role does climate change play in influencing your view of hydraulic fracturing. I think with [Name]' he's... So maybe if we do it anti-clockwise this time.

Female B: Oh God. Oh, um. Yeah, I don't know how it would fit to have lots of different types... different smaller types of sources being used. I don't know if that would seem a bit messy. I don't know whether the government would go for that. I mean, if it would work then why not give it a go. We've got to come up with some sort of solution, haven't we? But I don't know. I don't know whether you would be able to swap one sort of production for (inaudible 1:41:36) especially to the extent of 70% for something like this. I don't know how that would work. Sorry (inaudible 1:41:44) think about this (overspeaking).

Interviewer: No, that's okay. Don't worry. This is, of course, a very initial impression as well. So...

Female A: What was the question again?

Interviewer: So, how big... when you look at this and you're wondering what you think of it - hydraulic fracturing, that is - how much of a say does climate change have on your views on this?

Female A: If I'm getting right what you're asking, I would say we'll I just don't agree with that anyway. So that's just another part of the argument against it.

Interviewer: Okay, so you see Shell Gas being bad for climate change and that's just another thing against it.

Female A: Yeah.

Interviewer: So it's just adding up to the weight of things that concern you about it. How about you, [Name]?

Male D: I think (inaudible 1:42:44) climate change is such a huge overarching issue, but at the same time, for me, it's quite intangible and diffuse. So I think I wouldn't necessarily link the two together in my reading of this particular method. I might even have an assumption that it's maybe the lesser of two evils. I don't know.

Interviewer: What's the other evil?

Male D: I'd be looking for more immediate reasons in terms of my reaction to it and whether I was in favour or against. Climate change is something I think I look at more in terms of a broad overview of what's happening, rather than a specific reason to reject this, for example.

Interviewer: So what did you mean by the lesser of two evils?

Male D: You would assume that climate change, being such a huge force in terms of the way that, hopefully, what politicians are working towards and what people who have environmental concerns are working towards. You would hope that that would be a factor in the various consultations that would take place. And the various thoughts as to how we should proceed in terms of our... how we source our energy and that decisions would be made by people who had a much greater knowledge (inaudible 1:44:18) of the impact that it might have on climate change, as compared to other types of fuel sources. So I would perhaps look into delegate that to other people who were more in the know. Whereas, for me, what would influence me would be more immediate reasons in terms of the impact (overspeaking) talking about the potential concerns of water contamination and earthquakes even, rather than how it's going to affect us potentially in 30/40 years' time.

Interviewer: I was really interested in the phrase lesser of two evils. So just to pin you down on that, are you saying that climate change and responding to that is going to be difficult and awkward?

Male D: I think unquestionable, yes. I think there's some difficult decisions to be made.

Interviewer: But that's better than the alternative of...?

Male D: I think maybe if there are two concepts side by side of how we can obtain our energy, then it might be that neither choice is particularly acceptable and (inaudible

1:45:26) open... Much as I may find elements of this difficult, the alternative might be even less acceptable.

Interviewer: What alternative... can you think of an alternative that would...?

Male D: For example, nuclear energy. I've already stated my thoughts about that and, to me, much as I find some of the elements of this quite horrifying, if you were to say, okay, for Nottinghamshire you can either have fracking happening or you can have a nuclear power station in place (inaudible 1:46:00) I absolutely would say go for this option. So, yes, the lesser of two evils - for me.

Interviewer: Sure, okay. That's interesting. (Inaudible 1:46:10).

Female: I really have got nothing to say about it, because I know so little about it.

Interviewer: Okay, well, I mean there isn't a right or wrong answer. I'm interested in people's opinions on this. So there's no degree of technical expertise. How does it make you feel, having looked at these board? And I appreciate that two hours isn't actually that long.

Female: It's quite scary, I think. I'm concerned about the groundwater contamination and the earthquake elements of it. But I know so little about it and what the implications are going to be for us as a country. And a very small country, compared with the other countries that are doing most of the experimentation. As I say, I don't know what to say about it.

Interviewer: Even if there was a slim chance of those risks coming about, that would be too much, or under certain conditions could you accept those risks, like [Name]...?

Female: Yeah, Richard said if we're talking about nuclear energy and fracking, yeah, I think I would have to go for the fracking if it was going to be on our doorstep and we had no choice. But neither of them enthuses me anyway at the moment.

Interviewer: The lesser of two evils again.

Female: Yeah.

Male D: Also the lesser of two evils, I think I was thinking about if there were two methods which had an impact on climate change but one (inaudible 1:47:48). I would choose the one (inaudible 1:47:51) out of the two that had less than an impact, even though it did have an impact.

Interviewer: Okay and [Name], what...?

Male C: I still... I agree with what [Name] said there. I really think, essentially, it's a short-term solution, because you still rely essentially on fossil fuels. It's just fossil fuels being obtained through a different way and being obtained in a risky way. Quote a challenging and dangerous procedural way, really.

Interviewer: Okay, so even as a transitional fuel that doesn't persuade you?

Male C: Not really, no. Because it's no cleaner... I don't imagine it's that much cleaner than what it's replacing.

Interviewer: Okay. Sorry, you've obscured your name badge. (Laughing). Sorry, John.

Male B: The problems associated with climate change concern me greatly. I do tend to get behind that view that if we are going to be encouraged to burn more and more fossil fuels, we are storing up bigger and bigger problems. I might be wrong, but I would guess that there's been more research done in that direction than there has about this idea. And whilst I'm not 100% persuaded of the effects of fossil fuels, climate change, greenhouse gasses and so on, definitely leading towards that. And so, I think this would cause me considerable concern. And perhaps there would be greater benefits in moving away from fossil fuels and their use and more on sustainable energy and simply ways of conserving the energy that we have, rather than just continuing this what seems to me sometimes like a headlong rush to just use up more and more and more.

Interviewer: So you suspect there might be better alternatives out there? Whether that's in ways we produce energy or ways we use the energy (overspeaking).

Male B: Oh, I think we have to take the concept of climate change and environmental damage and pollution, etc., very, very seriously. I mean, we think we've been taking it seriously more and more over the past few years, but I think we've still got a long way to go.

Interviewer: And you, [Name]?

Male A: It's very complex, isn't it? I think there's two big issues for me. One is are we running out of affordable fuel in energy at the moment and with the hike in prices of energy you would think that is the case. And are we running out of safe fuel, not that there is any safe fuel. So, there's got to be a risk element to everything and I'm not sure that this is the answer. I think it's short-term. But if we do start to run out of energy, we'll seek to use any method, I think, of getting hold of energy and this will be... I don't think it will go away.

Interviewer: Well, we can talk about that a bit. Because this idea... this concept peak oil... is this an expression people have heard before?

(Negative response).

Female B: Not at all. I was looking at that thinking, what?

Male B: (Inaudible 1:51:10) for Derbyshire. (Laughing)

Interviewer: So this is the idea that this theoretical moment in time when we reach peak production of fossil fuels. So this is as much as we're going to get and, from this point onwards, we're on the downward spiral, we're producing less and less energy from this, until we get right down to the bottom where we were back in (inaudible 1:51:35) 1800 (inaudible 1:51:37). And so, for a while now, policy makers, people like that, some of them better than others, have been adapting to this idea that we maybe are there.

Male F: Different countries at different times, isn't it? Like peak oil in the US was in the 1970s.

Interviewer: Okay, so there's a layer of global complexity. But, in general, people were starting to come to terms with this idea that the world of abundance and cheap and easy energy was maybe... that was starting to come to an end and we were going to enter this time of scarcity maybe, particularly if we didn't get the technology right or make the right choices now. And what unconventional fossil fuels has the potential to do, now that we can access all of this fossil fuel that we couldn't get to before, or that it didn't pay to get to before, it has the potential to push that back.

Male C: But it's still only pushing it back. Essentially, you're still only delaying the inevitable, aren't you?

Interviewer: Uh hum, but if you delay the inevitable by a significant period of time, you know, a century...

Male C: (Overspeaking).

Male F: We're in a position, luckily, where we might have peak oil before it's too late. It's like having a drunk at a bar that only has one bottle of whiskey so he can't kill himself with it. But then he finds two more behind the bar and can carry on then kills himself. It's quite handy (inaudible 1:53:13) we've actually got peak oil. So we can actually be forced to stop destroying the one planet we've got that we live on.

Interviewer: So this time that was going to force us to make a decision, it was going to be an awkward and a difficult decision.

Male F: Yeah, change is always... because of necessity it's an imperative, isn't it?

Interviewer: And so taking that imperative away would presumably...?

Male F: (Overspeaking) carry on drinking the whiskey until we die of alcohol poisoning.

Interviewer: Do other people think we'll make these difficult choices if we don't absolutely have to, if there's still gas flowing out of the ground?

Male B: I think whatever energy we use it's going to damage the environment. We haven't yet found energy that's useable that doesn't really cause harm. So perhaps it is the lesser of two evils all the time in putting off (overspeaking).

Interviewer: I mean, some people would argue that (overspeaking).

Male B: ... something, you know, we have major discoveries in our history that are an enlightenment, aren't they? There might be something in the future. There might not.

Interviewer: What about... a lot of the NGOs are worried that money might go into this and energy and time that isn't going on developing renewables. Is that something that... can people see that happening?

Female A: That is part of it, isn't it, money that's going in there could be going elsewhere to explore.

Male F: The only reason why things like photovoltaic has got such an increasing efficiency over the last ten years, even, is because of people spending more money on buying photovoltaic stuff. So therefore the manufacturers make it more efficient, they put more research and development into it, because the money's there.

Male C: Hmm. And should we be... yeah, so should we be spending lots of money on what is, essentially, a short-term solution when we could be spending more money on a longer-term solution that would have longer term benefits, rather than wasting x millions of pounds on this, which is only going to last, say, 30 years. Whereas if you're spending it, again... refining the idea of solar energy that's going to last a lot longer.

Interviewer: What about this idea of speed? What about this idea that this has all suddenly happened very quickly? I know I had 1947 up there at the beginning, but as I've been saying this is a recent phenomena. How does that sit with people that suddenly this thing from America had these effects so quickly and people are thinking, well, we can do the same here?

Female A: I don't know actually. It's like fahion, all of a sudden, everybody has something that's similar (inaudible 1:55:46) think, where did that come from, actually? So where did it come from? I don't know. I can't answer that one. It's just like somebody gets (inaudible 1:55:58) wind of something and jumps onto it and there's all sorts of grants and money on offer to investigate. So then companies claw that in and do the investigations and...

Male B: I think what's scary is we've been around for millions of years and the industrial revolution took place 200 years ago and, ever since then, we've gone sort of almost uphill and rapidly downhill to a point of panic and we're going to run out of fuel, we're poisoning the earth. All this damage stuff that we've done in 200 years. I mean, it's a...

Male F: In geological time that's, like, a second.

Male B: It's just a blink of the eye. And yet we've... So what are we going to do in the next hundred years? We're going to really seriously damage this earth, aren't we?

Male F: There isn't a plan B, is there? We haven't got another earth that we can all fly to and try again.

Male D: (Inaudible 1:56:56) technical progress, I think that makes me think I'm not so diametrically opposed to it because it's a new thing, per se.

Male A: We're living longer. We're told that we're living longer, we've got better conditions and health and sanitation, but...

Interviewer: So you see that as a positive because you think...

Male D: That's an indication to me that new forms... there's a good chance that other new forms of energy production will come (inaudible 1:57:23).

Interviewer: But if these new technologies come around so quickly, do you have confidence that we can get to grips with them? That the regulators can get to grips with them? Or we as a society know what they are until they've already happened?

Male D: I think so, because it's becoming an increasing focal point of interest for governments and the population at large, really.

Interviewer: Okay, others?

Male C: I mean, comparing this to... again, coming back to solar energy, solar energy in the last two years has taken off massively. If you think two years ago, you never saw a house with solar panels on. Whereas, nowadays, again estimates... as I say 10% of the houses where I live have got solar panels on. So what's to say that there's not something else that's going to become... because, let's face it, solar energy is a hell of a lot less risky than that. So what's to say that in another five years time, something not going to come along that's even less... it's more efficient and there's less risky than technology like that.

Interviewer: Well, guys, we could probably sit and talk about this all night - I certainly could - but it is five to nine so I'll just wind us down into a debrief, because I'd better tell you who I am and what I'm doing, I suppose. Also, obviously, probably conspicuous there is the Dictaphone. And I think you read on the stuff that you had to sign - that the University makes me get you to sign - that... So I'll load that onto my laptop and the files will be password protected. And I will digitally edit them to take names out and any personal information, although I don't think there was anything particularly personal came up. And then they'll go to a transcription company who will type it up much quicker than I would ever hope to. So they'll hear them and then they'll come back to me. And when I write... I'll be writing a thesis on this and I'll be writing an academic journal paper as well. And so we'll be hopefully be using your thoughts in those bits of writing, but when we do we'll be using pseudonyms. So that's the stuff we have to go through. (Inaudible 1:59:35) terms and conditions, but anyhow. And so, yeah, we're doing this research into hydraulic fracturing. And we like to talk about energy first to set the scene a little but, I suppose, and sort of unfold it methodically. Because experience is that's a good way to have a very sophisticated discussion about something, which is why we're doing focus groups and why we're not doing questionnaires or something, because we've talked to a lot of people that way - a lot more people that way. And so, yeah, we're looking into the public acceptability of this. And so, I'm not funded by Quadrilla. I'm funded by... It's at Durham University (inaudible 2:00:18) and it's the Durham Energy Institute, who do get some funding from fossil fuel companies, actually. They're engineers and geologists mostly, but some social scientists as well. So this is really the social science of this. And what I hope to try and demonstrate is, firstly, that it's worth asking the public on this, because there won't be a referendum on this. And I think this could have... I don't think there should be... referendum for every big issue, you'd have one every day, I suppose. But this could pass us by if we don't stop and think, well, what is this? Do we like it? Do we not like it? And so I think it's worth asking the public and I think you can... People have very sophisticated views about this, which I think for a long time has been under-recognised. You get... it's a bit old fashioned nowadays, but you can get some quite flippant ideas that scientists have and certainly not all of them, it's certainly changing, but about, you know, this is a technical issue, this is... we've got... this is for people with PhDs to figure out. And so that's... I'm going to try and argue about that, I suppose. And so does anybody have any questions about that?

Male B: Are you going to Lancaster to...?

Interviewer: I am. (Laughing). We're doing two groups in and around Manchester.

Male C: Make sure that (inaudible 2:01:45). (Laughing). Can I ask, why was it in the initial questionnaire we were given, why are you interested in people with industrial (inaudible 2:01:55)?

Interviewer: No, that's good question. So we're doing six groups: two in Newcastle, two in Nottingham and two in Manchester. They're all different groups. They all have a different common characteristic and there's a theory behind all of them. So this one, there's a few ways of going about it. First of all, the idea of industrial history, it was maybe an appreciation on a longer timescale of energy, what it's done for us, what it's enabled us to do and become and so on. An appreciation of whether this... how this sat in this period of time. Is this part of the past, is this part of the future. Are they mutually exclusive? And I think looking back to the industrial revolution, one of the things I was mainly thinking about was, maybe science and innovation then was seen as this public good that was part of development and social betterment. And is that still the same, how does that sit with the market forces that have possibly a bigger influence now? I don't know. And so I was interested to

see whether that would play a role. So there were quite a few different reasons. But I thought you'd be an interesting group to talk to. So that's why we got you here today. And so, what we like... we like to offer everybody that contributed to... if you... I doubt you want to read all of my thesis, but if you want a summary of my thesis, I'd be more than happy, when that gets written in the summer some time, I'd be more than happy to send that around, if people are interested in that. There's no obligation whatsoever (inaudible 2:03:50) and so if I could just... If I just get a piece of paper and ask you to jot your email addresses down because I'm not sure whether [*Lynn] has them. So I'll do that and you're free to leave, actually.

Male C: Well, thank you very much. That was very interesting.

Female B: (Inaudible 2:04:03) thought about A level geography so many years ago and I was sitting here thinking, oh, really struggling here!

Interviewer: No, I mean, the thing about having technical expertise and knowing about this, the whole point was really to get people's opinions. It's about opinions, it wasn't really about the facts for me. The facts are crucial, of course, but it was about those things beyond the risks, you know, the subjective things around the edges of science that maybe we're not good at recognising. And I think the public are good at recognising them. So stuff about the industry and why don't you like hydraulic fracturing, well, because I don't trust the energy industry. I think that's actually a valid opinion, in a way. And I think it's worth looking into that. Anyhow, thank you all for braving the cold and coming out from wherever you had to come from.

Female B: Hasn't started snowing yet.

Male B: It's probably gone down several degrees since we came in! (Laughing).

[End of Transcript]

Appendix 3.4 - Transcript Group 4: Ex-miners

Interviewer: For those of you who I haven't already told, I'm a postgraduate student at Durham University, and I'm looking into issues related to energy and climate change, which is why I've bought you here tonight. I'm just interested in people's opinions. You don't have to be worried about facts and figures and whether you're right or wrong or anything like that, I'm just interested to get people's view and how people can justify their views. That's what I'm really interested in. So if we could just to start off with go clockwise, and when I say energy to you, what's the first thing that pops into your head?

Respondent: Electricity.

Interviewer: And could you sum up your views towards electricity?

Respondent: It's my job.

Interviewer: How about as a consumer of electricity? Is it something that worries you? Does it give you a headache?

Respondent: Does it give me a headache in what context?

Interviewer: Paying for it?

Respondent: If you look at it like that everything gives you a headache, doesn't it? (Inaudible 00:03:23) is it?

Interviewer: So would you rather just not worry about it?

Respondent: There's no point worrying about it, is it? You've got to pay your bills, you've got to get on with it.

Respondent: Going up a lot, though, isn't it, it's going up a lot.

Interviewer: Dan, when I say energy, what's the first thing that comes in your mind?

Respondent: Heating, I would say.

Interviewer: And so that's something that you can't do without, I assume?

Respondent: You can't do without? Yeah, because these days it's expected, isn't it? As society you expect the place to be warm.

Interviewer: Do you think we expect too much like that, or do you think that's right?

Respondent: It's what we've got used to.

Interviewer: Would you say that we take that sort of thing for granted?

Respondent: Yes, because there's no plan B, is there? There's no alternatives, nobody's got any open fires anymore. Currently now, talking about gas running out or being rationed, what do you do? You can't chuck coal on a gas fire, can you? There's no plan B.

Interviewer: So talking of gas running out, is that something that worries people around the table? I know it's not every waking hour or anything like that, but…?

Respondent: No, because they'll always come up with something else.

Respondent: It's media hype.

Respondent: Where money's involved, they'll always find some other ways of heating and lighting, and there'll always be an alternative.

Interviewer: So that's quite optimistic. Do others share quite an optimistic view?

Respondent: Well, there's always going to be an alternative, but it is a bit worrying that the gas, you know, we were all sold this North Sea Gas and it was going to last forever and ever and ever, and it isn't, is it? Now we're importing it from, what, Russia? I'm assuming, I'm talking to all ex minors that the government was buying in Russian coal and stuff. They did us out of jobs, closed down mines, and now they've got them by the short and curlies now, haven't they? The Russians have got us where they want us, because they can call the shots.

Interviewer: It's running out so I guess I'll put (inaudible 00:06:20). And I guess there's worries about where it's coming from, and energy security.

Respondent: It's not that, but it's costing us, isn't it?

Interviewer: So price is big, obviously. Is anybody else optimistic that somebody, somewhere is going to come up with a solution? Do other people see this happening?

Respondent: Are we just talking about gas now?

Interviewer: No, we're talking about energy in general, if you want.

Respondent: I'm thinking of solar energy as the way forward. A lot more people are getting solar panels and things. And the easiest energy there is is the sun, so I think that will come in in time.

Respondent: I think you're right there. I mean, we've got the PV panels there now, photovoltaic, which are improving. They're a lot better than they used to be, and it's starting to show that it can reduce your electric bills. But the first ones, it could probably just about power one kettleful of water, but they've improved them a lot now.

Interviewer: So what about you guys? Do you see solar as something that's going to provide us in the future?

Respondent: I don't think it's utilised enough, and I would say wind power was the downside to it, because you have to have your shocking great windmills.

Respondent: I quite like them (laughing).

Respondent: When you go and look at Skegness it's absolutely ridiculous.

Respondent: Eyesore, yeah, ruins the environment.

Respondent: Solar power yeah, I mean, why not? It doesn't look that bad. If that's the way forward, if that's all you have to suffer, the downside to it is it's free and yet it still costs us a lot to make, so it comes back to our jobs. And there will always be somebody there making money off these things.

Interviewer: Okay, so there's always going to be somebody making money off these things. What do others think about that point?

Respondent: I guess you've got within the next 20, 30, 40 years, many power stations coming to the end of their lives. And some of those are, obviously, coal power. So I would personally be worried about what's going to replace them and will it be UK based or will that be a foreign company being in charge of that? And there's the security, then, and control of that, of bills and payments, which I have more interest in.

Interviewer: So foreign companies building and maintaining…?

Respondent: Yeah, PFI projects, I guess, or maybe nuclear power stations.

Interviewer: And what do you see as the negative implications of that?

Respondent: It's not UK. I struggle to see any European company or a global company being too fussed about implications in the UK.

Respondent: I think that's true of most industries these days, nothings solely UK is it?

Respondent: No.

Respondent: It's always funded by some…

Respondent: Global, yeah. We are a global funded country, and that's just the reality in life, and we won't get away from that.

Interviewer: But it, kind of, implies that a UK based company is going to be inclined to look after UK consumers a bit better?

Respondent: I'd like to think so.

Interviewer: Do people think that's happening at the moment?

Respondent: I guess with BP no, if you look at the instance they had with one of their oil fields in the US.

Respondent: All they're interested in now is making more money for the shareholders.

Respondent: Profit, yeah. Profit for the shareholders.

Respondent: You don't seem to be able to control it, because it goes up 10% and then 12% the week after that, there doesn't seem any fair or reasonable… it's just you've got to pay whatever the going rate is, it seems very unfair. I mean, you can switch and that kind of thing, but, at the end of the day, they've just got you where they want you and you can't opt out, you've just got to keep paying and paying and it just keeps going up a lot faster than inflation. And our wages don't go up, so I'm worried about that, as well, the cost of it.

Interviewer: So thinking as the consumer of electricity and gas, what choice do you have? Do you have much of an option?

Respondent: No, if you want solar power you're looking at about £12,000 to £20,000, depending on the size of your house, and you might get that back over 25 years but, realistically, you haven't got an option in my opinion, just pay it.

Respondent: Have you looked in to that? You seem to know a bit about that, have you looked into it?

Respondent: Yeah, I looked into it, yeah. It's quite complicated, but you'd probably get your money back over a long period of time, but it just didn't really excite me at all. I thought you could do it free, but there's all catches and things, so you can't.

Interviewer: Is that something that people would be interested in doing if it was free?

Respondent: Yeah.

(Laughing)

Respondent: Yeah.

Interviewer: So this idea that if your bills go up you've got no choice and you've, kind of, got to go with it, unless you can generate your own electricity on your house…?

Respondent: What about gas, though? You can't generate your own gas, can you? Or can you?

Interviewer: No, I don't think these days, no.

Respondent: But with electricity you could probably produce it in a small way, but it would probably be an upfront fee, in my experience.

Interviewer: So what do people think about the energy industry, from a consumer's perspective?

Respondent: It's expensive.

Respondent: Yeah.

Respondent: They just seem like it's profit. I mean, we're alright, we can manage to pay our bills, but some of these young kids and that, you know…

Respondent: And pensioners.

Respondent: They're struggling to get on the first rung of the ladder, aren't they, to go on a house, never mind paying electric bills. And they're putting them up 10% a year.

Respondent: But they're still making, like, 50 billion, 200 billion, yet they still put it up 10%.

Respondent: Well, how much money do they need?

Respondent: Where pensioners can either heat or eat.

Respondent: What you've got to remember is that all these industries at one time were nationalised.

Respondent: That's why I'm not supporting them.

Respondent: The day nationalisation, privatisation…

Respondent: It was ours.

Respondent: It just got sold on again.

Respondent: We didn't get a choice, did we?

Respondent: Disaster.

Interviewer: So do you think that the privatisation… from what you're saying, Dan, you think it's had a negative effect?

Respondent: In my opinion this country worked best in the 50s and 60s when there was a fairly even balance of nationalisation and private sector. Now it's all been sold on.

Interviewer: Would you others agree with that?

Respondent: I wonder if we would have progressed as much in technical terms if we (telephone ringing)?

Respondent: Progressed?

Respondent: Would the investment have covered it?

Respondent: But the world would be a better place because it would be a fairer place. Because there would be more jobs for people.

Respondent: The nationalised Russian industry is as good as British (inaudible 00:14:14).

Respondent: I know what you're saying.

Respondent: There was the better mix between the nationalised industries that were non-profit making, and that's the key to the problem is that all these industries have got to make a profit.

Respondent: But if you make a profit you can invest in that profit to progress with technology.

Respondent: Yeah, but we don't do we?

Respondent: Otherwise you just stagnate.

Respondent: They don't do that because they give it out to the shareholders.

Respondent: Well no, that goes back into the company, you can't just give it the shareholders, because there's nothing to go back. If you don't invest your company can't go forward, can it? And you've got to keep moving forward because otherwise your competitor would steal your market.

Interviewer: Do you think that happens in the energy industry at the moment?

Respondent: I believe so, yeah.

Respondent: The energy suppliers, the British Gas and…?

Respondent: Yeah.

Respondent: What does what happen? They re-invest the profits?

Respondent: I wouldn't say they re-invest it all. Everyone's got to have some dividends because otherwise you wouldn't get investors. If you don't get money back there won't be any investment at all. Part of that does go back into the industry to progress and get more technology.

Interviewer: What I'm wondering is whether you think competition is working?

Respondent: Yeah, competition will always work, because if you don't you'll just stagnate, like I said, you won't invest. If you've got a share of the market and there is no competition you just sit there, don't you? You just go, "Oh, there's no need to invest in anything else because I've got the shares, nobody wants to improve on it, I can stick with this."

(Overspeaking)

Respondent: Yeah, but you can still invest, even if it's nationalised, they still investing, aren't they?

Respondent: The infrastructure was paid for by the debt, but it's like the railway.

Respondent: It's owned by everybody, not just a certain few, who's profiting from it.

Respondent: To drive a new roadway you don't use nothing, you've got a pile of money here to go and get what you want out of the ground.

Respondent: Is there competition in the energy companies like there is in supermarkets and oil companies? There doesn't seem to be any competition, they just seem to be able to charge what they like. They don't seem to be charging… "Come with us and it's cheaper," "Oh no, come with us and it's cheaper." They just seem to charge whatever they want to.

Respondent: But competition does bring the price down, doesn't it?

Respondent: It does, doesn't it, yeah, but it doesn't seem like there's any of that to me.

Respondent: I don't think so. I mean, you can drive ten miles and pass, for example, ten petrol stations, and yet some of them can be so much higher than others, and they don't seem to be worried about competition.

Respondent: You don't see any adverts for, like, do you, I don't know, for this energy and that energy, you know, save 10%?

Respondent: Yeah, because there's no difference in them, they're all part of the same…

Respondent: That's what I mean, but you see with competition it's just like…

Respondent: Including the petrol.

Respondent: You have to pay it and that's it.

Interviewer: I think Jack's comparison with food was quite interesting, because if you look at the supermarkets and the schemes they have at the moment where they tell you how much more it would have cost at the other one. And then there's also the other argument that if you want to buy an organic, high worth or whatever, you can go and buy one, or if you want to go and buy as cheap as possible you can do that as well. Is there an equivalent of those two dynamics, in the energy industry that you can see?

Respondent: Well, they know what they're doing. It's all clever marketing, at the end of the day, I would say.

Respondent: This price check thing, if you look at the small print it says it's got to be like for like, so what you'll get is, like, if you buy a television you've got an LG flat screen whatever inch telly in one shop and one that looks identical in the other shop. One's cheaper in the other, but you want to buy it from your regular shop at the higher price, and they say, "Well, we'll price match it, but it's got to be identical." You go there and you'll find that there's a B in it, or a different number at the end. And that's how they fix it. They put something slightly different so the price matching isn't true.

Interviewer: So say if you put a tin of beans against a tin of beans, it's obviously not a comparison because they're a very few products, at the end of the day, but I'm wondering what you're thinking about… there's a lot of noise about tariffs at the moment and how many tariffs there are?

Respondent: You don't really understand what you read and shell out for, do you know what I mean? You'd have to be a…

Respondent: Well, they're supposed to be simplifying it, aren't they? This cheaper tariff, it could be (overspeaking).

Respondent: I just don't understand it all. I never have. The bill comes and you pay it.

Respondent: But the trouble is with that, you change to another supplier, and then within three months the one you've just left has probably gone cheaper than that one. So you're forever bloody changing companies.

Respondent: Yeah. The thing is, with food you're picking what you prefer, but electricity is just electricity, it isn't different flavours or anything, it's just electric.

Respondent: As you say, the bill comes through, you pay the bill.

Respondent: Exactly, yeah.

Respondent: You haven't a clue what you're paying for and it's, I mean, the competition…

Respondent: They're like the con men, just confuse you and…

Respondent: It's not like, you know, your missus might say, "I went to Asda this week and it cost me… oh, it was quite expensive." "Oh, we'll go to Morrisons next week, then, or we'll go to Sainsbury's." You don't do that.

Respondent: No.

Respondent: Yeah, shop around.

Respondent: But then if you've ever got a problem you can't get in touch with anybody, can you?

Respondent: No.

Respondent: You don't shop around, you just put up with it.

Interviewer: So when you talk about consumer power to change things, do you see that being possible in the energy market?

Respondent: No, because they'd stamp on you like they did the striking miners.

Respondent: It always comes back to that.

Respondent: No, but people like us haven't got a voice anymore in this country.

(Overspeaking).

Respondent: You need them more than they need you, so you haven't got the power to… I don't think so, anyway.

Interviewer: You haven't got the power, so would you say you (inaudible 00:20:35) your powers?

Respondent: You don't have the buying power. You don't have the option of being able to shop around as a customer. You've got to pay it. There's no, sort of, "Oh, come to us and we really value you as a customer and…"

Respondent: How many people in here have changed electricity or gas company in the last year? Nobody. I haven't.

Respondent: Too much hassle, isn't it?

Respondent: I've never changed.

Respondent: That's what I mean. Too much hassle.

Respondent: All my bills are separate. I pay gas to the gas company, electric to the electric company.

Respondent: Yeah.

Respondent: Phone bill to the phone company.

Respondent: Having said that, I will shop around for house insurance, I'll shop around for car insurance, I'll shop around for…

Respondent: Because it's easy, isn't it?

Respondent: Yeah.

Respondent: Just Go Compare, and they come up.

Respondent: It is, because there's people ringing me and there's people sending me letters. You don't get gas companies sending you letters, 'Why don't you come to us?'

Respondent: Only demands.

Interviewer: So when we started talking about this it was because somebody said – I can't remember exactly what he said – they're greedy, and they just want money out of you. And so, what we've just discussed, I think, was about how it's difficult for an individual or even consumers as a group to do anything about that. Should the government be doing something?

Respondent: Yeah, certainly. But I don't think the government have got the bottle to do it? Who do you think is paying them? Well, does anybody think the government have the bottle?

Respondent: I was talking to a fellow about it yesterday. He's a shopfitter, and when he takes up carpets like that he sells them, because there's a way of making it into a burnable product. Obviously, something's got to happen to it, so they use it for energy to burn. Why don't we know that? Why aren't things like that advertised? Why can't you buy a boiler for your house that burns this stuff? Because nobody will make an awful lot of money out of it. Not the same sort of money as they can make out of gas.

Respondent: Any side effects to it, like pollution or anything? It sounds like burning carpet might be a bit…

Respondent: They've got to get rid of it somehow, haven't they? So they're going to burn it to waste it anyway, aren't they?

Respondent: I suppose so.

Respondent: If you take it to the tip they're going to burn it, so it's going to go anyway.

Respondent: Or bury it.

Respondent: Well, they can't bury stuff anymore, can they? They're getting to the point where they can't bury stuff anymore.

Respondent: I think the energy companies are happy, aren't they, because they're making billions. No one's ruffling their feathers.

Respondent: Absolutely.

Respondent: The government don't seem to be giving them any grief, they just…

Respondent: Because half of them are directors of those companies.

Respondent: Well, yeah, they're all turning each other's…

Respondent: They're all in it together, aren't they?

Respondent: I don't know about big business, they might have a bit more power.

Respondent: Greener energy has got to be cheaper, hasn't it? It has to be. It's not like, for example, coal, where you have to get in there and get it out and put all that money into getting it there. They only need to put these windmills up.

Respondent: But do you think if the government had not been involved in that, do you think we would have progressed in this greener energy?

Respondent: We'd have had to, wouldn't we?

Respondent: Would we have done, though?

Respondent: What's the option?

Respondent: But would we have done? Would we have thought about it? We'd have just carried on burning, wouldn't we, and burying?

Respondent: You can't, though, can you?

Respondent: No, because there were guidelines set. If the government didn't set any guidelines to say you can't burn this because of the toxins, you'd have carried on burning.

Respondent: Eventually they would have come out with a system that would have made burning cleaner.

Respondent: So, assuming it does not do this because of whatever, we'd have carried on doing it.

Respondent: The government make the money out of it.

Respondent: We would have carried on doing it, wouldn't we?

Interviewer: That was interesting, but if we move on slightly. Do people regularly see news stories about this sort of thing? Whether it's about the energy industry specifically or just energy, do people pick up on this in the media? Is it something people would read?

Respondent: I just get my wife telling me, because she pays those bills and she just says, "They're going up again, they're going up again, this is ridiculous." The media also reports on it, you know, 'Gas going up 5% again, 10% again', so I think you're aware of it but what can you do? I don't think you can do anything, can you?

Respondent: You don't kick up a big stink about it. They do reports saying it's going up by 10% or whatever, or petrol's going up by another penny or five pence.

Respondent: It wasn't that long ago when petrol went up to £1, and look at it now.

Respondent: I know, now we're paying £1.35, that's what I've just paid.

Respondent: And how much of that is taxed? The energy companies get very little of that. Most of that is taxed.

Respondent: And so who gets that?

Respondent: Yeah, the government.

Respondent: Is that the same with gas and electric?

Respondent: It's not the energy company is it, which we are slagging off and we do slag them off because they…

Respondent: The government as well, then, big business.

Respondent: Which we're supposed to see the benefits of, but we never do.

Respondent: We don't. So does gas and electric get taxed as well?

Respondent: That's stealth tax, isn't it? You get taxed on your tax. You get taxed at the point of your earning, then you're paying tax again on your VAT, and then you go and put some petrol in your car and you get taxed how many times on that? And then you get your road tax. It's just tax, tax, tax.

Interviewer: So to go down this idea of tax, do you think energy is taxed at the right level?

Respondent: I think it's taxed too high. It's needed for people to live for heating and for the energy, cooking, people have electric heating so they need the electric. So they're taxing it on people who might not have enough money, and the sting is if you can't afford to run your car you'd sell your car, wouldn't you? You can't do that with gas and electric, can you? You're stuck with it and you've got to pay for it.

Respondent: My missus's mum used to sit there with a sleeping bag round her because she didn't want to put the fire on.

Respondent: It's disgusting.

Respondent: It is disgusting.

Respondent: Absolutely.

Respondent: And the directors are being paid about, what, 5 million a year, 10 million a year, so that's disgusting.

Respondent: You get was it £200 or something? Winter bonus or something? Look at us it's now, it's spring and it's still freezing.

Respondent: She never got that because she died before that.

Respondent: That does annoy me, that, because if you're in full-time employment or even directors of companies, if you're over 60 or 65, you get that £200. I'm sorry, but if you're in full-time employment, director of a company, whatever, you don't need to have that.

Respondent: I couldn't agree with you more.

Respondent: Should be means tested then, is that what you're saying, yeah?

Respondent: Or if you are in actual retirement and receiving a pension not necessarily means tested, but I suppose you'd have to do a lot of means tests.

Respondent: You can voluntarily give it up, can't you?

Respondent: Yeah.

Respondent: These people who have got all these millions don't give anything away, do they?

Interviewer: What if we start talking about different sources of energy? We mentioned, I think, solar earlier on and we've been talking about gas a lot. Can I get a sense of which sources of energy you like? Which you think we should be doing more of? Which maybe we should be doing less of?

Respondent: Coal.

Interviewer: We should be doing…?

Respondent: Yeah, more.

Respondent: It's still there.

Respondent: It's still there. See, we're experts at it in the UK, or we were, and I think we were taken down a road from, maybe now, in hindsight, dodgy environmental data about the climate change. It's probably not so accurate as what was thought 15, 20 years

ago when Al Gore was on his little tour of the world. So the UK politics at the time decided to go green. And there was a political issue with shutting the British coalmines anyway, and we've now decimated the country from a process it was very good at, and would have kept us pretty much on an even keel for our own energy producer.

Interviewer: Do others agree with that?

Respondent: Yeah.

Interviewer: I suppose the other side of the argument, of course, is what you were talking about, greenhouse gas. Does anybody see that side of things?

Respondent: Well, the publicity of whoever started to shut the pits down in the early 90s was that coal was the filthiest way to produce energy.

Respondent: Yet I had a coal fire boiler at home that burnt its own smoke (inaudible 00:30:03). Why couldn't a big power station do that?

Interviewer: And so you said the publicity there, Dan, does that…?

Respondent: Well, the publicity was for us to read that and think, 'Okay, we'll accept it's not a very good way of producing energy.' But when now a lot of coal comes to this country from places like Vietnam and Australia, and even I think the few remaining collieries in this country now, and there's only about five, I think, are all likely to shut before long. UK Coal or whatever it is now will shut them. So, again, totally dependent on imports.

Interviewer: So we burn more coal. How much longer would you want to, in your ideal scenario, how long would you want to, not continue doing that, but restart doing that for?

Respondent: As long as it lasts.

Respondent: It's not finite, is it? Do we pass off a grounded approach to energy? So we start coal mining again for 120 years, but we have a plan within 50 years to start the next phase of energy for the UK. It's not just one approach, is it?

Respondent: Well, we'd have these clever people working on technology to make it cleaner.

Respondent: Well, the biggest Ratcliffe-on-Sour plant station, which isn't far from here, that still produces one sixth of the country's energy or power, whatever you like to call it, and that's coal fired. And I don't know how much that… does anybody know, they used to burn several million tons of coal per year there. But they've got a scrubber plant on it that, in effect, cuts the emissions, so there's no… well, not too much pollution.

Respondent: I think we used to sell them about 18,000 ton a week, didn't we? As fast as it came out it was gone, wasn't it?

Interviewer: But what about the energy about getting the coal to them at the moment? Because that's got to be transported to them.

Respondent: True.

Interviewer: So there's all that energy being wasted getting it to them when we've got pits, and we have pits in this country, they'd be just round the corner.

Respondent: Yeah, exactly yeah.

Interviewer: (inaudible 00:32:24) so we bring it by ship, road, into the train.

Respondent: And there are all politics of it being mined in third world countries at such a rate, how safe are they working? In what conditions?

Interviewer: So you use the energy that's here before importing it?

Respondent: Mm.

Interviewer: Okay, so alongside coal, what would the others be? If coal wasn't going to be able – I don't know the figures – if you needed something else, what would supplement that?

Respondent: There is nothing else, is there?

Respondent: Fracking has been mentioned, hasn't it?

Respondent: Yeah.

Interviewer: So that's gas, natural gas.

Respondent: Yeah, shale gas.

Respondent: They're having problems with that, aren't they?

Respondent: That will reduce through earthquakes and there'll be nothing left for England anyway, as I understand. No, I'm only joking, but…

(Laughing)

Respondent: Yeah, they have tried fracking in Lancashire, and it caused earth tremors in Blackpool somewhere, so…

Respondent: Yeah, that's not any detriment is it, really?

(Laughing)

Respondent: I agree with you there.

Respondent: I guess it's no different to when the (inaudible 00:33:42) came in and you had slippage, is it really?

Respondent: They've just shut part of the 614, I think, top of Ollerton because of landslide. So I guess there's not much of a difference is there, really?

Interviewer: Okay.

Respondent: Subsidence is a… conventional mining causes subsidence doesn't it? But I think fracking is a much more hazardous thing, you know, to drill down and cause explosions underground to get gas out. In America they're not really (inaudible 00:34:16) there, are they, environmentalists?

Interviewer: There are stories coming out of America on that study(?). What about nuclear? What are people's views on nuclear?

Respondent: That is fine, if it's done safely.

Respondent: Don't know enough about it. I've heard about it.

Respondent: (Inaudible 00:34:32)

Interviewer: So the regulation must be…?

Respondent: Yeah, very tight on it.

Respondent: They have their own HSE body that go in regularly to monitor from a health and safety point.

Interviewer: Do you feel they've established what they do with the storage of that, because there's so much to store, isn't there?

Respondent: Yeah, I believe Cumbria was the last county council considering having disposal there and they rejected that, so that's the question.

Respondent: Russia and (inaudible 00:34:59). They're all things that you can't safeguard against, they're all natural disasters, I mean, look what happened in Japan. How much of a worry was that? It was so close.

Respondent: Sellafield closed down at the weekend, didn't it? But it was thought to be a disaster plan because of the weather let's shut down and be safe. So a lot of this was planned for was in place. You've got all these old mines that crashed, you could put the stuff down there.

Interviewer: Further, kind of (inaudible 00:35:40) that gets some people worried. So before we were talking about renewables, and people were quite… there was some enthusiasm for renewables. If anything, as much as a way of producing your own electricity and maybe escaping the energy industry a little bit. So is that the only reason you'd go for renewables, or is there anybody here that follows the logic of environmental politics? Don't be ashamed.

Respondent: I think it all comes down to price again.

Interviewer: So when making these decisions, when you've got the pie chart and you say, "Well, what percentage of what are we going to use?" the main rationale for that, for you, is price?

Respondent: You've, kind of, got environment at the back of your mind, haven't you, but price overrides all that.

Respondent: That's right.

Respondent: 99.9% we're price all day long, aren't we?

Respondent: At the end of the day, for these young people who have got families and all that, they're not worried about the climate, they're worried whether they can pay the bill at the end of the month.

Respondent: Yeah, when it comes down to it.

Respondent: It's like these fancy organic vegetables, really, isn't it? At the end of the day you're going to go for price, aren't you? If you're shopping about, you know, and you go

to buy a bag of spuds and you've got your organic spuds at, I don't know how much, double the price. If you've got your normal ones, your happy shoppers, at half the price, that's what you're going to go for.

Interviewer: What if someone was to put the argument forward that, maybe long-term, the price of fossil fuels, looking into the future, on a longer timescale, that's only going to go up as (inaudible 00:37:26) production is whenever that may be.

Respondent: Yeah, but you say that, but what people don't understand about that is, if everything picks up again, there's people working. People have got money in their pockets to spend in the economy. People are going to spend their money, aren't they? If you've got a wage you go out and spend it in the shops. You have your car done at a garage. Everybody wins.

Interviewer: Again, just to play devil's advocate, what about these people that say, "Well, if you start investing in renewables and you've got all of these green jobs, would they last longer term, possibly?" And then there's the possibility of exporting that expertise, for instance. So I know if we build a new power station in this country it will be a French company that builds it, more than likely. That's because they developed the expertise in that industry. Is that an argument?

Respondent: That's great in an ideal world, isn't it? We'd all like to say let's have everything green and then we can all breathe fresh air and that, but reality is just, it comes down to people's money. I would love all green energy if somebody went to me every week, "There's £300, don't bother going to work. Don't worry about your bills."

Respondent: What are you terming as renewables, then?

Interviewer: So solar, winds, probably hydroelectric dams, hydroelectric, and there are probably more that would be maybe insignificant, geothermal, I'm not sure if we have much patent of that in this country. I don't know.

Respondent: We do geothermal.

Interviewer: Okay, sorry.

Respondent: My office has got geothermal heating.

Respondent: So this geothermal, this is heat, sort of, pumps, is it?

Respondent: Yes.

Respondent: Parts of Nottingham are heated by burning rubbish. Eastcroft produces heat that goes into one of the big shopping centres.

Respondent: They've stopped that now.

Respondent: Have they stopped it completely?

Respondent: They've stopped it yeah, taken it all out. It used to do St Helens, didn't it?

Respondent: Mm.

Respondent: But you wouldn't class that as a renewable?

Interviewer: That's a good question. Possibly not, I suspect there might be some emissions from that but people wouldn't want to call that renewable for various reasons.

Respondent: If they invested in the scrubbers as they have done in some of the power stations, then why not? It's burning something, rubbish that needs to be got rid of. We haven't got the landfill as much as we used to, so why not? Invent the cleaners to clean the dirty stuff, and burn it.

Respondent: There's a lot of methane, isn't there, that comes off these landfill sites, isn't there?

Respondent: Yeah, that's right.

Respondent: Free energy coming out for (inaudible 00:40:44).

Respondent: You know renewable energy, it doesn't necessarily mean it's more expensive anyway, does it?

Interviewer: I think a lot of people argue that at the moment it is, but I suppose the counter argument is if we do it more and get better at it, that could come down. So that's the other way it goes on up.

Respondent: At the moment, with the economy being as it is, people haven't got the extra money to invest in the long-term future on a day-to-day basis.

Respondent: But would it come down?

Respondent: It would probably come down a little bit, but once they'd got their hooks into you, again, it's, money's king, you want to see some proof.

Interviewer: So what about this point about the economy? Assuming that this isn't going to last for ever…

Respondent: Double recession?

Interviewer: Double dip, whatever it is, assuming that it isn't going to last forever, will people's minds change if they were feeling a little bit better about things like that or, in terms of price being the absolute priority, can people see their minds changing?

Respondent: I don't think they're educated enough over it, to be quite honest with you. I mean, you're talking now of renewable energy. You then said a French company might come over and create loads and loads of jobs, and I'm still thinking at the back of my mind what sort of work would that be? I don't think we really understand what we're capable of and how much… I wouldn't know how much power a windmill gives out compared to a log burning fire or a coal burning fire. I really wouldn't know, and if people did understand it and did take note of that bill that comes through the door and what you're actually paying for, I think it would be a lot different.

Interviewer: I think that's a good point, Bill. So where would you go to get your information on this if you decided right, I'm going to…?

Respondent: I don't know. The information is probably available if you go to look for it, but it comes back to the same thing. Somebody's making too much money out of what we've already got, to my mind. It's alright saying we should all be green and all this. Your government lose you money on that, your companies lose their money on it, because we all know that greener should be cheaper.

Respondent: Greener isn't always cheaper. Like, with the wind turbines they still haven't subsidised, it's a joke to say that they're going to be...

Respondent: Haven't been subsidised by what?

Respondent: By the government. They're so out, they really are just…

Respondent: So what money is going into them to make them subsidised? Because to my mind, in theory, once those things are up and yes, I consider that they're going to cost millions of pounds, once it's up what else is running? The wind's blowing, it's going round, it should be…

Respondent: Have you noticed when it's too windy they switch them off?

Respondent: There you go, because they were catching fire, weren't they?

Respondent: Yeah. I think they're just unsightly and they take up too much room anyway. They're certainly unsightly.

Respondent: I've got to agree with you.

Respondent: And (inaudible 00:44:03) the money they throw at them to keep them going.

Respondent: Do you think it's a bit of a bluff just to…?

Respondent: Yeah.

Respondent: What, just to say they're doing something?

Respondent: To say, "We're doing something."

Respondent: I certainly wouldn't want one outside my back door.

Respondent: Well there you go, I mean, you drive all over the country and there's these big posters up telling you 'We don't want a wind farm', so what do people want? While that's it, while there's not that education, then people will just say, "Oh, we'll just go along with it."

Respondent: We don't want (inaudible 00:44:30) at any cost, do we?

Respondent: That's exactly it.

Respondent: It's not just money, it's you want to look at the countryside and enjoy it, not have a wind turbine in a bloody field there.

Respondent: We're frightened of change, anyway, aren't we?

Respondent: But then again, would you sooner have one of them or a big load of coal at the side of your house, do you know what I mean? Slag heaps, and it's the same thing, isn't it?

Respondent: You got used to it didn't you?

Respondent: So your answer is if I've got more money in my pocket because the economy is more buoyant I wouldn't spend it on renewable energy, I'd spend it on something else?

Respondent: Yeah.

Respondent: I have other priorities before that.

Respondent: Yeah.

Respondent: No matter how well off I was, personally.

Respondent: Because we're all so capable of looking at money at the moment because we're going through a recession, that will just educate people to continue with that. You're saving money, why have we suddenly stop and throw it away just because you can afford it, you don't throw money away because you can afford it. You save money because you want to save money to do nicer things in life. Just because we're out of a recession it doesn't mean you can start throwing loads of money around.

Respondent: Yeah, energy is a must have, is it a need? Yes, it's a need, isn't it? You haven't got any choice, you've got to have it. Not like the luxury item stuff.

Interviewer: I have a hypothetical question for you, okay? If tomorrow we found a huge source of fossil fuels underneath the ground that people were saying that we could commercially exploit this, there might be economic benefits, there might even be price drops for the pricing of energy. How would you feel about that?

Respondent: Interested.

Respondent: I'd want to know more.

Respondent: Would you ask the questions about the environment or would you just go straight and get it?

Respondent: Yeah, I'd go straight and get it.

Respondent: Yeah, but would you ask the questions about the environment or would you just go and get it?

Interviewer: Are you asking would we?

Respondent: Yeah.

Interviewer: And what did people think was the answer to that?

Respondent: I think we'd go out and get it. We'd want to know how much it would cost us first, and then we're going to go and get it.

Interviewer: But if we knew that our children or grandchildren were going to be affected health wise, would we still go and do it?

Respondent: Did our fathers and grandfathers…?

Interviewer: No, but we just sat there, forget the past, we now know that there's an energy source down there. So we know in 50 years' time it's going to make everybody's lungs and whatever bad, or whatever it's going to do or, you know, would we still go and get it because it's cheaper today? Do you think it's employment for a few years?

Respondent: They wouldn't tell you about it. They'd only tell you the good stuff.

Interviewer: Any other questions that people would want to ask about this proposition?

Respondent: What sort of jobs is it going to create, and who's getting it out? How much is it going to cost to get it out?

Respondent: How long will it last?

Interviewer: Why is how long will it last important, Jack?

Respondent: Well, is it sustainable? Is it going to be here forever or are we just going to throw all this money at it and then in five years it's gone.

Interviewer: Okay, because earlier on you were saying about coal in particular, coal and gas as well, I think, you just exploit it until it's gone. But you're saying you would want to see how much it would cost to set up?

Respondent: Yeah, when you're starting something you want to know the life span of it, don't you? You don't just want to go into it blind and think, 'Well, it might be a month, it might be a year, it might be 50 years.' You've got to look it in some way, especially investors would want an idea, wouldn't they, what return they're going to get?

Respondent: It's got to make a profit, at the end of the day, hasn't it?

Respondent: And taking Doug's point, I'll definitely have some kind of moral and some kind of ethical thought behind it, because if I thought it was going to save me money but, like you say, it will make my grandchildren and great-grandchildren ill, I wouldn't take it up. I don't think it's just saving money at any cost. So there's, kind of, a balance, in my point of view.

Interviewer: Again, any thoughts about what sort of questions you're going to ask?

Respondent: As I think but everybody said it's all relative to cost, it's just no questions.

Interviewer: Okay, and if they were saying, "Yeah, we can get this out of the ground at costs that make sense, and sell it on maybe even lower…"?

Respondent: Yeah well, it's like as somebody else said, it's the scenario of two identical things. One made in China, one made in this country. The Chinese one's half the price, you always go for the Chinese one, don't you?

Respondent: Yeah, but they'll break after a week.

(Laughing)

Respondent: Identical ones.

Respondent: Okay, yeah.

Respondent: I think we'd be asking if it was going to create any jobs because, I mean, I don't know whether we'd all want to be interested in…

Respondent: But, at the end of the day, all you see now is kids standing on corners with nothing to do.

Respondent: Yeah, if it was something like…

Respondent: Big industries. You know the lads who come into our industry, some were like thick heads when they first came in, but when they left they were good lads. There's none of that now.

Respondent: Character's gone.

Respondent: That's right.

Respondent: You're not on about me now, are you?

(Laughing)

Interviewer: Right well, that wasn't actually a strictly hypothetical question as some of you might have guessed, actually. So we've mentioned it before, actually, and this is what I want to spend the next hour talking about. This is what my research is about, primarily. So I'll read these out. So hydraulic fracturing. Have people heard of this? Has everybody heard of this?

Respondent: No, I haven't.

Interviewer: Okay, so it's a technique – just so everybody knows what we're talking about – it's a technique that's actually relatively old, but people have only recently started to get excited about it in the last… no longer than the last decade, really. And it's involved in the process of getting early conventional fossil fuels out of the ground. They're the same as conventional fossil fuels, except for their source, where they are and how you get them out. So one of the most common ones is Shell Gas, so it's methane, it's the same as what we call natural gas, conventional gas. It's caught up in the rock, in the shale, so you have to go to these lengths to get it out. And so there's these two technologies, directional or horizontal drilling and then hydraulic battering. They've been refined over the years. I mean, the history goes back to the 40s. Those technologies have been getting better and also the rise in energy price has meant that it's economically feasible. And so hydraulic fracturing is, you get down to this horizontal bit within the shale, small explosions, and then you pump fracking fluid down the (inaudible 00:51:48). This fracking fluid is predominantly water and sand, and there's 0.5, or thereabouts, chemical elements in it that perform various tasks in the process, keeping the sand suspended and things like that. That fractures the rocks. The gas molecules caught up in the rocks flow back out. That's the idea. That's, more or less, the crash course in it. What are people's initial impressions about this?

Respondent: Interesting.

Respondent: How many people would be employed on one site, then, doing that?

Interviewer: Yeah, so you're worried about whether it's going to be as labour intensive as coal mining, for instance?

Respondent: Well, I want to know how many jobs it's going to create for people.

Interviewer: What about the bad press that it's had? What of the earth tremors and what have you.

Respondent: That's what Dan was talking about.

Interviewer: So you'd want to know what sort of implications this process would…

Respondent: Because you know when you send the explosives down and you're taking this gas out, what are you replacing that with? Now, when we were mining it was all propped up. So who's propping?

Respondent: It's to come down slopes.

Respondent: But you get, I would imagine, more than the media, that is a lot quicker effect you get with that, because you're taking something out, what are you putting back in its place?

Respondent: What, does the water stay there then?

Interviewer: The water flows back out.

Respondent: It comes back up as it gets pumped?

Interviewer: Yeah.

Respondent: Does it become unstable in any way?

Interviewer: We'll talk about the risks in a minute.

Respondent: So what's the end product, then, cheaper gas?

Interviewer: Yeah, the end product is natural gas, implemental(?) gas they call it, but it's methane, it's the same.

Respondent: And then it can capture that and sell it?

Interviewer: Yeah, exactly.

Respondent: How much is it is around?

Interviewer: That's another question. Because I will move onto this. I will try and answer as many of these questions as I can, but I'm just interested in your initial, kind of…

Respondent: We went into a seam at Cotgrave and they said they'd found loads of methane, so they put a methane draining system in, which was going to run the baths, all the electricity…

Respondent: There were showers and everything, weren't there?

Interviewer: Is that what's known as coalbed methane?

Respondent: Yeah.

Interviewer: Because you can frap for that as well.

Respondent: But then it ran out. Put all the pipes in, as soon as they got them down there it disappeared.

Respondent: It ran our baths and the generators, everything, even in the (inaudible 00:54:44).

Respondent: What pit was that?

Respondent: Was that (inaudible 00:54:47)?

Respondent: Are you from up there?

Respondent: I'm from Wolverton.

Interviewer: Are there any other questions, or shall I move on to try to answer some of those.

Respondent: I'm quite interested in it, I wondered if it's happening at the moment in this country. Dan seemed to say there was something up Lancashire way or something, was there?

Respondent: Melton as well, Melton they're doing some tests out at Melton way.

Interviewer: It's happened a lot in America in the last ten years, and the price of gas there has fallen.

Respondent: How do they locate the gas then? Is it just trial and error, do they just go in, or is there some way of saying…?

Interviewer: They have reasonable ideas in England about where there are shale formations, and the process for coming up with estimates at the moment is actually quite rudimentary, as I understand it, that it's digging a hole, going two miles down the road and digging a hole there as well. But they're working on modelling and stuff like that.

Respondent: Is it the same gas companies who are providing the gas now?

Interviewer: That's an interesting question. Typically it's been smaller companies that started this, and then maybe the bigger ones have bought them if it's gone well, that sort of thing.

Respondent: Profiteering, yeah.

Respondent: How much legislation is attached to this, is there a minimum depth before they start fracking, things like that, or not?

Interviewer: I'll put up the next board because you'll get to know your questions there. So these are the promises, these are the opportunities. And again, I'll just go through those. So the international energy agency is wondering whether we're entering a golden age of gas. Someone was asking where it is. So the places we have reasonable ideas, there's a lot dotted around America, obviously. A lot South America, China, little pockets all around Europe. Obviously, the depth matters as well as the area, but Australia, South Africa, Algeria. So it's pretty dispersed around the globe. So this is what's happened in America, it's being called a game changer. In the news today actually was Centrica struck a deal with an American company to import frapped gas from America, which the idea of importing energy from America and America being in a position to export gas has changed the energy context in America almost overnight in the period of a decade.

Respondent: When you say import from America, would that be pipes under the sea?

Interviewer: No, they turn it into liquid and, at least for now, it will be shipped.

Respondent: How does it burn, then? Does it burn like the natural gas that we've got now?

Interviewer: Yes.

Respondent: Is it the same product?

Interviewer: It's the same, yeah, it's just the process of getting it out. So we've got staff like the wonder gas that could cut your average bills up to so many times in 2011, Time Magazine, is rock the power of the world? Go on, major gas, game changes. So there's a lot of optimistic language on the board. We've got a couple of UK politicians that would like to explore doing this here. So the former energy minister saying there's a possible security of supply and economic benefits that could come from this. George Osborne, he said it again last Wednesday in the budget, he said this in the Conservative Party Conference last year. He doesn't want to see Britain left behind as gas prices tumble.

Respondent: Yeah, but Lawrence, do you really believe that our gas bills are going to go down? Because I just don't believe it for one minute.

Interviewer: Are other people pessimistic about that?

Respondent: Get back to what you say about the tax, the tax in this country is very high.

Respondent: Our bills will never go down. Not in this country.

Respondent: It's a mistrust in politics and the government.

Respondent: You can't believe a word they say.

Respondent: If Centrica have got a meeting, Centrica's your gas company, they're going to sell it at the same price.

Respondent: They're not going to go, "Oh, we'll knock £50 off your gas bills."

Respondent: You'll not get it cheaper. They'll make a bigger profit on it.

Respondent: But is it the companies or is it the government?

Respondent: Everybody's benefiting except the guy who's having to pay his bill.

Respondent: Except for me.

(Laughing)

Interviewer: So it's fallen to a third of its original price in the US, so what are they doing that you doubt we would do?

Respondent: Yeah, but have they passed that on to the public?

Respondent: Like I say, we don't trust our politicians.

Respondent: They must be still making the same profit.

Interviewer: The companies are still making the same profit?

Respondent: They must be, surely? The gas might have fallen to a third of the price to the consumer but they should be making the same profit.

Interviewer: They boosted supply so much.

Respondent: So they still make the same profit but they're just getting this other gas?

Interviewer: Yeah, I assume their profit margins aren't falling.

Respondent: But how long will their gas that they're getting now, that's gone down in price, how long will that last, then?

Interviewer: That's a good question, but people don't…

Respondent: They've said over 250 years over there, on the IEA world energy outcome. It says the total recoverable resources could sustain today's production for another 250 years.

Interviewer: So that's gas, conventional and unconventional, but I was saying unless they contribute…

Respondent: Oh, 40% of the income.

Interviewer: 40% of that.

Respondent: Are you saying that's greener as well? Cheaper and greener, or are you not saying that?

Interviewer: It looks safer and it looks greener on the face of it, doesn't it?

Respondent: Safer than oil rigs, coal mining, everything's done on the surface and done by machinery, by the looks of it.

Respondent: So why is it getting the bad press?

Respondent: Because they've put all the consequences, but what's the risks?

Interviewer: Okay, we'll talk about the risks.

Respondent: It got the same bad press as mining has, really, because people didn't like mines because the subsidy could be the worst they are. You will get subsidy and that's why.

Respondent: Coming back to education now.

Respondent: You can't take anything out without something's going to pack up, (inaudible 01:01:42) that's pure logic.

Respondent: So are you saying it's greener or are you not committing?

Interviewer: I haven't said anything about that yet, but would you like to see it be greener?

Respondent: Well, I don't see how it is greener at the moment.

Interviewer: Greener than…?

Respondent: Greener than conventional gas and other fuels.

Respondent: What about the burning effect? Is it green into the atmosphere when it's being burnt, or…?

Interviewer: It's the same gas, it's the same as natural gas, so methane, so…

Respondent: Yeah, but you're burning gas, you've still got a toxic getting in the atmosphere. So you're still not being that friendly to the environment, because you're still burning gas, aren't you?

Interviewer: Many people would say greener than coal, that would be the argument.

Respondent: Yeah, but you know all the negative press about coal – was that all genuine or was that just – that was overhyped by the press wasn't it? Coal's not as environmentally damaging as they portrayed it, is it? Have you researched anything on that now, or not?

Interviewer: I suppose there are a lot of questions which is the methodology and what, are they looking at best practice are they looking at shoddy practice? I've taken it as read that natural gas is (inaudible 01:02:23).

Respondent: Okay, fair enough.

Interviewer: So we've been talking about the economic side of things, and we're talking about prices in a bit, so Cuadrilla are a company that are exploring this in Lancashire, so Lancashire's rife. They're doing research and development for those at the moment, they're not commercial based. And they're saying they reckon there's 200 trillion kilo currently of this in the Bowland (inaudible 01:03:26) is Lancashire. And they say that, over a 30 year life cycle, they pay 5 to 6 billion pounds in corporation tax. And they've got estimates about jobs as well that I haven't got on there. So what do people feel about the opportunities presented on this board?

Respondent: Are you coming to the legislation later?

Interviewer: We'll talk about the legislation now. There's obviously the planning permission phase, which is the local authority, and there's a risk assessment there. And there's various permits for the chemicals they use in the fracturing goods from the environment agency. But there's no specialist legislation put in place yet.

Respondent: And is there a minimum depth?

Interviewer: There's no minimum depth yet. Not in law. There are scientists suggesting what that maybe ought to be.

Respondent: So if they found it ten feet down then they can go and get it?

Interviewer: Anything, yeah.

Respondent: So it comes to the same thing, you're saying it's hypothetical, but you know?

Interviewer: I think as part of the risk assessment that would come up, but it's my understanding that there's been no new legislation specifically for this. Many people don't think there necessarily needs to be.

Respondent: So what dates are from the other parts of the globe where they're doing this now, they have been doing it for ten years, what's the biggest consequence that's occurred to allow Cuadrilla to do their risk assessment?

Respondent: I wonder if (inaudible 01:05:13).

Interviewer: Pardon?

Respondent: 50 feet down.

(Overspeaking)

Interviewer: So why would you be interested in who Cuadrilla are?

Respondent: Well, they've got good health and safety records, they're good people to work for, they're creating jobs, so what's their angle? They're not doing it for fun, they're doing it for profit.

Interviewer: They have a couple of major investors. One of them is a company called Riverstone Holdings, I think, which is an American kind of equity investment firm that specialises in investing in energy companies. And there's a couple of other major shareholders, but they're a relatively new company.

Respondent: And is it an American company that's going to be doing it over here, then?

Interviewer: Cuadrilla are a British company, they're on the London Stock Exchange, their offices are in London and they've got three sites up in Lancashire.

Respondent: What else do they do, then? They're on the Stock Exchange, this is not their only product, so to speak, they must have other things?

Interviewer: This is what the people who have invested in (inaudible 01:06:33). Lord Browne who used to be the chief executive of PB and is their chairman now.

Respondent: So will we be able to buy some shares in this company?

Respondent: Well, that's surprised me.

Respondent: Venture capitalism.

Respondent: If you invested in this, then obviously you've got a clue that it's going to happen, isn't it? They've not put all these millions in for no reason. They've done that much, so this is definitely going to happen, by the sound of it.

Respondent: Definitely the prices aren't going to go down if it's something to do with BP.

Interviewer: Yeah, what do people think about Cuadrilla and their shareholders from around the world?

Respondent: They're going to get a return on the investment, obviously, because these guys don't really make mistakes, so this is going to happen on a large scale. You, more or less, could guarantee it, couldn't you? If they put this money in.

Interviewer: So you think it's inevitable. Do others think it's inevitable?

Respondent: Yeah. Definitely.

Interviewer: And do you like the fact that it's inevitable? Is there anything there that worries you?

Respondent: Well, they're going to be making all the money again, aren't they?

Respondent: It's going to be the same, isn't it? Prices aren't going to go down, are they?

Respondent: Equity back to gain from a big US corporation just says profit, and little will go into this country. You'll pay the corporation tax, but profits will just go out to wherever they go to in equity. We might…

Respondent: I think that, initially, it will probably drop.

Respondent: Yeah, we might be a little bit better off.

Respondent: I think it will probably drop, just to get people on side. And once it's then going out there's not an awful lot you can do about it, then the price of it can go up and you just accept it. You accepted it when it was cheap, you will accept it now.

Respondent: You're quite right about the price because there's no incentive to change, what's the incentive to do it? If we don't get any incentive back as consumers, why would we want to swap?

Respondent: If it's exactly the same product, then how will we ever be (inaudible 01:08:27) the difference?

Respondent: Is this labelled as something different now? Is this called shale gas or blah blah? Is it labelled different to any other gas or is it just…?

Interviewer: I mean, once they sell at Centrica, that will start coming in 2018, so unless we start producing our own by then, that will be the first time we've burnt it in the UK. Yeah, it will just go to Centrica and it will go into their power stations and (overspeaking).

Respondent: Is it cheaper to take out than gas that we've got now?

Interviewer: No.

Respondent: So why would they sell it cheaper, apart from trying to get people on side?

Interviewer: The whole thing is there's this vast new supply, and if you tap into it, then the whole amount of energy in the system washing around is more… so it's not per cubic feet or whatever, this is cheaper. It's that you have this what we already have.

Respondent: Yeah, flood the market with that, it's like oil isn't it? The more oil you produce the cheaper it gets, supposedly.

Interviewer: What America has done, up until this deal that was announced this morning, actually, is they've had very tiny export controls on this, so they've kept it all in America, which is maybe one of the reasons you've seen such big effects in America so quickly, because they haven't exported it and they're just starting to loosen that. Let's talk about the risks, then. So seismicity, a couple of you mentioned this, you were right, there were two earthquakes in 2011, about a month apart, with magnitudes of 2.5 and 1.5. And there was a report into this and they demonstrated that it was the fracking that caused these earthquakes, seismic events, trems. People argue about what to call them but they're earthquakes, technically. What do people make of that?

Respondent: I think that's enough for me, that.

Respondent: On average, those scales of 2.5 to 1.5, how big is that, on average, for your normal tremor that happens in the UK?

Interviewer: That's more magnitudes. You might have felt it on the surface, but it wouldn't have felt much on the surface. The Royal Society have done a study into this, and they're similar to the sorts of magnitudes you see with coal mining activities.

Respondent: So the likelihood is pretty low effects, so the risks are acceptable?

Interviewer: That's what the Royal Society have said, so you go along with that.

Respondent: So they're on a par (inaudible 01:11:04) with mining?

Interviewer: Yeah.

Respondent: Again, this gas, is it in the countryside, or is it under cities?

Interviewer: That's another difference between the United States and the UK, because there's obviously big, wide open spaces over there. Here, the nearest town is never that far away. So where it is in Lancashire, it was near Blackpool.

Respondent: Yeah, but what I'm saying is, is it under a city or a village where coal mining used to didn't quite go under cities.

Respondent: We had to have permission, though.

Respondent: Yeah, we had to have permission to use it.

Respondent: Well, I guess that would be part of their planning permissions, wouldn't it?

Respondent: In America they have more earthquakes and suchlike than us. The buildings are built to the standard that will take certain seismic events, and we're not built for that, are we? Our buildings won't take that sort of thing.

Respondent: Yeah, but you won't get the scale of the tremor anything like…

Respondent: We've only got two… we've had two, haven't we, 2.5 being the biggest? Well, how do we know… we could be getting bigger?

Respondent: I think it's the perception of it, isn't it? If someone said, "We're going to start fracking near your village, I'd say, "No thanks, do it somewhere else." And I think your house prices would go down if there was fracking.

Respondent: You say that, look at your house prices, you couldn't sell it.

Respondent: Yeah, well the perception is what if this, what if that? If you think like that.

Respondent: You could still put it under farming land, then you'll get some movement, but it's not as big a worry as if it was under a village or…

Respondent: What about when we have the first disaster, if we do have one?

Respondent: Yeah, it could happen, couldn't it?

Respondent: So the Department of Energy and Climate Change have said that it's not possible to state categorically that no further earthquakes will be experienced.

Respondent: Well there you go then.

Interviewer: But what do you think of this when you have a risk like this? And they're quite small magnitudes, we don't know if they'll ever happen again. Is that enough reason to shut the whole thing down right now, the fact that it could happen again?

Respondent: Yes, if it's your area. If it's somebody else in Lancashire you're not so worried. If it's suddenly next door to you, then it's going to be a worry.

Interviewer: There are a couple of companies that have planning permission to start doing this in Nottinghamshire. There's Shell Gas, Shell Oil, coalbed methane. You'd be worried?

Respondent: Is that out at Melton or somewhere?

Respondent: I think it's us.

Interviewer: I'm not sure of the specific Composite Energy, which is a subsidiary of a slightly bigger Australian company called Dart Energy, I think. But that might be in the pipeline.

Respondent: I mean, that's clear that we don't know what we're dealing with, isn't it? That's clear we don't know what the reaction is going to be, it's just like suck it and see. So we've got no idea. I think it's more of a danger, personally.

Interviewer: How do the others think about that?

Respondent: I think the government's far too smart to let it go down a suck it and see route. If all the risks have been assessed, and they've had the appropriate bodies in to assess it, and they use data from the rest of the where it's been done in other countries, to feed into that…

Respondent: I don't agree with that. If there's no minimum depth now, it hasn't been a risk assessment properly, has it? If there's no minimum depth to go down, then they can go 1,500 feet, 200 feet if they like.

Interviewer: I don't know exactly what's on the risk assessment. I know that there's no new levels of depth.

Respondent: What depth do you normally pipe this gas?

Interviewer: Typically about two to three kilometres down, something like that, so pretty deep.

Respondent: So nothing beyond that, then, normally? And if we did find something up there, would we still go for it, irrespective? Would we just go for it, because of the costs?

Interviewer: I've not heard of them finding it that shallow, but I'm not saying there isn't any out there.

Respondent: Would these companies be paying compensation to people, because that energy is there in the lower village, they'd come in an just bulldoze the village down, I would have thought. They're not bothered about people, are they? They're just bothered about profits.

Respondent: There would have been all of these discussions before they started coal mining.

Respondent: When they first started coal mining they just got on with it, didn't they? You know when you go down with a bracket and you go out, how far can you go out before you do another hole?

Interviewer: Why do you ask that? So how far can the horizontal bit go?

Respondent: Yeah, before you do it.

Respondent: Yeah, so if there's a village there can you go under it, rather than move them? I think that's what we're wondering?

Interviewer: Okay, so you want to know about that? I can't tell you about that. So reaching under?

Respondent: Yeah, it could have been Blackpool coming down to see us, couldn't it? Because we're better than Blackpool.

Respondent: Yeah, we've got a real tower. I mean, you're right, how far did we used to go out ourselves?

Respondent: Miles.

Respondent: Well, those were the places we mentioned quite often.

Interviewer: Let's talk about ground water contamination, which is another big thing that gets quite a lot of column entries. So the 0.5 additives, the chemicals that a lot of these companies use, and each company seems to use slightly different chemicals. But they're hazardous and you wouldn't want them getting into the water table. So there's this debate at the moment in America, these fracking fluids have got into the water table and caused water contamination, and there's a film called Gas Lands that somebody made a few years ago, and the most famous scene from that is somebody sets light to their tap in the kitchen because it's got methane in it and various other things. The cause between that and fracking has not been proven scientifically, so I have to stress that. The New York Times thinks there definitely is one case, but a lot of people say there aren't any proven cases. The New York Times thinks there is one, which was where there was an old gas well from the 40s, and so they think somehow it got into that, pressure rose and it came up. And that was, obviously, not in good condition, being that old and being constructed then. So that's what they think happened there, but again, there's this debate about whether it's happened or not. And so the scientists, the EPA, the Environmental Protection Agency in America are doing a big report into this. This case the New York Times are talking about is from 1987, which is early fracking. The EPA report doesn't… I don't know if they made this report until next year, because I can't read it before it's on this list. So until that report there is quite a lot of debate about this. So, talking about this minimum depth, scientists are saying there's three ways this could happen. Natural methane migration, and they're saying in most geology around the world, that's (inaudible 01:18:53) or vertical propagation was always induced hydro fracturing. These fractures can reach vertically high enough from where they are, two, three kilometres down to where the water table is, say 500 metres or whatever it is. Somebody's worked out… they've looked at all the data we have on good behaviour of fractures, and they've said the probability that stimulated hydraulic fracture extends vertically beyond 350 metres is approximately 1%. So then it goes that far is 1% for the two kilometres it might have to travel. Obviously, there is more possibility. And then the third one is leaky well casings. So, coming back up, there's something wrong with the concrete or the steel or whatever, and it's got in the act for that way. So what do people make of this ground water contamination?

Respondent: Well, I'm very anti fracking and I just (inaudible 01:19:59).

Interviewer: So what concerns you most?

Respondent: Well, what you've just said. I know, like, 1% of 350 metres or whatever it is, to get at two kilometres, there's just no point whatever, but if it's contamination, if they can set fire to water and there's gas in the water then I think the risks are too high. You don't know what's going to happen in ten years' time, 15 years' time. There could be a national disaster, but I don't think I'm being doom and gloom.

Interviewer: The risks seem to be, from what the scientists are saying, quite low.

Respondent: But there's still a risk. How can you set fire to gas in your water? That's scary, that is, to me. They made a film about it, so that's how topical it was at the time. I know the bias in the press. Some people are for it and against it, and you can think in terms of the same argument, strong in one way and strong in the other way, but personally – I might be the only one here – but I think I'm very anti fracking now, and I'm going to look more into it when I get home, I'm very anti fracking, personally.

Interviewer: Do others agree with that point of view?

Respondent: At the end of the day they've got to find renewable energy, haven't they?

Interviewer: Well, this isn't renewable, but it's much more fossil fuel.

Respondent: I don't think they've looked into it enough. Saying it's scientists, which scientists? Does it have to be a scientist? You get one scientist saying one thing, another scientist… so which scientists are we listening to? The risk assessors, is it their risk assessors, is it somebody else's? You could have two risk assessors and both will just contradict each other.

Respondent: So how do people feel when they see scientists disagreeing and there's uncertainty?

Respondent: They can make data say what they want it to say, on the whole, if they want to, they can make one set of data say that, and somebody else can make another set of data say that. So there's the reliability of that data, but I guess the worry would be contaminated water seeping into the outlets. How can you stop that?

Respondent: Even on the way back up, if you're getting leaks, it doesn't really matter how it gets into the water, you don't want it to… when we were down the pits, if they were saying that your coal was going to contaminate the water it would have been front page headlines, 'Coal Mines Contaminating Our Water'. So if this could contaminate the water that's coming out of your tap, on top of the fact that it might give earthquakes as well, I'm not a fan of it at all, to be honest.

Respondent: When we got the coal out of the ground we let the coal contaminate the atmosphere, didn't we, the same as the gas?

Respondent: Yeah, well coming out of your tap you don't want to be thinking, 'Has this water got methane gas?' Well, I certainly don't. I mean, I don't know how everyone feels but I feel like if it damages me fair enough, if it damages my kids then that, you know?

Respondent: I think it sounds a very exciting new industry, to be fair, and we're part of evolution, things have to change, new things come on board, and I think it's spot on.

Respondent: But is that, is there any risk? Can you drill through the water table?

Interviewer: Yeah.

Respondent: So how does that seal when you're drilling through it?

Interviewer: I don't know the technical process exactly, but the bit that goes through (inaudible 01:23:36) then they'll have concrete and steel, and maybe another layer of steel.

Respondent: I just see it like, you're getting all this information, you're going oh, that scientist this. If I said to you WMD, what does that mean to you?

Interviewer: Iraq?

Respondent: Yeah, and wow, we've got to get in there, kick their backsides.

Interviewer: They weren't scientists.

Respondent: It's the same thing.

Interviewer: But somebody in authority.

Respondent: A position of authority, experienced, everything, and we went down this route, and what did we find? Nothing. No evidence. There you go.

Respondent: But that was the same with the Falklands, we only went there because of the oil.

Respondent: What, when we went out there?

Respondent: We only went out there because they were only protecting the oil that's over there.

Respondent: I thought we were defending our country.

Respondent: No, if there hadn't been any oil there she wouldn't have gone in.

Interviewer: Bill, what do you reckon?

Respondent: If we've had the (inaudible 01:24:41) it might have been on one of these boards, it might have been that one, I can't see it that well. How long has it been going in Lancashire? How long has it been up and running now?

Interviewer: They've been there for three or four years. They voluntarily stopped it for a couple of years after those earthquakes.

Respondent: And how were people educated? Were people consulted on this before it took place? I'm quite surprised that this has been going for all this time, because, to be honest, I didn't know an awful lot about it. I knew that they'd had problems with this fracking but I was under the impression at the time that it was something new that they were trying. I didn't realise that it had been going for that amount of time.

Interviewer: So if it was coming to Nottinghamshire, you'd want a public consultation?

Respondent: Oh yeah.

Interviewer: If they're doing their risk assessments, what's not going to be on their risk assessment that you'd want to tell them?

Respondent: I'd want reassurances. I'd want to be absolutely sure that the water that I was drinking wouldn't be contaminated, that the air wasn't going to be contaminated. I'd want educating, I'd want to know what it was all about.

Interviewer: And if it was the company come around to do this?

Respondent: Once again, it comes back to money. You're going to hear it from their (inaudible 01:26:20) it will be biased, won't it? You'd want to hear the arguments, you'd want to see it from both sides. And I'd want assurances that it wasn't contaminated.

Respondent: The other thing is, if you had the same meeting with eight miners in Blackpool, as to those two earthquakes, they'd probably have a different opinion.

Interviewer: I'm going to Manchester tonight.

Respondent: Once you've had that earthquake I think you'd probably bring it home a little more and think, 'Well, hang on a minute, I'm not so sure about this if there are earthquakes.'

Respondent: How many of you people – we are all ex-miners – have had to live with subsidence?

Respondent: I have, I've had it at the back of my house.

Respondent: I have as well.

Respondent: We've lived with this, haven't we?

Respondent: Has there been any search done by any environmental group, such as Greenpeace?

Interviewer: Yeah, there were a couple.

Respondent: What have they said?

Interviewer: They're on the next board, there's a couple of them on the next board, so if we could just carry on and I'll get there.

Respondent: You can discuss this and you can say how much do you trust them and how much would you trust them, but if somebody came forward and said, "Right, we've got a town here with 10,000 people out of a job and we're going to give them all a job." Then there's arguments for and again once again, isn't there?

Interviewer: Because we were talking about what kind of factors you'd prioritise first, you know, price and that? Given that a the case, people were quite sceptical that prices would come down as a result of this, what do you think would persuade you, if anything, can you imagine?

Respondent: If I got the option of cheaper gas under those conditions I would say no, I'll pay what I'm paying now, because I'm just very anti that, very strongly. I don't think that's worth just saving a few, £10, £20 a month on your fuel. Because I think the potential of that could be quite bad, personally.

Respondent: I think if the risks are minimal, then I think it should go because it's creating jobs.

Respondent: That (inaudible 01:28:50) seem to be reinvesting in the community with the parts of this corporate social responsibility should go ahead.

Interviewer: So there's a bit of a difference of opinion in the room, I'm sensing. So, on the one hand, you've got precaution until we're certain or at least we have a degree of certainty that we're more happy you don't go there, versus you go for it and if these risks do even happen, in terms of water contamination, or if we carry on getting seismic events, then you reassess as you go, and see how bad that living with those risks are. So what side would people come down on? I know, Jack, you're maybe precaution?

Respondent: Well, setting fire to your water, to me that's way up, in terms of danger, that's way up somewhere that…

Respondent: The likelihood change, it's only happened once in America, just the once. The likelihood is…

Respondent: The likelihood is slim, but you think methane gas coming out of your water, that's gas.

Respondent: There would be the same risk that you'd (inaudible 01:30:03).

Respondent: It's that contamination.

Respondent: You've got a small amount of risk walking past a wind turbine and it falling on top of your head and chopping your head off.

Respondent: I would like to assume that, since that's happened in America, the lessons have been learnt.

Interviewer: Well, they don't know that it's happened. It's (inaudible 01:30:24) as to the cause.

Respondent: But surely that's then investing in a company.

Respondent: The company is always going to dispute it, because they don't want to get taken to court, do they?

Interviewer: We know we might get some conclusions in this report that comes out next year.

Respondent: I'm looking forward to that, yeah.

Interviewer: There are obviously…

Respondent: There's nothing without risk at all, is there? Nothing in this world. So it just depends what sort of risk you can live with, because everything has got a risk to it.

Respondent: You learn lessons from it, don't you? Okay, this is what happens, is there anything we can do about it? And that's priming.

Interviewer: So the board before with the benefits on it, do people think those benefits seem worth these risks?

Respondent: What sort of jobs does it create?

Interviewer: That's a question you'd have. What's the thought behind that question?

Respondent: There's obviously going to be a small risk, but I think for that small risk, I think the benefits outweigh the risks.

Respondent: It's not very labour intensive, is it? There's not going to be thousands of jobs with that. Extraction and building it…

Respondent: Be a drilling team, won't it, or something?

Respondent: And the people that make the tools and things, so there is a bit of a knock-on effect. Transport them and things like that.

Interviewer: What Cuadrilla are saying is – and they've got an interest, obviously – what they're saying is they want to turn Blackpool into the, kind of, Aberdeen of fracking. And Aberdeen with the North Sea Gas, obviously, that's a prosperous town with lots of jobs.

Respondent: I guess if you get cheaper fuel you're going to get cheaper manufacturers, it could have a knock-on and knock-on and knock-on.

Respondent: My point is, for the small amount of fracking you've done – very small amount – you've had two earthquakes, those size. If we go on the larger scale, aren't those earthquakes going to be more regular and bigger, maybe? I don't know.

Interviewer: There's an interesting point in there, because another one of the risks is scale of the risks for commercial operations. So for what's happened in America to have happened, in terms of prices and so on, there's thousands of wells. There's about three wells in Lancashire at the moment. So there need to be a lot of wells to see those benefits down there.

Respondent: But we do have tremors in this country, anyway, very minor ones, seismic. What will it look like, is it sticking out of the ground for miles or is it just like, you know, is it an eyesore or does it just blend into the environment, or what does it look like?

Respondent: Yeah, there is a… just a tower.

Respondent: Blackpool Tower.

Interviewer: So that question I asked before about they do a risk assessment and they come up with the answer that we can manage these risks, is there anything that you don't think would be on there that you want to say?

Respondent: That we don't want on there?

Interviewer: So the risk assessment is, basically, saying this is up to a level of safety that we accept. Is there anything beyond that that you think is important to address?

Respondent: Is it going to affect people where they live or are they going to be made to move out of their houses, or…?

Respondent: House prices.

Respondent: Do you know what I mean? If they want to do fracking, say, in the middle of a village or whatever.

Respondent: What about the environment? What affect will that have on the environment?

Respondent: Like wildlife do you mean, or…?

Respondent: Wildlife, anything. We need it.

Respondent: What about stuff to do with the kind of company and how many jobs there might be and whether they're high paid jobs will just be Americans come over and do them?

Interviewer: That wouldn't be in a risk assessment, but from what you've been saying earlier that would colour your view.

Respondent: We want jobs for our own people.

Respondent: Yeah, you're prepared to put up with the risk a little bit more if your community is going to benefit.

Respondent: They're being paid off, though, aren't they? We can give you a job but it's going to affect the town or whatever. I think you should take extreme caution about how you move forward on it.

Respondent: But it would give us jobs or would they start Poles and European neighbours start coming and pinching them.

Respondent: Yeah, it wouldn't necessarily give the British people jobs would it?

Respondent: (Inaudible 01:35:36).

Respondent: You can't just say it's going to give us, it's going to give Europe. They've all got free access.

Interviewer: I can tell them they going to have to add something.

(Laughing)

Respondent: I think as long as profits seem to be floating back into the economy of the local environment, it doesn't matter who the engineers are as long as the community is benefiting in some way.

Interviewer: So the government are talking about giving people that might have to live near these things incentives, or they're not flashing out details yet, but insurance and how they're sharing the profits. Some people are accusing them of, essentially, bribing. Not essentially.

Respondent: Well, it is a bribe, isn't it?

Interviewer: What do you think about that?

Respondent: I'm always open to a bribe.

(Laughing)

Respondent: I'm exactly the opposite, I'm never open to a bribe.

Respondent: Mind you, I think if you live next door to it you've probably less subsidence, because they're going to go out, aren't they, because they don't want their (inaudible 01:36:41) so they're going to go out before they explode it.

Interviewer: Who's going to really benefit from this and who's going to deal with the risks? Are they likely to be the same people?

Respondent: Shareholders, I guess, have been benefiting.

Interviewer: So you think they're predominately the ones that will see the profits?

Respondent: Yeah.

Respondent: If it's a success, like it probably will be, yeah.

Respondent: If they went to a village and said, "We're going to put a fracking tower up here and we're going to give you all £5,000 and we want you to vote," I think 95% would say no, personally. I don't think any cash incentive is going to make people agree to that.

Respondent: It does look pretty imposing, doesn't it, the tower there? People don't want windmills.

Respondent: You don't want a big, massive tower, and think they're drilling under your houses and there could be earthquakes, it could be affecting your water.

Respondent: You could see it on the horizon.

Respondent: Could you imagine going to Ed Johnson and saying, "We're putting one of them up on your golf course next to your house"?

Respondent: Exactly, yeah. Where would you put them up?

Respondent: Yeah, at least 400, 500 bars long.

Respondent: You'd need a lot of them where are you going to put them up?

Interviewer: I'm going to put the last board up (inaudible 01:37:56).

Respondent: I mean, there are about ten towers or something, I don't know. Nobody wants it on their own doorstep.

Respondent: If you're getting gas out of your tap, at least it's cheaper than your water.

(Laughing)

Interviewer: So, as I was saying, George Osborne was talking about this in the budget. Usually when he has a high profile speech to give he mentions Shell Gas. He says it's part of the future. What do people think about that? Can they see this being part of the future?

Respondent: It's an investment, probably, but it's just a disaster. There you go, no fracking, look, we're British.

Respondent: I just think if there's a profit to be made I don't think it would really make a difference what we think, I think they'll just go ahead and do it anyway. They're too powerful nowadays.

Respondent: Can't villagers get together and say we're not having any, like the guy there with the poster saying 'No Fracking'.

Respondent: Well, we can try.

Respondent: The villagers get together and say they don't want houses building but they still get built. Villagers get together and say we don't want wind farms, they still get built.

Respondent: Because it's just like big multi-national industries are just too powerful, they do what they like. They've a lot more in the pot.

Respondent: Look at BP, where they go round the world in these poor countries and taking all their resources.

Interviewer: So does everybody agree that it seems inevitable that certain people want it to happen so it just will happen, regardless of what local people will say?

Respondent: It's the nature of things, isn't it?

Respondent: It's like, money controls it.

Respondent: The application for planning will be stuck in some filing cabinet in a cloakroom in the darkest suburbs of somewhere else.

Respondent: And then they'll all fly off together in their helicopters.

Interviewer: That's, kind of, a fatalistic approach.

Respondent: I think it's true. It's how they play it.

Respondent: It's how the UK has been going now, hasn't it, for ten years, 20 years?

Interviewer: So who do you think will decide about this? Not ordinary people, by the sounds of it.

Respondent: The government.

Respondent: They'll justify it by saying that the other gas is running out and we've got to have this.

Respondent: But we always bow down to the Americans, don't we? We always have done. In the last few years we have, anyway.

Respondent: Some assurances from these equity companies. If you let us do this in the UK we'll give you so many millions or billions towards whatever, and then it will be an incentive to the government to allow it to go ahead, and it could also be that incentive, right, you let us do this in your country, we'll let your English company do this in…

Respondent: Deals, deals, deals, yeah.

Interviewer: That's interesting.

Respondent: So is this happening in France, Germany, or just…?

France have put a moratorium on it, it's temporarily banned in France whilst they gather evidence.

Respondent: Germany?

Interviewer: I think some of the states of Germany, some areas have banned it, as has happened in the United States.

Respondent: You see, that might tell you that their scientists are probably better than ours and perhaps something also that (inaudible 01:41:22).

Interviewer: I think they favoured precaution over…

Respondent: I think we need more research.

Respondent: It sounds like it, doesn't it?

Respondent: Look into it more.

Respondent: Are they not as worried about resources running out?

Interviewer: I guess the context for each country is different. France has a lot of nuclear power, so maybe it feels secure in that. Poland are going for this quite a lot. They're meant to be one of the European countries that really goes for it. (Inaudible 01:42:02).

Respondent: (inaudible 01:42:03)

Interviewer: People are arguing that's because they're dependant on gas bought from Russia and they'd, kind of, like, not to be.

Respondent: There must be a lot of politics there, isn't there?

Interviewer: There is politics. Do you see this as being a political issue, because when I was talking about the risk assessment before, obviously, none of this politics is going to make its way onto that decision making process. Do people see politics in this?

Respondent: Yeah.

Respondent: Well of course I do, because Russia can just turn the tap off, can't it, so… they have done in the past. So you don't want to be dependent on somebody else, do you? You want to be independent. And if you've got the resources there that you could be independent you're going to do it.

Respondent: I just think if France have banned this, then it's an extra piece of caution to me that there's something…

Respondent: They've not banned it, but they've stopped while they're waiting on certain conditions.

Interviewer: Yeah.

Respondent: Did you say for two years or something?

Interviewer: Two years. I think, actually, the wording is they've banned it until they can be certain about (inaudible 01:43:12).

Respondent: They'll wait and see what happens here.

(Laughing)

Respondent: Or we can be down Dover and put the pipe across the channel and start before them.

Respondent: That's the right approach in planning, until you're sure. If you're not sure then I don't think you go ahead, personally.

Interviewer: What about climate change? Is that going to affect how people think about this?

Respondent: No.

Respondent: If it's going to make things warmer I'm all for it.

(Laughing)

Respondent: But climate change might change where the Gulf Stream goes so it could make it colder.

Respondent: I don't want it colder.

Respondent: That's quite interesting, borders, because if you've just said by Dover, it's only 35 miles across. We don't know how horizontally so far this goes up, so could it go up?

Interviewer: It won't go that distance, I wouldn't have thought, no.

Respondent: But what about Germany and France on the border? If perhaps Germany goes for it and France doesn't. And Poland and Germany.

Interviewer: Another point is that if the price of gas falls because there's all of this extra gas sloshing around in the system, depending on your tax regime and your regulation, this might not stay feasible. If America does it and Poland does it and we don't, the price of gas could fall and then our share isn't economically attractive anymore.

Respondent: So you're saying we've got to get in from the start, is that what you're saying?

Interviewer: I'm not saying that, but some people might argue that.

Respondent: It's quite (inaudible 01:44:55) that we're surrounded by the sea and struggle for energy.

Respondent: You've quoted the Deutsche Bank there saying that, 'Those waiting for a shale gas revolution outside the US will likely be disappointed in terms of price and the speed at which production can be achieved.'

Respondent: I can see that.

Interviewer: Jack has read it out for us.

Respondent: Yeah, it might just be, like I said, political, I don't know, it's cheaper gas and how it works it to try and get your gas prices down, so it could be…

Interviewer: What do others think about this Deutsche Bank quote, then? They're saying that in Europe, including here, this isn't going to happen as quickly or to as much of an extent as it has in the United States.

Respondent: Why are they saying that?

Respondent: Why would they say that to us?

Interviewer: They're saying that because they have the infrastructure and a lot of the expertise in place already in America. They've got a different tax system that tends to be lower on this sort of thing. Maybe heard there's likely to be more opposition at the planning phase and slow things down that way.

Respondent: So we were right then, we're not going to get cheaper gas rates.

Interviewer: Regulation is likely to be tighter here. Also, mineral rights laws in America and the landowner on the surface, you lease the land off them, and then you can go for the… but here it's the Crown, so it's more complicated.

Respondent: Having read that quote, you'd think it's just not worth the risk then. It's just worth it if it's not going to be that productive and it's not going to be that much cheaper why do it?

Interviewer: So you'd need persuading that these benefits are actually going to arise before you could back us?

Respondent: Yeah.

Respondent: It's not going to create thousands of jobs, it's not like the pits is it? It's not going to create thousands of jobs, it's just a few.

Interviewer: It depends. Commercially, with lots and lots of wells. And then I suppose the argument is the knock-on effect of that, and the machine for gas, maybe.

Respondent: Well if the stills are not being manufactured over here, surely it would be cheaper to manufacture it over here than be sent from America, I would have thought. I don't know.

Respondent: They're on a win, win aren't they, then? They're going to create loads of jobs which will boost the economy and then get brownie points towards the election for (inaudible 01:47:27) I suppose.

Respondent: Is there any on the east coast at all? Because the east coast is eroded quite badly anyway, isn't it? So if this is going to happen would that escalate that?

Interviewer: I don't know about the east coast. I knows there's bits dotted around Nottinghamshire. People are looking into it down in Sussex, Somerset, Forth of Firth up in Scotland, South Wales, and Lancashire is the first place people are going in the UK.

Respondent: Can't you do it under the sea, or is that a stupid question?

Interviewer: Somebody asked this question before, and the answer is there probably is shale under the sea. People haven't necessarily mapped it like we have on land, but maybe that's an additional cost that means it might not be commercially viable.

Respondent: But there's not so many risks.

Interviewer: Well, what do you think of this, because America's got a lot of history of drilling gas onshore? We've got a history of coal, onshore obviously, but for us gas is this thing in the North Sea.

Respondent: They've got the space to drill, relatively speaking, that's a town and then they've got all that space where we haven't, have we? So you're going to affect towns and villages and people are going to be unhappy, whereas in America if you see one of those towers going up in the middle of 50 square metres of land, it's not so intrusive.

Interviewer: Someone was asking about the climate change research, but people have looked into this. The Tyndall Centre is a climate change research centre at Manchester University, and they've got this argument that, first of all, depending on they have huge remissions, which is gas escapes in the process that wasn't supposed to. The idea is there's always going to be some of that with this type of process, but you can get it down to a reasonable level that means it's only going to be slightly worse than natural gas from conventional sources. And I know that we've been talking about before, but probably better than coal. So a lot of people that say this can fit any with responding to climate change, it can be this transitional fuel from coal to this, and it can also be this baseway(?) fuel, which is the continuous supply you have underneath your renewables for when the sun isn't shining and the wind isn't blowing, peak times and stuff like that. But the Tyndall Centre don't think there's enough time between now and 2050, which is seen as the date to act by it, we're going to prevent the worst consequences of climate change, keep it to a 2 degree sea rise. Because between now and then there's not that many decades left to get an industry up and running, turn the taps on, get the gas flowing, and then transition from that again. And they're saying it could end up being economically unwise, because if we give this a generous tax regime to get the industries going and we focus on this rather than renewables, when we eventually have to shift from this we will have done the research into making better wind turbines, better solar panels. What do people make of that argument?

Respondent: You can never have gas as a renewable, can you?

Interviewer: No.

Respondent: To me, it intrigues me when the gas comes from other countries here, is that from underground or is that from fracking or what?

Interviewer: We haven't had any fracked gas in this country yet.

Respondent: So it's all from where?

Interviewer: North Sea, but then, if we have to, Norway and Russia, we import it from Qatar, I think, as liquid. They were talking over the weekend of turning on a pipe programme between here and Europe and those conditions they were talking about emersions going up from the European infrastructure that comes from Eastern Europe and Norway.

Respondent: But whatever happens, it's going to run out isn't it?

Interviewer: Eventually, but people (inaudible 01:51:52) key production, you hear that you're getting as much fossil fuels out of the ground as you're going to get and then, from that point, there's less and less and less. So a lot of people were thinking that we were about to hit peak production, but this could push that back by a century, say. How do people feel towards that?

Respondent: Why could it push it back by a century?

Interviewer: Because there's all this new resource that we couldn't get before and now we can get.

Respondent: And you know the question you said before, were you saying that there's not enough time… if we focus on this for 20 years, there's not enough time then to switch back to renewables? Are you saying this is going to push back the renewable research?

Interviewer: That's what the Tyndall Centre are arguing, and they're saying, like Deutsche Bank said, it will be slower here than it was in America. And if it takes 20 years, say.

Respondent: So they're arguing there's no point so just focus on the renewables?

Interviewer: That's their argument, yeah. What about this idea of if we went for this and then we decided that by 2050 we'll tone it down to 20% or whatever, and that will be a, kind of, background fuel with a bit of nuclear and the rest renewables, and there hadn't been any earthquakes, any ground water contamination, are we really going to lower how much we're getting out of the ground if there's still plenty there?

Respondent: Well no, if there's no risk, no earthquakes or that, we're going to keep getting it out, but, like we said at the start of this, there's always… you don't rely on one energy, you're always wanting more from all sources. So I don't think that will ever stop developing just because we've got on this… we'll still develop all our energies.

Respondent: Profits from these companies should be forced to invest in other forms of renewable energy for when this runs out.

Interviewer: So that five, 6 billion windfall somehow should be going into…?

Respondent: Well, if they've got any sense they would know, wouldn't they?

Respondent: A certain amount, a percentage of that into the communal rural funding(?).

Interviewer: That answers the NGOs who were saying what if investment in renewables falls because of this, that's a way of answering that.

Respondent: Why couldn't you go into the future with just all electric, no gas at all?

Interviewer: The question is where you get the electricity from, because about 40% of our electricity comes from gas at the moment.

Respondent: From gas fired power stations?

Interviewer: Yeah, 40%.

Respondent: That's going to drop, isn't it, if we take more from the sun?

Interviewer: I think I will just tell you a little bit about my research now, and then you can all go off into the night. Thanks very much for coming, I know getting here is a bit of a pain, and giving up the evening. I'm looking into hydraulic fracturing, basically, and there's a lot of interest in it at the moment, there's about a new story a day, and whatever I wrote last January is now a bit out of date, because a lot of universities want to get something out about this because it's rising up the agenda and people see it as a big issue. So I'm doing six of these, this is the fourth one and, as I say, I'm going to Lancashire tomorrow. I'm interested in people's opinions about this, basically, and I think…

Respondent: What's been the consensus over the four groups, for or against?

Interviewer: Different groups have gone in different ways. So up in Newcastle we had some allotment owners and they were similar, in a way, to you guys. They were really concerned about price and they were going on about the energy industry, but they could see themselves going for this, because of some of the benefits. Then we had mothers with young children and we spoke to them because we thought they think

about the future a lot, so whether that's we want jobs in this country or whether that's we want a good environment for our children. And they were quite scared by it, they were pretty anti it. And then, in Nottingham we did members of a history society interested in industrial history, and we were interested in, we thought they might have the stats of our history of burning fossil fuels and this developing, and this idea of science in Victorian times is for the public good. And we thought they'd have interesting stats and, again, a lot of them were persuaded by politics of climate change, and so they thought it doesn't really matter if the risks are true or not because, at the end of the day, it's methane, it's a greenhouse gas, so that was where the argument began and ended with them, really. And so there's this idea that this is going to be decided by politicians and scientists, and I think there's a lot of uncertainty. And I think when you have uncertainty like this it can't just be determined by the science, because there aren't actually that many facts around yet. There might be in ten years. It might prove to be really difficult now.

Respondent: I don't think there's enough information for me on this.

Interviewer: That's why I'm doing the research.

Respondent: It should be on the backburner for ten years then, until there is.

Interviewer: Yeah, and I think people should be asked, because I think it could have big implications for the future, but I'm going to see what people say, of course. I've got two more groups to do and then I'm going to analyse that and see what I've got. But I think they've all been really interesting so thanks a lot. I'll be writing a thesis about this, so if you're interested in – I won't bore you with the whole 30,000 words – but if you want me to email you a summary of that, there's no obligation, you don't have to…

Respondent: Yeah, definitely.

Interviewer: If I put a pad on there and if on your way out you could jot down an email address, and if you don't have an email address you could jot down an address and we can do it the old fashioned way.

Respondent: Can I say one final thing on this? You're going to write, for example, we go to Skegness regularly in the summer, you know Skegness, a two hour drive to the east coast. Would you want to be driving along and see probably 100 of those towers as you went along? I just wouldn't want to, I think it would ruin the whole country, I'm so anti it, I feel so strongly. It would ruin the whole…

Interviewer: With energy there's not much that doesn't have some sort of a visual impact, whether it's wind turbines or power stations or pylons.

Respondent: What's your personal opinion on it? What do you think of it?

Interviewer: I think for me, personally, I think it comes down to how it fits in with this. So if it can be this transitional fuel and replace coal and if we're sure that it's better than coal, and we'd have to be sure about that and we'd have to think about who's proving that and do we believe them and things like that. Because I suppose I'm a social scientist, so I'm not a geologist or a climate change scientist or an engineer. But I think if there are guarantees from the government that somehow there are mechanisms to make sure it does actually happen and that it's not short term and they don't just renege on their promises. If they can play the role, improve things a bit and then be improved upon again in the future, I could go with that, but I'd be very sceptical as to whether we actually would turn the taps off, if you like, and say

no, now is the time that we're going to change. I think it could be one of those things where they just put things off and off and off.

Respondent: What will your research feed into then, Lawrence?

Interviewer: That's a good question. So I'll write a general article paper, so that will be peer reviewed by other academics, and that will be published and form part of the debate about this, and hopefully people will read that. There's also a wider group of researchers at Durham University and all around the world increasingly looking into this. And I know at Durham they're getting funding to do a big Europe wide consortium of researchers into the geology and social side of this. So people are looking into this, but it's taken us a while to catch up, which is often the case with technology. Because it happens then we realise it's happened and you've got to say well, what does this mean, what's going to happen? But that's the way forward I guess.

Respondent: So who's funding you?

Interviewer: I have funding from an institute called the Durham Energy Institute, which is a research institute attached to the geology department at Durham, so precisely where they got their money that they gave me I don't know exactly, but what I do know is they do get a proportion of funding from the fossil fuel industries. And I'm perfectly happy to be banked by that. I don't report to that, I report to Durham but that's the case, and if someone asks me I'd better tell them the truth. I don't know if it has come from that pot of money.

Respondent: So is an environmental group already looking into this as well? Greenpeace, for example?

Interviewer: Yeah, they've all got their lines on this, as to specific studies from NGOs, I'm not sure exactly. I know that there will be stuff out there publically available on the internet, but everybody's going to get something out on this over the next few years.

[End of Transcript]

Appendix 3.5 – Transcript Group 5: Lancashire Wildlife Trust group

Interviewer: So this is the fifth of six of these groups I'm doing. I'm Lawrence, by the way, I think I met most of you when you came in. I'm doing a Masters by research at Durham University, and so I'm doing six focus groups about issues surrounding energy and climate change, and that's what my research is about. So this group is a bit of a departure from a lot of the other groups I've done. A lot of the other groups I've done, you'd maybe describe it as, well, the literature calls it lay people, I think that sounds old fashioned, but non-experts, members of the public. And so in this group tonight I'm anticipating that the issues we're talking about there might be a mix of people here who know as much, if not more than me, and some people who are not as clued up as that, necessarily, on the technical side of things in particular. But that doesn't really matter, I'm a social scientist in training, so it's really people's opinions and views that I'm interested in, rather than going off facts and figures. What I would also just say is that I'm interested in your personal opinions rather than representing institutions. And I'll have some boards with information on that we'll start using about half way through, and we'll start talking quite vaguely. And just because this was designed to take up the public I don't want anyone to feel patronised if it seems a bit simple, but it's just people's impressions and opinions. There's, obviously, no right or wrong answer. So if I could just start by asking a really vague and maybe annoying question, and if we could maybe just go round clockwise with you Chris. When I say energy what pops into your mind?

Respondent: Supply of resources, power.

Interviewer: Okay, Julie, how about you?

Respondent: Generation and lack of policy.

Interviewer: That's interesting, Steve?

Respondent: Limited resources.

Respondent: Ways of harnessing it and transferring it sufficiently.

Respondent: I think renewables I think about.

Respondent: At the moment I think about we're being held over a barrel by the energy companies.

Interviewer: That's interesting, that comes up a lot. So is that something that others would agree with?

All: Yes.

Interviewer: What makes you say that?

Respondent: Because I've just got a gas bill.

(Laughing)

Respondent: It's about £200 above what we normally pay, so they seem to be really rising. They're basically taking the mickey at the moment.

Interviewer: So, in terms of being a consumer, do you feel powerful as a consumer? You're suggesting that you feel powerless?

Respondent: I don't feel powerful at all, no.

Interviewer: Sorry to hone in on what you're saying, other people's answers didn't receive as much scrutiny, but it's because…

Respondent: It's just wrong.

Interviewer: So ordinarily in a marketplace – because people talk about this a lot – so if everyone was so unhappy about something they take their custom elsewhere, but there's something about the energy industry where it doesn't seem to pan out like that.

Respondent: You do try, you can surf the internet for alternatives, but there doesn't seem to be a sensible alternative. And whereas I'd like to look for a green alternative, at the moment it's not necessarily possible for me to go for that.

Interviewer: So I think there's two interesting… the first is do other people search around for best deals, like so many people do?

Respondent: I've done collective switching which I think is becoming more common.

Interviewer: Can you explain that?

Respondent: I did subscribe to Which magazine and they offered, you didn't have to be a subscriber but they tried to get a certain number of people such that they could go to the power companies and negotiate so that, collectively, you got a better deal. And I know in Lancashire a lot of the local authorities are doing this. So say if you live in Chorley, Blackpool or Fylde, on their websites they're offering what I think is a similar offer. So trying to get a critical number of residents and then they try and negotiate a better deal.

Interviewer: So that's a way of trying to introduce a degree of consumer power?

Respondent: It's very hard to do on your own, but if you get a critical mass of people, then it might be possible to achieve a better deal or better terms.

Interviewer: So the idea that if you want a specific type of energy, say, from a specific source or a group of sources of renewable energy, there's no company… the product just doesn't work like that, you're saying that was impossible. And so if that was possible…?

Respondent: Well, I'm a bit, actually, worried about the focus on cost of energy because it actually moves you away from choice about different sources of energy, different types of energy and, indeed, behaviour of the supplier. Whether they're an ethical provider and stuff like that. There was at one time much more different choices from different suppliers. They were all trying to suggest green tariffs or whatever and actually they've more or less vanished now. There's a requirement, I think, for them to provide so much renewable energy and they just do that, they're not trying to make a benefit out of it anymore. But there are one or two tucked away there, who are actually trying to provide the whole of their energy as being a more sustainable course of energy. And this focus on the cost would move you away from that, and that's what worries me.

Interviewer: And does this focus on cost? Because when I've been around the country cost always comes up and it's usually key.

Respondent: We can't get away from cost, obviously, no.

Respondent: It's increasingly put up.

Respondent: As costs rise, that is going to be the selling factor, because people have a choice.

Interviewer: Do other people share this anxiety about the cost being the decision making logic?

Respondent: Yeah, because if it was all within a reasonable price, then you would go for the one that you felt… well, I'm sure people would go for the one that was more ethically up their street, and they might actually look more into the roles of production and that stuff, but if it's expensive and getting to the point where you can't afford it, then you would go for the cheaper option because that's what you can afford. So then you end up not being able to have the choices about why you're going for it so much. It's about how much it costs.

Respondent: The majority of the people in this country, they have got gas because that's all they can afford. So again, those companies that offer the cheapest electricity and gas are the companies that are going to have the most power, so they don't have to even consider the green arguments, which we'd all like to.

Respondent: I don't think there's enough known about it anyway, generally. I know there's energy and efficiency and thinking of the environment is important, but I don't think that it's widely available enough for people to look into. You have to want to look into it to be able to know about it, whereas Joe Bloggs wouldn't necessarily think to look into all these different things, so why bother? Not that I'm saying that (inaudible 00:11:15).

Respondent: I find it very scary, Julie made the point about the sustainability nature of it and that really scares me that we're so tied up in all these arguments about price and companies ripping us off and things, and to me it's getting away from the key problem, which is we're so horribly inefficient with our energy use. And there is another way, and that's to invest heavily in energy conservation and look at the ways we do things so that we're not producing so much and using so much unnecessarily. We're squandering a very finite resource, which is forcing us even more into a corner, so I find the whole thing very scary.

Respondent: I agree with you, but you could argue that if we rush headlong towards Armageddon, the end of the finite resources, it means that we've got to put more effort now into developing future fuel, alternatives. If we scrimp and save, then we're putting off the inevitable, aren't we?

(Overspeaking)

Respondent: I do agree, exactly.

Respondent: Well, I think it's been deferred by looking at things that would have previously been perhaps not able to be exploited, like, shale gas. That would have been written off because it was uneconomic, but now it's being considered very seriously.

Respondent: But they do have alternatives for the (inaudible 00:12:34) carbon stuff that they don't necessarily make available readily because they want you to pay these big companies for fuel so it's not that they can't do it, they just choose to hide it away and not let you…

Interviewer: So, Lynne, who do you think 'they' is in that connotation?

Respondent: Well, I'd say mainly these big companies, but I'm sure government is involved in it, but the major distributors of oil and stuff like that. I know years ago there was a guy who developed a water powered car, very environmentally friendly, but the design he'd sold to one of these big companies and then he wasn't allowed to produce it. So they should be there and now it's not being used.

Respondent: Well, it will only make problems.

Respondent: Yeah, buying it for the purpose of not using it, exactly. That's right, they, the conspirators.

Respondent: Also being a member of the press, I understand that there's a lot of misinformation out there as well, and a lot of it is, as far as I'm concerned, I personally think it's fuelled by the big companies to make sure people don't look at renewable energy and don't look at water powered cars seriously, they treat it as a joke.

Respondent: There's a lot of vested interests aren't there?

Respondent: Yeah.

Respondent: The (inaudible 00:13:47) club is one of the biggest in the country. They're saying that we all (inaudible 00:13:52) industry, you're talking of multi-national global companies and they've got a lot of power been put into media (inaudible 00:13:59) and social, it's hard to counter that.

Respondent: A lot of it's not government owned now, anyway, is it? A lot has got sold out to other organisations in other countries and stuff, so they have even less, in this country, even less of a say than if it's kept a bit more in-house as well.

Interviewer: So there's a lot of interesting ideas in there. So there's a lot of constraints to the change that I'm sensing a lot of people would like to see, and one of them is its incumbent interests and so on. Another slightly simplistic question, but who decides where we go on this, sort of, matter? Where do you think the power lies? We've already had some ideas that say we're losing industry and government.

Respondent: The power must lie, ultimately, with government, in their legislation. They set the initial strategy, don't they, and they set their legislation around it and things on carbon emissions and so on, so they're all tied together. So if you have got a viable strategy, which I don't think we have, then they are the ones who are responsible for implementing it. Everybody else then makes the best of it. To be fair to the big energy companies, the price of energy was always going to go up as sources of energy become harder to come by. That's not their fault, it's not a conspiracy that that's happened. And, in a sense, it reflects the environmental damage done, and that's why, as we move towards other sources, energy in general becomes more expensive and, in a sense, that's a good thing because it sends a signal back that energy is a scarce commodity.

Interviewer: I was going to say, do people think energy should be more expensive?

Respondent: If we're going back to the cost of it, I think it goes back to the government again. I don't think as a regulator it's strong enough to stop these energy companies raising the prices to whatever price they want. I don't think the price of energy is an accurate figure of what they should be charging at the moment. I think, basically, it's very profit driven.

Respondent: Especially when they say, "We're hit by the recession. We only made 2 billion this year, 2.5 billion last year." They still make a massive profit, don't they?

Respondent: You have to segregate the context of disposable income as well, don't you? Because if you go back hundreds of years ago there was less disposable income and so the cost of things was probably relative to the day even more that the cost of things today.

Respondent: I thought it was different, though, in that people are more and more, families and individuals would feel poverty now, in the income available to them, more of it is going on…

Respondent: Yeah, but when was that set out? It's 10% isn't it?

Respondent: I don't know what the actual percentages are.

Respondent: It's 10% off, yeah.

Respondent: It's actually quite a relatively small amount, perhaps you could argue, compared to there was a lack of disposable income at some point. It's the modern thing, isn't it, disposable income?

Respondent: Yeah, but the whole energy situation has changed now, that I'm not sure when you're looking back to. I'm just thinking that central heating is fairly common and all sorts of appliances, certainly in this country, the lifestyle has changed hugely. And what you would have regarded as a luxury is now regarded as an essential.

Respondent: Our expectations have gone up, so you expect the house to be warm all the time, you don't expect to go into a cold house and maybe make a fire in one room.

Respondent: Press a button.

Respondent: Yes, it's all relative to our expectations.

Respondent: But people, I think, ought to be able to live in dry, warm houses.

Respondent: Yes, of course they should.

Respondent: But people go much more beyond that, don't they? It's ridiculous and I get so frustrated when I see a little green light on the computer when everything's turned off and there's a little green light in the room. And there's all these little bits that just get left on all the time, microwaves and things like that. They just get left on and that's not keeping you warm at night, that's just because you're lazy and can't be bothered turning it off, or because you don't think that it's important enough or you've not necessarily thought about it at all, but all those little things, the majority of people don't do, and that goes towards your costs being higher anyway.

Interviewer: Do you think lowering consumption is an individual responsibility?

Respondent: Well, you can't force other people to do it, but I guess it should be the government's responsibility to make people more aware of it but, at the end of the day, you're responsible for your own energy consumption, aren't you? But then, I think if everybody's energy consumption went down the prices would carry on going up because then the companies would want to make up that difference of loss of profits, I think. I don't think you could.

Respondent: But again, there wouldn't be any government regulator to actually say you're doing wrong. There isn't one. They don't do it.

Respondent: There's an energy regulator.

Respondent: Yeah, but they don't do it.

Respondent: Well there's a regulator, but has the regulator got any teeth or power?

Respondent: That's what I'm saying.

Respondent: Is it effective?

Respondent: They don't have any say whatsoever.

Respondent: Make recommendations that (inaudible 00:20:09).

Interviewer: So what were you going to say, Julie?

Respondent: Just to pick up your point as a design issue, as well, in principle, it's really hard to buy almost anything that's electronic now without it coming with a remote control device. Just really daft things, you think, 'Why on earth have I got a remote control for this?' You go out and buy batteries and no one uses it and, again, it's (inaudible 00:20:30).

Respondent: So you don't have to get off the settee to turn something on.

Respondent: Yes. So there's things that could be designed out of the system, but I think that's a manufacturers…

Respondent: Yeah, but manufacturers are led by consumers aren't they, surely? And so that's what consumers want.

Respondent: Well, I partly agree, but I think there's something of oh, well I've got it, I'll use it, but I didn't actually want it, I didn't ask for it. If I didn't have it I wouldn't be particularly bothered.

Interviewer: That's goes a bit back to this argument of consumers having the power to change things by saying we want this sort of thing, rather than that sort of thing.

Respondent: You need to do it en mass though, don't you?

Respondent: Look at the standards for washing machines and things. The energy efficiency of all these devices has massively improved, but many more people have got one and they're much more affordable, so the two things balance out. It's the same with water. They all use much less water, but more people have it, and so they are much more energy efficient than they used to be, and there is the pressure which, presumably, was imposed to publish what band they're in and so on and so on. So people do know what they're buying and there is some peer pressure to produce a reasonably, particularly you don't want to be in the red line when selling an appliance. So there is pressure to keep them more efficient.

Respondent: I think there is a cause and effect thing between consumers and suppliers.

Respondent: I think if there wasn't a single standby device anywhere and everybody abolished hand held devices, we'd still have enormous problems with energy and lots of difficult choices to make. So we can't pretend that by fiddling round the edges

we're going to resolve the problems of where our energy is going to come from and how much it's going to cost. And those are the reasons.

Interviewer: Well, in terms of where our energy is going to come from, if I steer the discussion more in that direction, where do people think our energy will come from? Let's say an arbitrary take on it, between now and 2050 what's going to change? Well, 2050 isn't that arbitrary, actually.

Respondent: More nuclear.

Respondent: I quite agree.

Respondent: Just go nuclear, because that's the most efficient, cost-effective… well, not the most cost effective, but it's mass…

Respondent: It's the fastest way to generate what you use.

Respondent: It's the fastest way that you can get huge capacities. One nuclear power station is equivalent to probably all the wind turbines along the whole spine of the Pennines. You just can't get that capacity for consumables(?).

Respondent: Are there not still viable quantities of coal and that to be extracted but with greater efficiency, new burn technology and all the rest of it?

Respondent: Yeah, coming up with a friend of ours, he works in…

Respondent: I can see that carried on.

Respondent: He works for mining equipment and electronics and stuff. He says there's 400 years of doable coal under our feet.

Interviewer: I was talking to ex coal miners last night, and they said they certainly think there's plenty of coal still there.

Respondent: The technology is there for clean burner coal, carbon capture, it's just the cost. Is the cost of having a nuclear power station, is the environmental cost of that got to be weighed up against the carbon capture and the clean burn coal.

Respondent: But we've missed the boat haven't we? We've just pratted about, pretended to be (inaudible 00:24:36).

Respondent: People are absolutely terrified of it, though, aren't they, because of the scare stories?

Interviewer: Of nuclear?

Respondent: Yeah.

Interviewer: It depends where you go. Interestingly, we do quite a lot of work in Heysham(?) as you know, and the people around there… I went to a public meeting and the meeting was overwhelmingly in favour of new build nuclear power, because they got so used to it and, in a way, have grown their trust in it. So I think it will vary hugely, depending on where you are.

Respondent: I work for a couple of years in Barrow-in-Furness, and it was very pro-nuclear. But the rest of the country would turn round and say, "Well, you're not putting that in my back yard." That's the problem we're having with fracking at the moment.

It's nothing to do with environmental concerns, it's to do with, "I don't want this next to my house."

Respondent: Yeah, but they're going to have to have nuclear if they want it in Barrow but not is Sussex.

Respondent: Yeah.

Respondent: But in reality, most new nuclears are going to be near existing nuclear.

Respondent: Well then it will probably be accepted with open arms in those areas.

Respondent: (Inaudible 00:25:38)

Interviewer: I asked you where you think we'll get our power from, rather than where you think we should get our power from.

Respondent: I think we'll have shale gas. It's clearly coming. So we'll have a balance, but we'll definitely have shale gas in the mix, I think. I think we might have some coal, so we'll carry on keeping our options open, if you like, so that as the new technologies come along stream, I don't think we've actually got any power stations with carbon capture yet have we?

Respondent: No.

Respondent: There might be a pilot, but we haven't actually got one yet.

Respondent: Isn't there a huge government cash incentive for a company literally to be develop functioning carbon capture and storage?

Respondent: People put forward that plant in Ayrshire, and then withdrew it because they couldn't make it work financially, so it obviously isn't that good an incentive.

Interviewer: I sense that was what we thought will happen, but what do you think should happen? Is that a company that you (inaudible 00:26:58).

Respondent: Well, it should happen. I'm not even sure if there are any viable, nice options. So obviously, what should happen is that we should have a carbon free energy solution, but it's a lot easier said than done. And the trust itself has found itself in a bit of a cleft stick by promoting renewable energy as being the answer to climate change in one place, and vigorously opposing numerous renewable schemes in another. Because, when it comes down to it, they come up and a wind farm on a peat moor, a barrage in an estuary, it can be extremely damaging. So there are no easy answers. And we actually had a workshop on this at the last volunteer conference – it was a year ago now – and, in fact, of the options there there was a tendency to move towards nuclear option, just because it was the only one that offered the security and it was a known quantity, if you like.

Interviewer: So the lesser of a group of evils?

Respondent: Yes.

Interviewer: What are other people's ideas on that same question? Which do you find most powerful?

Respondent: I think we're too fixated on big energy projects. I'd like to see much more around decentralisation energy supply, so that local communities could generate their own

energy, in different ways, small implemented schemes. But you first have to focus on reducing energy use. I think instead of government policy which is all about generation, I think we want reduction.

Respondent: I suppose if it was local there would be more incentive for them to reduce it.

Respondent: Yeah, absolutely. You're more likely to welcome something into your area if you're then using that energy or getting some feedback from it.

Respondent: Well governments have to think at national level, don't they? So they can't really (inaudible 00:29:19).

Respondent: No, but they can put the framework in place that encourages decentralising. If you have smaller combined impounds, something new (inaudible 00:29:29). None of that has been brought in or has been encouraged in the planning (inaudible 00:29:33)is a shame.

Respondent: But how big is the community?

Respondent: Potentially I would imagine it would be pretty impressive combining a power plant for the whole of London(?).

Respondent: There are at least transitional towns.

Respondent: I think Brixton is one, for instance, in London, where they try and look at this thing on a community level, but there's issues with where the community contends, so they may be doing things in Brixton like, that, but not necessarily power generation.

Respondent: The problem with big schemes is you waste so much energy moving energy from one place to another. From a physics point of view it's a nonsensical process.

Respondent: What's that, 10% is it?

Respondent: Yeah.

Respondent: We don't lose 10% in all distribution, we lose maybe 30 or 40% in some cases.

Interviewer: That works much better with renewables…

Respondent: Coal fire, heat going out the chimney.

Interviewer: Because fossil fuels tend to be in one place and then you have to get them from that place, whereas renewables tend to be everywhere and you're focussed on them. So what about other ideas about what should happen, and then maybe versus what you think will happen?

Respondent: I don't know much about them, but is there not energy from hydrothermal vents and stuff like that, that can be used? I don't really know much about them.

Respondent: I've heard of them trying it like that in Cornwall, I don't know that's being seen as a big answer. I know and Norway do, but…

Respondent: Do you mean ground source heat pumps, or…?

Respondent: I just remember reading there was something about a heat source from underground, so they'd got these pipes that were warmed up and, as a result, they

generate through that way. And I don't really know whether we have much of that underground that we do that with. I don't know enough about it, but from what I remember reading I just thought, 'Oh that seems quite sensible, but it would be a lot of investment, I think, in actually setting it all up, and I don't think people are around long enough to want to bother with a really, really long-term solution that they might learn from. But I don't know enough about it, though.

Interviewer: Can people see 100% renewable?

Respondent: Not really, no.

Interviewer: Because it just won't happen or because it's impossible?

Respondent: I don't think it's possible, is it?

Respondent: I think we've got to the position where we're so over populous in this country that it's just unachievable, and way beyond in relation to carry capacity for this tiny island.

Interviewer: So you'd have to have a constant supply of something underneath, supplementing it?

Respondent: A backup.

Interviewer: So I'm getting the impression that nuclear is maybe the monster that you might have to embrace. Some of you (inaudible 00:32:34) about shale gas as well, actually. So if there was a choice, say, between nuclear and fossil fuels, however gotten at, what side would people be falling down on?

Respondent: Fossil fuels with or without carbon capture?

Interviewer: That would determine your answer, whether or not that technology gets there?

Respondent: Yeah. I think if there were fossil fuels with guaranteed carbon capture, then it would certainly bear close scrutiny, wouldn't it? Although provided you're happy with the way the carbon is being stored and whether, actually, that's just another time bomb that will eventually go off when it all suddenly gets released out into the atmosphere and chokes us all to death or something. But I don't think they know that these options are… it tends to be shoved under the carpet, that side of it, doesn't it? It's just centrally stored. Like they used to say we centrally stored the nuclear waste until it started leaking out and escaping into nuclear weapons.

Respondent: I think the earthquake in Japan probably had quite an impact as well. The tsunami, of course.

Respondent: Yeah, but it wasn't as if people were happy about nuclear before. Nuclear has been through a phase when it started when it was going to be unlimited cheap energy, and it was fantastic, the science has arrived to solve all our problems. And then we discovered that, actually, it was a front for making nuclear weapons, and then all the various nuclear accidents and discharged into the sea. And we realised we'd actually thoroughly polluted out environment and set up a problem for thousands of years to come. So it's had a pretty bad press, in many ways. And then, somehow, nuclear is supposed to fight back and actually present itself as yes, well that's all in the past but we're all different now, and now we're much cleaner and better and it will never happen again. And then something like the tsunami comes along and shakes people's confidence again.

Respondent: But it has affected – perhaps not our government – but it has affected government policy because am I right in thinking Germany has moved away from nuclear, and lot of other countries, in France they're very strongly nuclear. But on the world scale that may be tipping the energy generation ballast.

Interviewer: So we've had maybe 15 minutes talking about different choices and combinations, and I'm sure we could go on a lot longer, but I suppose there's no wholly satisfactory answer or combination of answers. There's drawbacks, perhaps, with everything. So, given that there are going to be pros and cons, whichever combination of things somebody ends up plumping for, what factors do you think it's crucial to prioritise when making this decision?

Respondent: Security, in terms of energy and other types.

Respondent: Pollution control.

Respondent: I don't know whether you can have both.

Respondent: Security of supply.

Interviewer: And what's your fear in having unsecure…?

Respondent: This country is a net importer now, isn't it? Look at gas.

Respondent: We had two days left last week.

Respondent: We are economically held to ransom, potentially. So the prices you pay now are nothing compared to probably what they're going to be or could be, I'd say they were nothing.

Interviewer: So what other logics would people like to see informing this sort of debate, this sort of decision?

Respondent: Just the national strategy. I just think tinkering around is…

Respondent: Something should be done.

Respondent: It's great, I live next to a wood, I'm fine, that's great for me, but what about the rest of us?

Respondent: We'll come to yours.

(Laughing)

Respondent: It's not solving the problem is it? So I think national, international level.

Respondent: So, from that as well, it's got to be a collective solution?

Respondent: I think so. I don't know how that's achieved.

Respondent: I think it's a joined up thinking thing, really. I would like to see as a factor we'd almost taken as read that we've done as much as we can for any conservation, so that those who are most vulnerable, in a way, have been looked after and encouraged. Things like loft insulation, there are so many houses that don't have loft insulation. If they're elderly and some strange person is knocking on the door and saying you can get free grants, they may as well be talking Martian to them really. And everybody needing a lot of hand holding, but they're just not getting

there, in terms of ensuring those things happen and people are supported. So I think that sort of stuff would be essential. There's quite a lot of factors, really, but I do worry about what Steve is saying, how do you get to a point where you've got the stick and the carrots in the right formula because we are dealing with what is a free market – free in many ways – and I don't think companies act with any sort of moral standards. They, basically, are free agents, and unless somebody is restraining them they just go for profit because they don't have a collective conscience. As individuals they might have, but as companies they just don't act that way, they are duty bound to make as much money as they can for the shareholders. So, somehow, we've got to get beyond that and I struggle to see how.

Respondent: Nationalisation?

Respondent: Yeah, it might be. Well, it might be, if we've run out of gas and it was a desperate situation where people were dying left, right and centre – because we've had some really cold weather, haven't we – and it wouldn't be long, a few days, before people were dying in large numbers, thousands, we might need to have to do that a couple of times before we actually bite the bullet.

Respondent: You'd have to (inaudible 00:39:36) and not feed the dying (inaudible 00:39:40).

(Laughing)

Respondent: Well, it would solve part of the basic problem, wouldn't it?

(Overspeaking).

Respondent: That would solve the problems for the opposition to shale gas then wouldn't it?

Respondent: What, a very (inaudible 00:39:54)?

Respondent: Yes, when people really accept that there really is a problem they'll say, "Well why didn't you do it before?"

Respondent: But that's human nature, isn't it? You're right, I think that's what could (inaudible 00:40:09) unless something catastrophic happens we will just carry on as we are, I think.

Respondent: This is the problem with looking at things that are national basis, because most people don't think on a national basis.

Respondent: Even if we solved it all and we had absolutely 100% sustainable energy, what about China and India and all those developing economies, it is a global problem isn't it? It's not just a national problem. Although you might hope that Britain then Europe set an example, what's our proportion of emissions? I don't know, it's pretty low compared with the developing economies in America. So, actually, it's a global issue, and ours is just a contribution towards a much, much bigger problem with much less environmentally or socially concerned governance. So, actually, it's a pretty big issue.

Interviewer: That's the whole tragedy of the commons(?) we won't bother, because nobody else might bother?

Respondent: No, I'm not saying we won't bother. I'm saying…

Interviewer: You're worried it might be insignificant?

Respondent: Yeah, I think we already are set down on a path which is supposed to be bothering. We've got legally binding CO2 emissions for starters. So we're not doing very well but we are going down that path. But yes, it does worry me that actually, in the big picture, it won't actually make much difference in that I certainly don't see problems to climate change and the carbon emissions coming up at all, I don't see that being solved. I think we're probably already past the threshold. That doesn't necessarily mean we shouldn't carry on trying to do something about it, but I think it's going to get a whole lot worse before it ever starts to get better.

Respondent: Don't you think we've got a moral obligation to show leadership?

Respondent: Yeah, just because there are a lot of difficulties doesn't mean to say that we shouldn't do it.

Respondent: Otherwise why would we be in judgement in (inaudible 00:42:38) if that situation was happening?

Respondent: But, coming back to that, there will be big implications for the things that we're all in a job to look after.

Interviewer: So, in that context, and assuming that carbon captured and technology refined, and the fact it isn't around the corner – I don't know whether it is or not – but assuming that it will be, I suppose there's no guarantee. So, assuming that isn't going to have been perfected this time next year or in five years' time or ten years' time, do people think fossil fuel should be a thing of the past, with that proviso that technology hasn't come good yet?

Respondent: They're going to be a thing of the past eventually, aren't they?

Interviewer: Should we make them a thing of the past artificially soon, before they…?

Respondent: No, I think we should exploit them in a nice way, because you can certainly use them. We need energy on the planet. It surprises me that we've not got a viable alternative yet to coal and gas, you know, renewables, but fossil fuels.

Respondent: It depends what you mean by viable? I mean, nuclear energy does work, it just has a few problems, but it certainly does weigh out those risks associated with it.

The thing about nuclear energy is we should be putting science into making us we should be looking at is as the viable alternative. Because there were massive problems with, and there still are massive problems with fossil fuels. The miners who I've spoken to in the past will tell you that the reason why the coal mines in Britain closed down was nothing to do with the fact that there was no coal, it was the fact that there were cheap imports coming in and they were being subsidised. So you've still got this political problem, whatever happens, whatever you're dealing with. In most people's opinions the oil companies rule America, so you've still got this political opinion. We need to look into something different, we need to look into something viable, and if it's nuclear energy, it's got to be nuclear energy.

I agree with that, but we shouldn't abandon fossil fuel as an interim. We should go that extra mile and put money into technology.

We can's abandon fossil fuel as an interim, but we should be looking to phase them out and getting the science into nuclear energy.

I could put the emphasis on looking to phase something else in, because phasing something out means precisely that, but I think…

That's what I'm saying, we should be looking to phase in the alternative, and if it's nuclear energy we should be looking to phase it in.

Respondent: But when you look at internal combustion engines, first it's electric cars and this, that and the other. There's not a viable alternative to the internal combustion engine, and I think that's the same as fossil fuel. We've got good technology now with petrol and diesel. And they're far more efficient than any battery powered growing cost…

Respondent: Who's told you that?

Respondent: It's true, they are.

Respondent: Who's told you that? Their own companies are telling you that?

Respondent: No, I think it's true, because they did independent tests of specifically the Prius, which is lorded as the electric car, but they're dying. Well, they're not dying, but they're not as good and they're not as efficient as the internal combustion engine.

Respondent: Well, at the end of the day, it's something we're going to have to look at, so people should be looking at buying electric cars and using electric cars and phasing out the internal combustion engine, because we can't afford to keep using it.

Respondent: I just think we should push and push the boundaries of the energy and the fuel reserves that we've got now, that we have been using since whatever. These came off a long time ago, because we've got the technology for clean burn and all the rest of it, and I think we shouldn't abandon that, just because we think it's...

Respondent: Don't you think if there's going to be a mix of different ways forward there are going to be some places where it's still more effective other than doing a carbon formula basis to use things like local coal, rather than… if you've got a rural village in Scotland, if you've got local coal deposits, if we can use the technology and burn it as efficiently as we can, that's better than transporting nuclear energy over 200 miles or whatever, to actually get it to the site where you want to use it. So, if you can look at a mix of stuff and you can bring as much technology as you can to reduce the carbon emissions, I'm not sure that we need to.

Respondent: I suppose I'm thinking of the national and international, rather than (inaudible 00:47:33) which is great. I've got one (inaudible 00:47:38) it's great.

Respondent: We have very much been focussing on this country, haven't we, where it's cold and wet and windy. A lot of the planet is extremely hot and very sunny and there's lots of stuff that we could be doing there that we're not doing. So the solutions are easier over there because people aren't… if there's no fire they don't freeze to death.

Respondent: They've got cooling issues, haven't they?

(Laughing)

Respondent: Which takes equal amounts of energy.

Interviewer: So, Alex, what do you think about this question, fossil fuels, should we phase them out as quickly as is going to be smooth or as long as they're there?

Respondent: I think we've all become very complacent. It's easy to turn the gas on, turn the key in the car and (inaudible 00:48:28) then we should charge headlong to a new Armageddon, and then there will be this sudden realisation that we need alternatives and we need to invest in finding those solutions and quickly. I think the pace of finding the solutions is slow, because I don't think we realise that we are heading towards a disaster.

(Overspeaking).

Respondent: I don't think for this development – I'll go back to one of Dan's points – it's politically worth doing. And at the moment it's economic growth over the environment. It's we need to grow (inaudible 00:49:13) of this, and at the moment sod the environment, we need to push forward, and a comment was made last week at a meeting about this, "Let's go back to the old great crested newt thing, it's loaded as a barrier to development," and then someone said, "Show me a development that has been stopped by a great crested newt and I'll buy them a pint, because there isn't one.

Interviewer: So you're almost saying we're going to need a crisis to put a spur…

Respondent: I think we do need a crisis. I'm old enough to remember the 70s and the lights going out, and the three day week and the lights going out, and sitting round the coal fire with it glowing and the lights going off. And you knew, 7 o'clock, three hours and there was no electricity. I think maybe…

Respondent: It might still happen, it depends on (inaudible 00:50:03).

Respondent: Exactly, and I think maybe if we had that it would be a wake-up call.

Respondent: It's really sad you have a power cut in your house now and everyone will go, "Oh my gosh, power cut, have we got any candles?" Because one night without power is crazy.

Respondent: This was… it was quite exciting as a kid, but you perhaps didn't realise that your parents were on three days a week and money was tight and it wasn't so good.

Respondent: Don't you think if they had that, sort of, Armageddon scenario, the reason why politics can't think ahead and come up with some sort of rational way forward is because the political timescales are so short. And if we do run out of energy how long is it before rioting starts on the streets and the political system collapses, and thousands of people are dying? It doesn't bear thinking about really, I don't think society are that civilised as we tend to think we are. We very quickly (inaudible 00:51:03), or are the government, in a way (overspeaking)?

Respondent: There are thousands of people dying already. In London the air pollution is now from diesel emissions, there are more people dying now than there were in the great smog because they're dying of something different. I was absolutely shocked to read that, and so we focussed on… got rid of the lead, got rid of the big carbon particles in the sulphur dioxide, and now there are carbon particles and people are dying of bronchial diseases. And they are literally thousands. But what's the solution to that? Either you go one further step down in cleaning up the exhaust emissions or you can get rid of them completely. You can get rid of fossil fuels as (inaudible 00:52:07) to drive cars. But I'm not sure, Lawrence, whether you're asking us to paint a picture in (inaudible 00:52:16) or whether you're saying what do you think we ought to do, because ought always comes with a cost. And we started off this discussion about the cost of energy and said it's far too high and

fuel poverty is increasing and so on. So a solution which actually most probably pushes the price up still further because that would be the correct, in a sense, thing to do, to give everything its correct value in terms of the environmental damage that it does, or in terms of the cost of the technologies to clean it up which is, more or less, the same thing. So, if we went down that road then energy is going to become even more scarce and even more expensive, but at least those of us who are still alive will be clean.

Interviewer: What do you think, Chris, about the fossil fuels?

Respondent: I'm a bit of an idealist, and I still think there is more scope for work on renewables. I know a little bit about short rotation coppice and I think we haven't reached that ceiling yet. I don't know what the proportion is, actually.

Interviewer: What, renewables?

Respondent: Yeah.

Interviewer: For electricity, coming up to about ten something, is that right?

Respondent: I have a sheet somewhere, I don't have it in my hand, but ten, 11%.

Respondent: The little bits that I've read there's still more capacity there that could be pushed…

Respondent: But surely that is land, isn't it, that requires land. But land is scarce, anyway, for growing crops and things. And the burgeoning population…

Respondent: In places, in parts I think it's a mix.

Respondent: Yeah.

Interviewer: I'm going to go and get an information board and put it up and then we're going to spend the last hour talking about one specific example which might be slightly predictable. Now some people are going to know a lot about this, I would have thought. Hydraulic fracturing has everybody heard of this? Some think you have, you haven't. Again, I don't want to patronise anybody, and at the risk of that and just in case people can't see or whatever I'll go through it. Longer history than maybe a lot of people realise, but it's really started, it's gone up a few notches in the last decade in America really. So the reason for that increase in its development, we've got these two technologies, horizontal drilling and hydraulic fracturing, and the price rose to a level where it was economically feasible. So horizontal drilling, I suppose, is self-explanatory. You go from a vertical well to a horizontal well in the strata, in the shale, if it's shale. Hydraulic fracturing, pumping fracking fluids at high pressure to induce fractures in the rock. The molecules of whether it's gas or it's oil flow back out and the fracking fluids, as the website companies never tire of pointing out, 99.5% water and sand, there or thereabouts. 0.5% what are called here on (inaudible 00:56:11) website, additives, which perform, they keep the sands while they perform various tasks. And so shale gas is, at the risk of patronising people once again, one form of unconventional gas which a lot of people are most excited about. And there's shale oil and coal bed methane and other things. So if I could just ask the initial impressions?

Respondent: Of what particularly? The technology or the viability and decay or the environmental impact or…?

Interviewer: All of them.

(Laughing)

Respondent: There's quite a lot there, isn't there?

Interviewer: In the context of our last discussion, keeping the lights on or playing a role in managing mix in the future. Is this a viable option for people?

Respondent: If we have no other form of energy supply, yes. Not in the short period.

Respondent: Yeah, it depends on your timescale. Cuadrilla's got one drill in the UK.

Interviewer: Then in the long-term possibly?

Respondent: It does depend on your timescale, because they reckon they can do 400 sites in the Fylde, but they've got one drill. So, to get that capacity out might take them 20 years. They've got to get that investment to (inaudible 00:57:54) this is a massive infrastructure project which, at the moment, the companies that are investigating fracking just don't have… the timescale is critical. Maybe in 50 years it might be amazing but I don't think it's a solution to the lights going off in the next five years, for example, which is how it's slightly been (overspeaking).

Respondent: But in the next five years Centric have just signed a deal to import liquefied shale gas from the States, so they'll be tankering in liquefied nitric gas within the next five years. So it won't be produced in the UK, but we will be using shale gas.

Respondent: Yeah, I'm not saying we won't be using it, but I'm talking about…

Respondent: Production.

Respondent: Yeah.

Respondent: I went to an anti fracking meeting on the Fylde a few months ago and there was a lot of hot air. Obviously, (inaudible 00:58:54) members as the Wildlife Trust, and there was a lot of talk about concerns about the environment, and I came away with concerns about the environment. Not the same concerns as the anti frackers. As I say, they were more interested in the house prices in many cases which, I hate to say it, but it's true, I was at that meeting and as far as I could see people were more interested in house prices than the actual environment, even though they were demanding that we came up with some answers as far as the environment is concerned. But I'm concerned about the environment and the impact it's going to have. And I certainly don't like the idea of pumping chemicals underground. And I don't think enough science has been done into this process in the States. They were showing videos with real horror stories about it, but there was an expert there from Fylde Council who was completely independent – or so he said – but he came up with some very good arguments, but he also pointed out that he was under the impression that there hasn't been enough research done into this. Which makes you wonder just how dangerous it's going to be.

Interviewer: Just to pre-empt a discussion that usually in the group we'd have a bit later on but, obviously, because people know a bit more about this tonight, when there is that uncertainty – and I think it's fair to say there is – how do you proceed? Is it precautionary principle, or if you're doing that are you missing out on…?

Respondent: I certainly don't think the government should be, basically, agreeing to this yet. I think they should be very careful before they proceed. And I think that all the signs from the government at the moment are that they want to proceed with it.

Respondent: Well, they've just incentivised in that last budget…

Respondent: Just today they've announced that they're going to…

Respondent: I think that's very dangerous.

Respondent: They've announced the planning they're going to publish the planning in June. And this is the capital of fracking in the UK.

Respondent: It says on the board 1947, and then it says over 2 ½ million have taken place globally. Cuadrilla. Surely there's a science behind it with all that amount of drilling? Surely there's a science behind it that we can scrutinise?

Interviewer: People assume that we know everything that goes on all the time. It's happened in America, a lot of rural communities. Mineral rights laws, the Crown doesn't own the ground underneath America, like it's the case here. So it's a case of dealing with the private landowners on the surface. So it's a bit more of a streamlined process, and I find it hard to believe that more isn't done when they look into it.

Respondent: Is it not there to back people up?

Respondent: It's not, it's just wholly technology and (inaudible 01:02:02) mineral extraction.

Respondent: So, looking at the costs, what is the factor of costing versus profit? I mean, it must be viable for them to do it, to want to do it, but I've no idea, what is it? Is it huge? Is it a small proportion? The investment cost as opposed to realising…?

Interviewer: I don't know exactly about that, but, as you say, it's economically viable.

Respondent: It depends how tightly they're regulated. Because depending on the monitoring conditions attached it can potentially hugely affect your costs.

Respondent: It's produced lots of cheap gas in America. I think over here it wouldn't be anything like so cheap.

Respondent: Well, (inaudible 01:02:44).

Respondent: Possibly. I don't think they're going to be any bigger (inaudible 01:02:49) and things anyway, bigger reserves. But here where it will be, people are concerned about regulation, and there does seem to be the possibility that regulators will be told how to regulate, rather than actually coming up with what they would genuinely think is the right form of regulation. But the mechanisms are all there to regulate, so it should be possible, and I think, regardless, they've virtually pre-empted it by saying we're going to do this, anyway. And there's nothing fundamentally new, it's just another refinement on extracting a particular type of fossil fuel. It's got a high life, we've already been through the last big bonanza with North Sea gas, and when was that? In the 80s. And a generation later, whoops, it's all gone. And now we're into the next one, and so instead of actually developing genuinely long-term… I would say 30 years is a very short-term solution, really. And I think the best you could say about fracking is that it's effectively – because decisions haven't been made on anything else that actually provides a long-term solution – it just buys us a bit more time. But, of course, in the process it develops a new fossil fuel with all the accompanying emissions. So if we really want to reduce carbon emissions why are we going down that road? But the answer is probably because there isn't anything else on the table. So they're desperate, and this is the only thing on the table at absolutely the last minute – and it probably will be at least five years – but that might be just enough

time with buying in other things to get us off the hook and keep the politicians happy and avoid making a decision on anything controversial.

Respondent: And another reason I just want to mention the science, I don't think the science has been looked at deeply enough is because, basically, there was the earthquake wasn't there?

Respondent: Two earthquakes.

Respondent: Two earthquakes. If they've actually done the science into it why are they allowing that to happen? Because it's not a very good publicity thing, is it? An earthquake.

Respondent: I think if a geologist had said to you you can now, you know, under the ground as well as… predicting earthquakes is notoriously…

Respondent: Yeah, but the only thing is it happened.

Respondent: It was a tremor. We have natural earth tremors just as big as that.

Respondent: But if you were living in that area…

Respondent: I do live in that area.

Respondent: If you were living in the area when that happened, what kind of reaction is that going to get from the public and the press, if Cuadrilla are drilling and this happens. Whether it's a natural earthquake or not it happened.

Respondent: It had a very good effect on making them approach it more cautiously, which is great. And I think this country…

Respondent: Try telling that to the people on the Fylde.

Respondent: They have quite a good reputation, in terms of regulation overall, is, therefore, approaching this very, very cautiously, quite rightly. And I think they do know why it happened, because of a particular geological formation and I think there will be regulations to prevent drilling in the kind of conditions which caused that to happen. And I think they will come up eventually with more or less acceptable ways of regulating it so that the disposal of the waste of which is one of the things that the Trust has honed in on as being something which actually they haven't really come up with anything particularly viable. And in America there was plenty of evidence that it could be a problem. And it doesn't just go through local waste treatment works, it's totally untreatable. Highly saline and partly toxic, so it's not an easy waste to treat.

(Overspeaking).

Respondent: It will finish up in the sea.

Respondent: And the other issue that's peculiar to this bit of Lancashire is you've got potentially fracking, you've got a major gas storage project that may be consented in a few weeks, and there's a (inaudible 01:07:28) gas-fired power station all within a very small area.

Respondent: Like a bomb.

Interviewer: What I'll do is I'll put another board up, and we'll move on a bit, because you didn't really need this introduction.

(Laughing)

Interviewer: So this is the sell, I suppose, and it's going to be a hard sell. Not that I'm representing anybody. So 'A Golden Age of Gas?' You've got Time Magazine saying, Let's Rock a Power of the World.' 'One Big Ask, Cut Your Energy Bills', from The Sunday Times 2011. 'Game Changer, Shale Gas'. I suppose that's the kind of language that's being used.

Respondent: That's real hype.

Interviewer: Is that just hype?

Respondent: Yeah.

Respondent: The Blackpool Gazette isn't saying that.

(Laughing)

Respondent: They're not really up to the Time Magazine, aren't they?

Respondent: It's just another source of gas. And it comes with quite a few local issues, not least there could be 100 or so things clustered about the Fylde?

Respondent: There's 106 isn't there?

(Overspeaking)

Respondent: That's a game changer, that's a landscape changer.

Respondent: That's one of the things that they talk about in America, it industrialises the landscape. In terms of the Fylde, it will industrialise what is a rural landscape at the moment.

Respondent: Once the particular (inaudible 01:09:15) – I don't know what the term is – has finished what happens? I presume they move on and cap it or what do you do then?

Respondent: They're just like big metal plates. They're not massive things, probably about as big as this room.

Respondent: So you wouldn't fall down there?

(Laughing)

Respondent: No. But 400 of those across the landscape would (inaudible 01:09:33).

Respondent: I'm not sure how big the footprints are.

Respondent: They're the proper big size, they're just under a hectare.

Respondent: And then what subsequent testing after that? Do they have to get them through any…?

Respondent: We don't know yet.

Respondent: We don't have any knowledge about what they're going to do about that.

Respondent: Is it required? Samples of groundwater or whatever?

Respondent: I went to the environment agency and specifically asked about something around water, and they said, "It's not in our remit we won't do it." And there's nobody else to do it. It is a concern that, particularly on the farms they use a lot of, is it groundwater or homespun.

Respondent: (Overspeaking).

Respondent: But they can build moisture into the sets, they can require the holes to be stepped out.

Respondent: But at the moment that hasn't happened with the exploratory side, because there were some questions there (inaudible 01:10:26) at the one side that they have drilled on. And it was very confusing because it's split. There's three agencies, Health and Safety, Environetics and somebody else that monitors it. And, at the moment, those three agencies aren't working together, so no one really knows who's responsible for what bits, which is where you're probably talking about independent (overspeaking) customer is concerned.

Respondent: Yeah.

Respondent: I agree with what you were saying before that we could have good regulation and that's what we're good at in this country.

Respondent: We haven't got our act together yet.

Respondent: Systems we've got with shale are just absolutely appalling.

Interviewer: Do people think that there's any amount of regulation that means they could be optimistic about this? Is it a case of regulating away risks? What you were saying before it it's just another step on that road which maybe is going somewhere you don't like.

Respondent: You can't regulate away the carbon emissions, unless they're going to commit to planting 1,000 trees for every five emits of gas that they produce, or whatever it is. It's going to produce more carbon emissions, and quite a lot more, because it requires more energy to get it out as well. I think that is real hype to say it's the golden age.

Interviewer: That's international energy.

Respondent: There are significant risks and environmental issues associated with it, just like every other source of energy.

Respondent: What worries me about regulation as well is that, hopefully, there'll be a lot of caution in the early years and, hopefully, the scale will pace at which it's exploited will be slow enough for the regulation to be very good.

Interviewer: What do you think about the pace? Do these things come up too quickly for us to respond to them in time?

Respondent: I think we've backed ourselves into a corner so that, clearly, the government are busy making tax breaks because they want to really rush ahead and get this stuff in place as quickly as possible. And although the agencies may well get to regulate

well, if we're talking about something that's going to go on forever, if these holes are in the ground forever and the water quality in 100, 200 years we've still got to do some sort of monitoring, we all saw what happened with the last change of government in that the environment agency were, overnight, gagged by the government and taken away their independent speech powers. And the staff were told that it's disciplinary, you're sacked if you actually go outside this. And very quickly laws can be brought in to deregulate certain, or to lower the standards that regulations going on if we're in the corner. So I really am concerned that the regulation is going to collapse in 20 or 30 years' time when nobody's looking so hard, and we're struggling to actually meet our energy needs.

Interviewer: I'll put the board about risks up now, because we're going to talk about risks, essentially, now.

Respondent: Will they not apply for deeper landfill sites? I assume the landfill sites on the Fylde are monitored.

Respondent: I think your problem is that, if you're going down 2 km or something and then you're going along for a certain length, and then they're fracking out with those, the leakage into the water table can be any one of several kilometres of…

Respondent: Can I also just say it's not just the Fylde? They're also considering it in Salford as well, which is getting very, very close to our mosses.

Respondent: And West Lancashire.

Respondent: South Wales, isn't it?

Respondent: Nottinghamshire.

Respondent: Forth of Firth.

Respondent: Sussex.

Respondent: Ireland.

Respondent: The Irish Sea.

Respondent: Brindle.

Interviewer: We were talking about whether the science has been done on the American case study. So the Environmental Protection Agency, their report on this coming out next year, June 14, there was a progress report in December that didn't say anything. They found water contamination in 1987, so the New York Times reports.

Respondent: What from the initial 1947?

Interviewer: No, that was from a well that had been fracked in 1985.

Respondent: What was the breakdown of that contamination? What constituted the contamination? What were the nasties?

Interviewer: I'm not sure exactly about that. There was an old gas well from the 1940s which they think actually came up. But others say there aren't any proven cases of this. So whether there's scientific proof and journalistic proof…

Respondent: You have to watch the film Gaslands. I don't know if you've seen that, and it's quite a scary film to watch. It starts off by talking about when there was a boon. The companies were exempt from two particular parts of the American Environmental Protection Act, which was water and the air. And they were exempt from actually reading the regulations compared to us. So maybe it was known already and to progress it. And it was the time of our friend Toxic Texan. Maybe the actual energy popular at that time.

Respondent: I think all you're really doing is drawing attention to the terrible state in American environmental regulation.

Respondent: Yeah. And I genuinely don't think that anything like that would happen over here for a variety of reasons.

Respondent: What I understand to (inaudible 01:17:14) of it.

Respondent: That doesn't make it a benign technology by any means.

Respondent: But do you think if the government's hell bent in progressing this they will (inaudible 01:17:22) the environment links even further?

Respondent: I think they will, actually, yeah, I think they will. Partially, (inaudible 01:17:28) put the squeeze on. I think they will tell them, "This is going to happen and, basically, we'll finish up, we'll make the best of a bad job. Because it's going to happen anyway because the politicians decide that it's going to happen," and that is quite clear. So I think we're very much in making the best of a bad job, because it's going to happen whether we like it or whether we think it's a good idea or whether we don't. And, at the end of the day, it's just one other source of energy with all its associated problems. It's not a (inaudible 01:18:09) in any way at all. And the fact that there is this indecent haste to book it in is bound to have defects.

Respondent: Do you think also the forthcoming panning guidance is going to be manipulated?

Respondent: Yes, I think it will, because that's the way this government… it's already done it on housing and other things. Yes, it will, and make it easier.

Respondent: So it will talk then, because it's (inaudible 01:18:33) the complete opposite?

Respondent: Yes, and then if anything goes wrong it will blame it on local planners for not doing their job.

Respondent: Because it's fracking it will go onto the National Policy Statement, anyway, for energy. So it would bypass local…

Respondent: It would be planning inspectorates it would go to.

Respondent: I think it's going to be steamed on and in. In many ways I think the discussion is a good idea, but we've missed the boat, really, because it is clear that… it was announced in the budget, it's happening. It was announced today, the guidelines will be here in two or three months' time. It's happening, and so the local communities had better brace themselves, and it's very much going to be fighting a rear guard action to protect local communities interests, and trying to make sure that the environment agency do do the job that they are there to do, and do it properly. So it think that's what the battle will be about. About getting effective regulation in.

Interviewer: So do other people share the inevitability of the…?

Respondent: Sadly, yes.

Respondent: It's coming, it's definitely coming but, as I say, (inaudible 01:19:56) who spoke at that meeting basically said, "If you want to stop it then make sure that they fold at every single rule or regulation." But it depends who's going to enforce those rules and regulations.

Respondent: And how you find out what they are. And there just isn't the capacity for monitoring, I don't think. None of these organisations have any resources. I think the Health and Safety executive have one guy who is responsible for all off-sea drilling and he's been given the fracking as well. It's added to his remit. And he's in Scotland. And they came down, they did one visit to the viral test site, and all they were concerned about was whether the guys onsite were wearing their (inaudible 01:20:37) jackets. But they're in there, and that's what they do and that's all they are meant to do. So the expectation of coordinated effective monitoring and enforcement I think is pie in the sky. I think baseline monitoring will be very important, if that's possible, so you establish what the conditions are for fracking procedures to commercial extraction.

Respondent: You won't be able to do that if you have an evidence base, if anything goes wrong. I think they're decisions they just haven't quite (inaudible 01:21:10) because that question (inaudible 01:21:11).

Interviewer: So we've been referencing the budget and (inaudible 01:21:20) in that shale gas is part of the future – hope I'm not misquoting – so what do people think of the implications of that proposition, and do they feel that, is it optimistic? I think I know the answer. What concerns you most about a future where shale gas is part of the future?

Respondent: I think the emphasis has been taken away from trying to reduce consumption, and lowering the need for all this energy, and I think you mentioned earlier about the focussing on just finding new ways to find it and this, that and the other. So having that as a statement, shale energy is part of the future, clearly a significant part, then that's what the focus is, not how do we learn from gumption? That's not my biggest concern.

Interviewer: So you're worried that it shifts the focus?

Respondent: Yeah, because we should be looking at how to reduce what we're already using, really. How to stop a population from carrying (inaudible 01:22:32) as it is doing and demands on resource. Because it's an issue with everything, really, isn't it? Resource and everything. So the fact that that isn't their main focus that worries me, really.

Respondent: But we live in a democracy, that's never going to happen.

Respondent: No, it won't do.

Respondent: We can't limit childbirth and we can't say well, you've sewn it and you need to pay…

Respondent: No, you can't, but when your main focus becomes just about that, well, this is what people are consuming let's find what their demand is, you know, supply and demand. Rather than saying, "Right, we need to be challenging."

Respondent: Yes, focus first on what we can do i.e. save energy. I agree entirely, but it's not going to happen. They just don't do it. Even in this building. You take this building as a snapshot of what goes on out there, it's frightening.

Respondent: I know I left the computer on one night.

Respondent: I'm known as the person who goes into a room and turns the light off.

Respondent: Then other people go in and turn it on.

Respondent: I'm regularly the last person out and it's amazing how many computers have all got those little lights on.

Interviewer: What do other people think about that question before, George Osborne's statement shale gas about the future?

Respondent: That sounds like a typical politician sound bite to me. You want to believe that it gives us some options that we don't really have at the moment to actually phasing a better future, but I just can't help seeing it's a dash for the cash.

Respondent: I think with such a precarious situation with energy security they are just looking at anything that might offer a fairly short-term solution and I just fear that some very bad decisions will be made because we've not had a properly thought out energy strategy.

Respondent: Also, as the government changes…

(Overspeaking).

Respondent: They make their impact there, and then they'll go, "We did this and we did…" you know, so they have to do it when they're there, that's why they get pushed through so quickly, isn't it?

Respondent: Well, this is the problem with this government at the moment. It's, basically, every decision seems to be a knee jerk reaction to something, and this just seems exactly the same thing.

Respondent: I think to be fair to this government, the last government were absolutely crap on energy policy and now they've got ten years to…

(Overspeaking)

Respondent: The last three governments have been a disaster. But, as I say, with the latest one it's a complete knee jerk reaction. Because they've done so many U-turns and this seems to be another. Maybe not a U-turn, but maybe, hopefully, they'll look into a little bit more seriously than they appear to have done.

Respondent: But the timescales are so short, and if they're going to come up with guidelines within two to three months, that's just an astonishing short term where there are so many unknowns.

Respondent: In comparison to this report in the States, wouldn't they be better waiting until after they have the report in?

Respondent: If I got a report from the States I wouldn't necessarily be happy that that was going to be representative of conditions in this country.

Respondent: That's not the point I'm making, the point I'm making is if there's a report that's been done into shale gas and how it's worked in the United States then, surely, they should wait, rather than just ploughing ahead and ignoring the fact that there's going to be a report. Whether it's the United States, Russia or whoever is doing the report, at least there is a report coming out in 2014 so, rather than jumping ahead now, let's wait and see what they recommend and if there are any problems.

Respondent: I think they'd know about them if they were that horrendous problems. There clearly have been very badly organised operations in the past, and I think we know it is possible to manage them a lot better. But I do agree with Karen, I think it's going to be rusting and then we will get the consequences of things being rushed, and there will be bad decisions made and especially we, as a country and we as a local community, we'll all suffer the consequences of those bad decisions. But it's not on the scale of Hiroshima or something like that.

Respondent: No, but for example, it completely mucks up the (inaudible 01:26:54).

Respondent: I don't personally think it's going to do that. I think it will be much more the countryside will be changed. The opportunities that there might have been to, I don't know, make the thing invisible won't be taken, by the best you gain, or there might well be opportunities when you think of that. If you just get £5,000 per 400 installations to do something good with. There are issues around this and that's what I would call making the best of a bad job.

Interviewer: I'm going to put a final board up which is going on risk. So climate change. We've been talking about the risks and they've been on quite a local, kind of, so, obviously, earthquakes and groundwater contamination, in a sense, is quite… how big a role is climate change going to play in how people feel towards this? There's, basically, two ways you can go about trying to say these two things, responding to climate change, exploiting shale gas are not mutually exclusive. And so transitional fuel is better than coal, it's a step in the right direction, and then base load, if we don't believe we can have 100% renewables we need something in the background or a continuous supply for peak times or if it's…

Respondent: That's coal?

Interviewer: That's coal. But the line are shale gas.

Respondent: Coal was proven at the time, this is not. It just doesn't make sense to me at all.

Interviewer: The argument is that it's better in terms of the greenhouse gas effect. Particularly (inaudible 01:29:15) on best practice

Respondent: It's like Dan said, we have to use energy to crate and source energy. There are natural pollution cycles and the coal is there for the taking, so we're led to believe, but the technology is there as well. But this is new, I don't understand why the government are pushing so much while there's stuff in the ground.

Respondent: Because we're so geared towards using gas, rather than using coal powered stations and things, and it's continuing what we know, isn't it? My worry about climate change is that instead of using this to substitute for less gas generating technologies, we're just going to use it as an additional thing, oh whoopee, we can use more energy.

Interviewer: That's where the Tyndall Centre is at Manchester, and so coal exports from the US. So they haven't stopped mining coal because they've got all this gas. They're

exporting coal and they're exporting this gas to us from (inaudible 01:30:28), as you were saying earlier.

Respondent: So you've got the growth thing going on, haven't you? So if somebody is willing to buy it and use it, then it will be sold to them and they will use it, so it's actually adding to climate change. And I think it will change people's opinions, but I don't think in the part of the world we're in it will be as cute as other places on the planet where climate will change so rapidly that it will just become inhospitable to survive and people will have to migrate. So it worries me that the climate change thing won't affect us and we have, in a way, a bit of a cushion that a lot of people don't have when it comes to climate change.

Interviewer: So the initial point about the transitional fuel, by (inaudible 01:31:14) it's an improvement on coal. But the counter argument from the Tyndall Centre is saying, first of all there's if you carry on mining coal and exporting it there's no gain at all, you're just increasing the potential consumption. And, second of all, in terms of timescale, we're talking about maybe 20 years to get the industry going. So they're saying, in terms of taking, so there'll be a carbon transition plan, (inaudible 01:31:41) to prevent the worst consequence of climate change, the two degrees rise. 20 years' time is 2033, and then, say we've got no earthquakes and no groundwater contamination and everything's going really fine, and maybe even prices are falling, although there are differences between here and the US, so that scenario has happened. Then we turn the tap off or tone down how much we're using. Would anybody have any confidence that we could finish the transition, if you like, or just get there and go, "Actually, this is a bit too good, we don't want to stop"?

Respondent: Why is it seen as a transition? A transition, it's as if you're going from one thing to another. What's the other thing? It's just this is a transitional fuel, but what are we going to move to?

Respondent: It's still a finite resource, as is coal. We've got the coal technology, why don't we exploit it?

Respondent: Again, you could say the same as coal, that could be a transitional fuel.

Respondent: If we're looking at it buying us more time to develop technologies and other things, is that what they mean?

Respondent: I think that's what they hope. There's no guarantee that this is going to be a transition to something better. What progress have we actually made towards the carbon emissions? This is a country which is supposed to be trying quite hard. I think the only progress has been made by economic decline, and even that didn't produce a great deal of progress, and so it probably does pick up again and the emissions go straight back up again when, in fact, they're supposed to be on a downwards slope and when do we stop testing (overspeaking)?

Respondent: Other things will happen there in the (inaudible 01:33:49).

Respondent: We'll be forced into legislation then.

Respondent: But have we met any of them?

Respondent: No, I don't think we have.

Respondent: We're just never going to do it, are we? When you think about our power usage and we lead the way to pay for that stuff, and everything's electronic. And that

takes power, doesn't it? I just cannot see this Nirvana somewhere ahead. I just see it a relentless march towards, well, it's capitalism, isn't it? It's all about economics.

Interviewer: What about the motivation behind, so this technology was developed over quite a long period of time, and the political will to bring it here, to import it here, if you like. What motivations do people think are behind those decisions?

Respondent: Not the same ones as us. It's not about a social good or providing people with cheap or free or clean energy. Cuadrilla are promoting massive amounts of employment through this process. I think they quoted something like 500 new jobs for the exploration place, and what we had was four guys coming over in a van from France.

(Laughing)

Respondent: It's just not to give them money, so it is a business opportunity. And I'm not knocking Cuadrilla for doing that, that's their role and they've got to shell out and they're trying develop their business.

Respondent: The thing is, their target is money and they have to sell it to people not as that so, yeah, they have to come up with all the good reasons that the general public would love to hear, as to what's great about it. I'm not saying they make up reasons, but they pick on things that aren't necessarily significant and turn them into these wow things.

Respondent: Yeah, but we all do that, don't we? Every company does it. Charities, everybody. You put a positive spin.

Respondent: But they're an exploration company aren't they, so it's in their interest to big it up as much as possible. They propose to sell it on, presumably to one of the large oil companies, possibly, and they will take it to commercial extraction. I don't think we'll have a long-term relationship with Cuadrilla.

Respondent: So we can get lots of money so that we can lavish our own lifestyles more, whereas theirs would be more likely be to do with their own personal gain and stuff, and luxury. Whereas we're looking at save the planet and wildlife and things. I know we do it as well, but I would say that ours are more in tune with sustainability, whereas they're more in tune with what they're going to get out of it personally at the end of it. So I don't think their reasons for doing it are…

Respondent: Yeah, but they have to sell things. At this level we don't sell anything, just trust in it. So it's easy for us, we don't sell anything.

Interviewer: I'll draw you through maybe the other side of the board now. So first of all we had this idea of keep production and maybe some people starting to – we might be sceptical about these claims – but a lot of people were getting used to the idea that we might be coming from an age of abundance to an age of scarcity. And some people, in terms of fossil fuel, some people saying unconventional fossil fuels might put that time back fairly significantly. And it depends on which estimates we believe. What is people's response to that prospect?

Respondent: We've heard about this peak oil and everybody was oh, you know, but where are we in the oil? The amount of oil that's still available to be extracted? I've heard stories that it's rubbish, this peak oil. Yes, it's getting more difficult to extract, but it's there. It will cost more to do it but it's still there. So I'm sceptical about this peak oil that's scaring people into other things like hacking and where bad

decisions may be made. Can we not find out where we're up to with this peak oil business?

Respondent: Making estimates about how much…?

Respondent: That's right, where are the estimates based? Is it worst case scenario or best case scenario?

Respondent: And who's doing them? That's the main thing, isn't it?

Respondent: It's difficult to make them, because I started in recycling 20 years ago, and then the mantra was we've only got, I think it was eight years of landfill left. And that mantra is still being quoted today, because we're an innovative species, so we will always find your way through things. It will cost us more, it will be harder, it will be more difficult and more complex, but we'll get around this, no problem. So, for me, I don't think peak oil, personally, I'm quite worried about it. But if I went and talked to my neighbours they'd just look at me as if I'm stupid.

Interviewer: Earlier on I think, Alex, you were saying we maybe need a crisis. Was peak oil going to be about crisis?

Respondent: I think what's going to bring it to a crisis is the cost. That will bring it to focus it more and more because the price of petrol at the pump, everything else that requires the people, it's got so much embedded energy in it but (inaudible 01:39:40) in it they're so wasteful. I mean, right at the beginning of the discussion you talked about you were going off key words and you stopped at Alex. And I was going to say wastefulness and energy efficiency would be my two key words. Because we do waste an awful lot (inaudible 01:40:02). And those are the key things, I think.

Respondent: It's true, but it's funny though, isn't it, if we all saved and lived a fair share existence, you could argue we just postpone.

Respondent: Absolutely, the world is actually (inaudible 01:40:22) few more begin.

Respondent: There isn't the will in this country to do anything about climate change. People talk about it, people like us talk about it, there isn't the will in the country to do anything about it and, as Alex says, it's going to take a crisis eventually, one way or another, to actually do anything. And it won't be just a few scallies on the streets of Manchester breaking into clothes shops. There will be proper riots eventually over it, and something will have to be done.

Interviewer: But do people feel that hydrofracturing and these reserves, whether they're conservative estimates or the more farcical ones end up being true unlocks these unconventional fossil fuels, will that put back that crisis?

Respondent: It might defer it for a bit.

Respondent: I think it might localise it.

Respondent: Unless that's a different situation.

Respondent: I think it might localise it.

Respondent: I think that quote from Deutsche Bank is a good one. It's (inaudible 01:41:30), it will take longer and it will be more expensive for all the reasons that we've

discussed. So it will arrive, and things will carry on. We'll carry on searching for better solutions.

Respondent: What's scary is that unless it's seen as an opportunity to reduce other forms of energy use, then it's going to be accelerating climate change massively, and it could be the rising sea level that becomes the thing that creates the catastrophe. It could be freak storms. I was listening to the radio and there was a guy in Scotland saying that in 40 years he's never seen snow like we've had over the last week. Every year there's extreme, you know, values are being exceeded and exceeded. And in 20 years' time, I find it quite scary to think where we might be, and if we don't be very careful with this that's not going to be 20 years' time, it's going to be 12 years' time, ten years' time.

Interviewer: Before we were talking about the regulatory situation in America and how maybe (inaudible 01:42:41) is the highest standard that was (inaudible 01:42:45). So I think we were referring to it before as, it's known as the Halliburton Loophole, so it was the Bush Cheney administration and Cheney performs the Halliburton, and so it was the 2005 Energy Bill with the Clean Water Act as part of it. So there was the exemption for fracking companies. Halliburton does a lot of work as the patent of the techniques of fracking. And one of the main implications of that that gets quoted a lot is the chemical composition of the additives the fracking includes can be kept a trade secret. Actually on their websites they usually disclose it, but I suppose there's a difference between the government telling people and (inaudible 01:43:41). So are people more confident that the regulation is going to be less laissez faire, a bit more stringent here? Or are we going to fall into these traps or are we going to learn lessons?

Respondent: Well, it's certainly tightened up since… I would have thought it's tightened up since the tremors, because I remember seeing the report on North West Tonight that they were going to tighten up, which is a natural response, isn't it? But what that actually equates to I don't know, and whether that will be adequate I have no idea.

Respondent: I think we've alluded to it already, but we're going to see the regulators (inaudible 01:44:30) massively so that this thing can be driven along.

Respondent: I think it will still be better than America.

Respondent: Yes, but I think it's going to be a physical impact for our area, the Fylde, because the traffic movement, the water issues, I don't think that's been really brought to the fore, when it comes to the amount of water that's going to be used, and the waste water, where it's going to go and how they're going to treat it. I think that's one of the issues that's been glossed over a bit. I don't think that's been brought to the fore. It's all about tremors, but I think the surface water is going to be one of the key issues here. We all know the Fylde, it's country roads, isn't it, and I don't think there's the infrastructure there to take the amount of vehicles and traffic.

Respondent: The moss roads are sinking as it is.

Respondent: How are they going to plan this? How good are these fracking plans?

Respondent: So the drill plans you were saying earlier.

Respondent: With the exploration sites they've developed so far they deliberately kept them below one hectare, the fresh ones, so that they didn't have to do any IA(?). So it's less than one hectare, but I don't know how much of that is literally occupied by

the well head. And also that's exploratory ones, so I don't know if commercial ones are bigger.

(Overspeaking).

Respondent: There might be a hectare when they're constructing them, but slims down (inaudible 01:46:15).

Respondent: Yeah.

Respondent: And how long are they in months of drill time?

Respondent: I don't know. Just so much you don't know. Well, I certainly don't know.

Respondent: It seems so little information when it should be open. It should be far more open. But I don't think you can trust, you can't trust Compass and you wouldn't trust the regulators either.

Interviewer: What about the scale up for commercial exploitation and for the benefits that are being spoken about? They run certainly hundreds, maybe thousands of the wells? Is there anything in that that concerns people?

Respondent: I just think, long term, in the grand scheme of things, it's nothing, is it? I don't mean this is nothing, I mean what it's going to provide is nothing. And is it worth potentially wrecking potentially pristine areas or sites just so…?

Respondent: Well, they said that about wind energy.

Respondent: Well, personally, I think it's an absolute waste of time. It's not reliable. If there're no wind the damn things don't turn it.

Respondent: One thing it will provide is a lot of newspaper headlines with fracking. It's such a good word to use for headlines.

(Laughing)

Respondent: And it will be all over the newspapers. Every time they get anything wrong.

(Overspeaking).

Interviewer: So thank you all for giving up your time. People are starting to do research on this, you were talking about there's no research or there's not enough research. It usually takes the social sciences about five years longer than everybody else to realise and things happen and they try and do something on that. So I'm doing, as I said at the beginning, this is the fifth of six focus groups that I'm doing in Newcastle and Nottingham and now here, in and around Manchester and the north west. I'm looking into the social acceptability of this, and I'm interested in the kind of ethical systems or the kinds of decision making processes people think should be in play here. Because when there's uncertainty and when there's conflicting messages and when experts are disagreeing I want to know how the public see that and what they see as a way out of that, and how they would define a satisfactory outcome or a satisfactory decision, and who that involves. Is it just a couple scientists and ministers sitting in a room together, or is it, in these cases of uncertainties, is something more needed? That's the sort of thing that I'm looking into, and this group has been a bit different as I did anticipate. It was maybe more of a group interview than a focus group.

(Laughing)

Respondent: People do get the difference between that. Are there any questions about the research?

Respondent: Yeah, what have you found from the other groups? What, sort of, general things have come out from them compared to this one?

Interviewer: That's interesting. In a way, it's actually hard to know what you've got until you've listened back to them a couple of times. I've spoken to allotment owners, mothers with young children, ex-miners, people with hobbies related to industrial history and, I guess, there's theories behind all of the groups, and I'm talking to people with children at university tomorrow, in Oldham. Obviously, with the mothers with young children the future played a big role, and this idea of not storing up problems for future generations which was, in a sense, what we predicted and why we spoke to that group. There's a lot of mistrust of the energy industry and a lot of mistrust of the government's relationship with that energy industry. There's the good purpose of science, that's not assumed anymore. People have problems with who's funding it, people have problems with the motivations of the people developing the science. So this idea that science has become a social betterment in the public good is going, and that's the same as social scientists have found out when they look into nanotechnology, geoengineering, biotechnology, any kind of new innovation. People no longer just assume that scientists' intentions when they're coming up with new technologies are not unproblematic, should not be discussed. And so, as a social scientist in training, I'm interested in what happens when facts get made, and I'm interested in the subjective grey areas and the hazy bits in that process. And I'm interested in, because I think those political visions are embodied in new technologies, so I'm interested in what may be embodied in fracking. Do people like it? Was there a chance to have politics to do politics? Because if you just say this is about facts and this is science, then that's objective, and it's either this or it's that. And I think debate gets a huge and obscured by a narrow frame, and so I'm interested in trying to open up that and, as you said, social scientists are always a bit late for this, as I said before, and we are at a downstream phase, so things are being decided as came up. But I want to try and problematize that in 2013. It might have been better in 2009 or 2008. Any other questions?

Respondent: What do you think?

Respondent: What was the right answer?

(Laughing)

Respondent: What do you think a scenario will be, in terms of energy provision, globally or nationally, I don't know which, maybe both, in 50 years' time?

Interviewer: This is the slight awkwardness of doing interdisciplinary work, because I'm not an expert on energy. I have my sociological theories that I'm applying to this world of energy. So really my opinion on that is you may as well pull somebody off the street, really.

Respondent: What do you think is the answer, if you had to just say this is the answer?

Interviewer: If I give you an annoying, politician-like evasion of that question?

Respondent: I want your answer.

Interviewer: Actually, I don't think the key question is what is the right answer, because I don't think there are any right answers, and I don't think we know enough – even if there was a right answer – to realise that was the right answer. What I'm bothered about is how we decide what we plump for. I don't think consequentialism, judging a decision in its consequences is possible in these situations, because I don't think…

Respondent: It's like predictive science, and that's never easy, is it?

Interviewer: I think it's then the quality of the decision you focus on, the actual process, the ins rather than the outs.

Respondent: I'm asking you what is going to provide us our long-term energy problems? What is it?

Respondent: Has your personal view on things evolved as you've gone to more and more groups and meetings?

Interviewer: No, I don't think it really has.

Respondent: I suppose there's a danger, isn't there, and if you do have a strong view, how can you be impartial and write a report that really reflects some of the processes that ought to be recommended if you've got preconceptions of that you might be able to push it in the direction that you'd like to see it go if you make certain recommendations.

Interviewer: What I would offer you, if you want to read a summary of my thesis, I don't want to impose the 30,000 words on you, but a summary, I'd be happy to email that around. I think I have all of your email addresses.

[End of Transcript]

Appendix 3.6 – Transcript Group 6: Parents of university students

Interviewer: All right, well, thank you for coming everybody. My name's Interviewer and I'm a postgraduate researcher from the University of Durham. And my research is about energy and about climate change and so it's kind of issues related to that which hopefully we're going to have an interesting discussion about this evening. This is the sixth of six groups, my final group. I will just mention all of the others have been between the hours of seven and nine so if it gets to 8.30pm and it doesn't look like I'm going to stop, then that's just me on autopilot and if you just tell me, because I can see that happening. So, I'm really just interested in people's opinions on what we're going to talk about. There's no really right or wrong answer, anything like that, and it's kind of about how people go about just finding out about things and how they came to them. So, if we start off quite generally, and maybe if we could just go in a clockwise direction, so sorry to put the pressure on you Female C, but (laughter)

Female A: I might have dropped off. Oh, no.

Interviewer: Oh, there we go, Female A. When I say "energy" what comes to mind?

Female ?: Do you want any of us.

(laughter)

Female A: Initially what comes to mind?

Interviewer: Yeah.

Female A: When you said energy, it would just like be energy that somebody has, if somebody has energy, you know what I mean, you know, can you understand what I mean, like?

Interviewer: Yeah, yeah.

Female A: Have you got the energy to do that? That's what comes to, that's what came to my mind, when you first said it. Which is probably not right, but that's what came to mind.

Interviewer: Well, as I said, no right or wrong answers.

Female A: Yes.

Interviewer: What about, so what about in the context of climate change then, if we think about energy in terms of electricity or?

Female A: Well, yeah, that's what come, that's, when you say something like that, that's what comes to mind. You know, energy. Electricity.

Interviewer: Okay, so if we're talking about electricity, I mean, how do feel towards that?

Female A: I'll be honest with you, I've never thought about it. It's something that's never really interested me and it's never really, I've never really thought about it. Probably that's why I'm finding it hard to answer the question because I've never really thought about it.

Interviewer: Would you say that it's kind of taken for granted?

Female A: Yeah, definitely.

Interviewer: Is that, a view others recognise, or?

Female B: I've, when my been at school, it's the same with development.

Interviewer: Okay.

Female A: And I live in a place where they've been trying to get a windmill, so, and that's like my husband's for windmills, the rest of the village is against.

Interviewer: Cool.

Female B: But, no, that's the first thing I, when you said energy, climate change, I saw windmills, I saw Sellafield.

Interviewer: Hmm hmm.

Female B: That's how I would think, in those terms.

Interviewer: Okay.

Female B: Nuclear energy, wind energy. Alternatives.

Interviewer: So, Female C?

Female C: I think I just sort of say energy efficiency and solar panels and, there's so much about it on the news and so, saving money and running out of fossil fuel and sort of natural gas. I just see it as saving money and saving energy with this green, green energy that's coming in.

Interviewer: And, so it's coming in. And how do you feel about it? That it's coming in?

Female C: At the moment I think it's a bit of, a bit of fuss about nothing. You know, I don't think it'll be a worry in my lifetime, yeah perhaps in my daughter's lifetime, but not so much in my lifetime.

Interviewer: Okay. Is that another, I mean again, how do people react to that idea that energy may be, it might be because of the kind of the next generations.

Male D: I think it's started quite a bit, hasn't it, I mean for me I'm just over 50 now. And 20 years ago I think that's what they said. That, you know, come whatever it is.

Female C: Yeah.

Male D: You know, the 31st century, you know, we're going to run out of all, all sort of minerals and things because I think every year it seems to be coming backwards, if you know what I mean so that the end of renewal seems to coming forwards so all of a sudden people never talk about the Antarctic, or freezing and we fell for that, winter, it's been horrible. So I think, I think it's very difficult obviously to get it. There's a lot of myths, isn't there, and mistruths because people are saying what they want for their benefit and whether it be the electricity or the gas or the oil companies and then there's the …

Female B: That's what I think.

Male D: … Greenpeace people. But I do think that year after year it seems to be getting more on everybody's agenda. It's quicker and quicker. It's coming quicker and quicker, yeah.

Female A: So we probably need to accept that there's got to be an awful lot of research and there's been a big thing of, I'm not sure what it's called, you could tell me about this, it's the one where they drill.

Interviewer: Fracking.

Female A: Fracking. And it causes minor earthquakes. It's, it's, but I don't see that we have much alternative other than to do, and there was a really good programme on TV the other night and it was about, it was recyclable, it was something about getting gas out, burning it in such a way and, well, putting something back. I can't remember what it was but it was fascinating at the time. And then I fell asleep so I'm so sorry.

(laughter)

Female A: But.

Interviewer: You probably lost your bottle.

Female A Pardon?

Male D: Something about melting down plastic bottles and getting the oil back out it.

Female A: You know, I think that could have been it.

Male D: Yeah, and you got the oil out of it.

Female A: Yeah. That's right. It was. Thank you.

Male D: That's right, yeah.

Interviewer: So, how about you Male E?

Male E: What's the energy, you know, you need it, it's fossil fuels, won't last forever. And thing is there's that much money involved in it, if you make money out of it, I'm sure they'll find something that what, they won't come across when, all the rest of it, but I'm sure they'll come up with something, I'm sure they're studying because fossil fuels are going to run out, aren't they, plus the damage they cause.

Female A: Hmm.

Interviewer: So.

Male E: So I think, there's always going to a need for them, because when you go to China or India now, they're taking off. We're cutting back trying to get green, but I don't think they are. I mean they're building a power station every week or something, aren't they, China?

Female A: Hmm.

Male E: Burning coal or whatever. Maybe we're taking the lead but you know what China's like, will they listen, they're not, they're making the money, as I say, it's money. That's the way I think.

Interviewer: Okay, so there's a few ideas there. One that, well, this idea that consumption around the world is likely to rise, the amount of energy people are using, you mentioned kind of China and India. Do you think in a country like Britain, can you see us using less energy in the future? Or do you think we'll always need to provide the amount of energy?

Male E: I don't think it'll get any less, I don't think we'll get much less. I notice from our energy but nobody else.

Female A: Yeah.

Male E: Look at your house. Was it, there was only one fire, no central heating.

Male F: Oh, I think the need's going to greater, isn't it, without a shadow of a doubt, it's just, I think there's just going to be different sources of energy so the need's going to be massive, that is going to be, I just don't think you can count on it because as I said, they look 20 years ago to that.

Male E: I mean, there's electric tools for everything.

Male F: Yeah.

Female B: Yeah.

Male E: They're that cheap to buy, the electric, you need power.

Female C: They just, I think they just sort of, searching into every area now, because with, like these countries can hold us to ransom with the oil and so on, so we need an alternative direction. And you know, that, that is a major thing I think why they're doing it. Because, like I say, we could be cut off anytime we want. And like that.

Male E: It's slightly like cheap alternatives, they have found alternatives but they're not ch-, I mean, they've the car now, haven't they, the emissions are, awesome. Is it the hydrogen car? I think it's Toyota and Honda have built it haven't they? They just put two gases in, water come out. It's an electric power car.

Female B: Yeah, I think that.

Male E: Well, obviously, you know.

Female A: Well, we mean at night.

Male D: I agree.

(overspeaking)

Female C: I think that with.

Male E: It's all hydrogen or something isn't it?

Female B: I think that'll be the next thing.

Interviewer: So something just to pick up on another thing you said Male E, sorry, just, got that, so you said it kind of, it comes down to money or something along those lines?

Male E: Yeah, there's that much money to be made out of it somebody'd be there to make the money.

Interviewer: So, do you think in, so we kind of, we're sceptical that we're ever going to kind or use less energy than we do now unless we're absolutely forced to in some sense that it's hard to predict. So given that we are going to have meet those demands in the future, do you think that in a sense the market and the industry, do you think they'll able to find those alternatives? By kind of chasing profit?

Male E: I think they'll yeah, they'll have to do, yeah. They'll have to change. Obviously they know the fossil fuels are going to run out so they're looking for alternatives that can match the prices of what we're paying now. It's a hard one.

Female C: Won't they find a sort of a new kind of, I don't know what it is but there's something they've found I think in the North Sea, no it wouldn't be the North Sea, it will be the Atlantic, and that's going to save us all. Some, some? What was it?

Male F Fossil fuel, I don't know what it is.

Female C: Something, yeah, they've found. Was it methane?

Male G: Don't know. There's always the methane.

Female A: Yeah, that, actually it was that, I didn't take much notice about it but it's supposed to, you know, be able to.

Male G: Control it, yeah.

Female A: Save us all, you know, it'll have, we'll have enough energy to power comes for years and years and years and years.

Interviewer: Is it just about having enough energy or are there kind of conditions on that?

Female A: Oh, I don't know, I didn't listen to –

[cough]

Male F: I think there are conditions, aren't there, I think with this, Male E said before that the fossil fuels are run down and I wouldn't say it was a fact but, you know, they're finding it hard now, aren't they to find oils and gas and all the other stuff so I think, I think there is, has to be an alternative. You know, there has to be and whether it's something that we reinvent or go with what's out there or we recycle more, seems to be the obvious answer. There has to be another way than, because sooner or later when you keep fracking or drilling or whatever, that could increase the (inaudible 00:17:47) sooner or later.

Female A: Complaint, yeah.

Male F: You've got this feeling, haven't you that it's going to all fall apart somehow.

Female A: Yeah, yeah, yeah.

Male F: And I bet there are times they drill and don't find anything and how far they go, I mean, it's got to come from, when they stop drilling.

Interviewer: So would it bother you.

Male E: They're mining in India, aren't they where they're taking coal but there's fires all over the place.

Male F: Yeah, you know.

Male E: It's just setting on fire.

Male F: Well we see these things every so often, don't you, and you know whether it's myths or not, but you see things in the, on the Daily Mail online and you see like the biggest crater that's ever been created, haven't they, and it's been burning for the last 30 years and nobody know why it's been burning. And you think is this because everybody's drilling into the atmosphere, into you know.

Female A: I think that's why, go for the methane idea.

Male F: Well, it's like we.

(overspeaking)

Male F: We shall have to do something ourselves and we should recycle, shouldn't we?

Female A: It's sounds a good option, doesn't it?

Interviewer: So.

Male G: This is more, like I say, about recycling, our last one step in a hotter, you know, recycling, saving erm.

Interviewer: That's the other side of the equation, isn't it? Trying to use less while we're finding ways to produce the same amount. So, back to the original question, Female A, I believe we were up to you in terms of just what comes to mind.

Female A: Well, what comes to mind is renewable energy, and I think that's what we're going to need. That's my [cough] because I think Male E's right in what he says, it's about money. I think we've got two things going on. I think a) we've not got enough energy for what we need and we've got to find ways of using what we have to create energy rather than keep depleting. And I think the other thing that we've got to think about is energy in terms of how we breathe, because we are going to be sadly lacking in oxygen the way we're going. The air is filthy. If you look at that very, very far hill, over there, well I live just at the bottom of that. You climb to the top of that hill and you'll see the filthiest hole all across this area. It's bad enough to feel very high. So I think, in terms of energy, we've got to think of our own energy. There isn't enough oxygen in the world because you've got people, like you were saying, China, India, creating power plants, creating pollution. I mean if you go through London, you know, you go on the Underground, ugh, you know, what you got, what you picking up there? And we just haven't got everything that we need. We need to be planting trees all over. I've got this thing that every time as car is created, a tree should be planted. You know, I feel, it's quite a big thing with me. Because, you know, it's something quite dear to my heart.

Interviewer: Okay, so from what you're saying, I suppose in many ways you'd say we're not being anywhere near as kind of proactive enough?

Female A: No.

Interviewer: In various types of things?

Female A: Yeah, what we're doing, we're looking, we're saying this fossil fuels run out, let's look for another one. Well, that's not the long-term answer, is it? If this planet is going to survive, not just for the next two centuries, after that, we've got to find an alternative that is renewable. Wind is renewable, isn't it? Water is renewable. So we've got to use hydropower, we've got to use wind power and yet I'm told that windmills aren't particularly productive, you know, it takes more to, for them to maintain them than the stuff it produces. So, the kind of thing, yeah, that's something else we could look at, but, we're coming to another ice age which it feels like at the moment, you know, that's not going to be, so, we've got to, that's why that programme I was talking about fascinated me so much. Because we take the recycling and we turn it into something. Sorry. I'm waxing lyrical. (laughter) So sorry.

Interviewer: So if we move onto Male G.

Male G: Erm, I've not, bit like Female B, I just take it for granted and I don't, sort of give a lot of thought to, I do sort of listen to the news and you know that there's shortages and sort of gas and electricity and that people are using up and it's, you know, there is going to come a point where, you know, there isn't going to be enough to sort of, you know, make this country function. And I do think that they're constantly developing different ways and I am aware of things like solar panels and the windmills and stuff and I may have heard that as well that the windmills are not very effective and a bit of eyesore, I see one behind you actually.

Female A: They're pretty.

Male F: Plenty of times that they're just stood there, aren't they? They say it's too windy or it's not windy enough.

Male G: I am aware as I drive around that lots of people are having solar panels that lots of people are having solar panels on their houses these days and, you know, and being told that it takes ten years before they start making any money for you. But I suppose ten years down the line then it's going to make all the different maybe but, I think we are definitely [cough] in this country at recycling things. And I think a lot of people are jumping on that bandwagon now and being a bit more aware of that. I do think about the future with my children and my grandchildren and you know, what sort of future they're going to have and what's it going to be like for them, but again, I do take things for granted.

Interviewer: So, when you say stuff about energy and the media, what, I know there's probably a lot of conflicting stories being out, different sort of stories, but what's the kind of overriding impression you get?

Male G: Well, the biggest thing for me is the cost. What it costs now. And there is so much competition you know, but the fuel bills are just rising, you know everybody's struggling.

Interviewer: Do you mean?

Male G: And I think that because, you know, it's limited and, you know, people are struggling and you know, the energy efficiency, you know, is fine, but I still think there is going to come a point where we will be running out of that. It's something inevitable.

Interviewer: So you said there's so much competition, did you mean between the kind of energy companies?

Male G: Different suppliers, you know on that and I think, you know, the, and the prices are just going through the roof and you know, there's lots of sort of things that, you know, it's going to impact on the future of the next generations that are coming along. That's my feelings. The other thing that particular affects me at my age.

Interviewer: Okay. Do other people see, the energy industry as being this industry where there's a lot of competition? In terms of if you were kind of dissatisfied you'd move somewhere else?

Female A: Yeah.

Female B: Utilities? Yeah.

Interviewer: Whether it's gas or electricity?

Group: Yeah, yeah.

Female B: Because they're always ringing you, aren't they?

(overspeaking)

Interviewer: So are there people there that kind of search regularly with those sorts of things?

Male D: I try to.

Female A: I don't.

Female B: I used to between time to time, yeah.

Female C: Every two or three years I have a little look and.

Female B: They seem to all be very similar though, you know, what, and.

Male G: Some will offer you fixed deals now, a couple of years where it doesn't change, you know, if the tariff goes up, you know, if you agree to sign a contract for a couple of years it will stay the same. But if it comes down, that's where you lose. It's a gamble.

Interviewer: Okay, that's interesting. And if we, sorry, I can't see your name badge.

Male F: It's Male F. I didn't get a badge. I'm Male F.

Interviewer: Male F?

Male F: Yeah, I just think as, well, this, what this lady's going to do with the last one, it's because you're the better wanted -

(laughter)

Male F: I mean, with me, it's just I look at it, energy with utilities, so is that the gas and electricity, and (inaudible 00:25:37) and stuff and fuel in my car and things like that. And I think, as you said before, and it's two things. There's one, the price of it has made you really concentrate on energy because as I said, when, 20, 30 years ago I was probably paying a quarterly, not paying a month, so all of a sudden it gets to be an important item in the household so the more important it is, then the more expensive it is, a bit like (inaudible 00:26:02) is the more people sort of focus

on it, the more people, you know, the more press put, you know, things about it in there. And I think, I think there's two things for me, I think we've got to do something, say it is running, there's no doubt about that, but I think it's a global concern and as Male E said, there, you can do everything you want on this little island, but it's, you know, we're only a small part of the universe, and if China and India and these South American countries just start sticking up stuff whenever they want to put it up, without adhering to the green policies that everybody lays out, it's useless. And I think closer to home, I think the worst they've ever done is have all this competitive tendering for gas and electricity.

Interviewer: Okay.

Male F: I still believe it should be, I don't, I think, I don't think it'll ever be fixed unless it's nationalised again and then you have one policy around making it green. I think asking 20 companies to all do the same thing is just, they'll be so many profits that they're not, that's not really their intention. I see these offices with all these call centres and they're interest is getting you to buy and spend money and they probably rent out six people looking at the green bit. You know, it's like a -

Male E: Aren't they, that's all they're after.

Male F: Yeah. They're all about the shares, this year's financial dividends and not what's going to happen in ten and 20 and 30 years' time.

Male D: A lot of them want to tie you into contracts as well now, where at one time you could just jump from.

Female B: Jump yeah, from one.

Male D: From one to another, you know. If you weren't happy with it, you could move, but now. They're trying to tie you into contracts.

Male G: I know what you mean, they changed me over without me agreeing. The only thing I agreed to, luckily, I had my wife there witnessing, we agreed to listen to the tariff, and they told us the tariff, we looked at it, weighed it up and you know with juggling, and thought, that's nearly the same as what we're on so we didn't take it up. The best is we got a letter off British Gas saying, oh sorry to see you go.

(laughter)

Male G: To see you go. They said, you've changed over, we said, no we haven't. I said that you, we said, we haven't. Anyway, we phoned up said you said we'd agreed to look at the tariff. Like a say, you just no customer.

Female B: I think they can be quite intimidating as well, these companies. When they phone, when they're on the phone, when they're talking to you.

Interviewer: So, I mean, a few people have already said something along the lines of it's kind of all about profit. So the views are obviously companies, they're businesses, they've got shareholders, their job is to make a profit, what is it about this idea of kind of moving energy to businesses and being, and them making profit, being their primary kind of function. What is it about that that doesn't sit well with people? Can you put your finger on that?

Female A: Yeah, because they're looking, they're looking at profit making, but they're not looking at a long-term picture. They're looking, it's a very, very short-term view. The profit, somebody said, this year they did some just go round, this year or this

next 12 months, next two years' profit. But that's a very short-term view of things. And what they should be doing, instead of making huge profits, is ploughing that back in to some kind of research. For finding alternative energy.

Male F: They put it, I think it's a, I don't think it should be their business because it's a commodity that every single person needs.

Female A: Yeah, we have to have it, don't we.

Male F: And whether we've got the money or not, and I think that's one of the issues is, you know, all those (inaudible 00:29:24) who can't afford to heat their homes and things like that, are obviously, I mean, we've said haven't we, last week there's so many thousands of people died in March because of the snow and also it's the winter I think and the fact the winter's over. You know, switch heating off, and a lot of people have been caught out with it, and likewise for low income families and people on benefit, it's, it's a necessity and actually, and as well, it's not, not anybody's is it? I was, this electricity thing, like that, you know, why should they make money on that because, you know, I believe they think it was a free utility, if you know what I mean, say like water, you know, I think it's nearly back rounds a little bit and I think one of the issues is it's having so many companies being able to provide that has just increased the greed and this short-term vision.

Male E: They're just in it for a quick profit, aren't they, so if go for it, they'll have their backs covered, they'll have their money and good, they're off with the money, aren't they? It's like the bankers.

Male F: Yeah (inaudible 00:30:19) Because it's been like the car issues, isn't it?

Male E: Many of them, they're off work, they're on.

Male F: Car insurance is the same, I've just done it today, I've just renewed some stuff and they always get you three years for what is quite cheap. Best price around and it sneaks up you, doesn't it?

Female B: Yeah.

Male D: And then when you look at it again you think, dear me, these are nowhere near now as cheap as other people and I think it's similar to that. People are just thinking of that 12 months, let's keep them on as long as we can and if they can't be arsed looking again for an alternative, we'll just keep stacking it up and stacking up until they do. And it's not quite right.

Female A: I think they all jumped on the same sort of bandwagon, even the government, you know.

Male D: They're just interested in making money.

Female A: And they've offered this green deal scheme, the government have said that if you make your home more energy efficient, say you needed a new boiler, and put windows in and central heating and so on and so forth, then they'll offer this loan shame, like it's not an interest-free loan, but it's very low percentage loan and it sounds really good until you start going into it and the money you pay back is what you'd save on your energy bills and like I say, it sounds re-, you think, oh, this sounds good, this is, but when you actually go into it, it's a big con, and that's the government conning you. You know, you sort of think.

Male E: So you're saying you save nothing.

Female B: It's just a straight back.

Female A: Yeah, you're still paying it back and if you sold your house, then that loan, that energy efficiency loan on your house.

Male E: Go over me for the green –

Female A: Yeah, it looks great for them. But goes to the next people who buy your house, so, therefore, your house will probably not be as desirable because you buy with an energy efficient loan and you sort of said, you know, if you start going into it you think, well, that's the government sort of trying to get us all to be more energy efficient and so on and so forth by offering this loan and it's a load of trash.

Male F: Well, if they do it through one company they might achieve it mightn't they, because they just say, well, we're going back to having …

Female A: Yeah.

Male F: … providing the service, if it goes once, when we went to British Gas, and British Electricity, if you like, then they government could sort of dictate because what happens now is, as you say, it's just a little tick in the green box, this is what we're doing, they don't actually look to see if there's any benefit at the end of it or they don't sort of oversee anything or there's no policies in place to see that.

Female A: It used to be always British Gas, didn't it? In the old days, everybody had British Gas. You know, when you though.

Female C: You didn't have any choice, you didn't have any.

(overspeaking)

Female B: The electricity board was regional, wasn't it?

Female A: Yeah. It was British, British Gas and then.

Female C: And Norweb, that was it.

Interviewer: So, you think we'd stand a better chance of making these sorts of transitions maybe say from, you know, fossil fuels to renewable fuels with that sort of an organisation? You know, with a single nationalised company for instance, which I think is what we've been talking about?

Female B: Because you're not looking at making profit.

Female C: Yeah.

Female B: If it was nationalised, you're a non-profit making organisation, aren't you?

Interviewer: Well, what are the implications for that? I don't know if this would necessarily be the case, but it would certainly be an argument against it, was that prices would rise.

Female B: Well, they're rising anyway, aren't they?

Female C: Prices, well, they are rising anyway, they're going to rise even further as it becomes a scare commodity, isn't it, supply and demand. So you might as well the

price up a little bit in order to get some research in to keep us going in the future. We'll just have to bite the bullet on it because we're biting the bullet and tightening our belts and all the other clichés at the moment, aren't we? At the end of the day.

Male E: Now because of this cold snap, it's going to be going up 10%.

Female C: The British have already. Whatever anybody designs, it's householders, we're going to pay for it.

Male G: Course it is, isn't it.

Male F: What do think about product said it go up, sorry, going up for me is that it doesn't stand up because as I said, there's that many companies with so much infrastructure in place and so many of managing directors and so many dividends to pay, that surely if we did it nationally, we must make a better effort than, you know, paying out 50, you know, salaries for directors and assistant directors and infrastructure and helpdesks and all these kind of, it must, must be able to make it cheaper.

Female A: I think, at the end of the day, all it does it create sort of a society where we don't care. We've had it, you hear it from one company, then another company, then another company about saving this, saving that, and so on, and we're not stupid. It's rubbish. And in the end, you just think, well, I don't care because they do what they want to do anyway.

Female B: And the most insulting thing is when they try and con you.

Female A: Yeah, it is a con.

Female B: Yeah.

Female A: Like that green deal. It's a con.

Interviewer: So, Female B, were we round to you with the initial question?

(laughter)

Interviewer: It seems like a long time ago.

Female B: I just think of like electricity and gas. Utilities. Obviously. Where I live I can see the wind farms and a lot of people, you know, who are close to them, and you see the solar panels, don't you, when you're driving around on the houses and everything but it doesn't really, I'm like you, it doesn't really interest me, to be honest, you know, it's just a necessity, isn't it? We talked about the different companies, you know, I mean, you know I get phone calls and my husband tends to swap and change, you know, with the different utility companies, but in the end, you know, you just, I don't think there is much difference in the prices. I think when you pay by direct, everything seems to be direct debit nowadays anyway, so it just goes out of your bank account, you know, you just, you just sort to pay it. I think if sat down and you, you know, you really worked it all out, you know, I mean, it's quite an expense but it's a necessity.

Interviewer: So we can't, I mean, this has come up before that, you know, you can't do without it, I'm not sure any of us could imagine, of course, so in a sense would you have this degree of dependency on it? In the, you know, we have to have it. I mean how do people feel about that being kind of dependent on this thing that there's kind of uncertainty for in the future?

Male D: It's not so much a dependency, it's a necessity, isn't it? Everybody has to have it, you know, you need it.

Male G: It says it all when we have, when there's a power cut or anything like that. Everything goes down. Your clocks have went, there's that much digital stuff and everything in you house and.

Female C: I think, like, if it was imminent, it could be a bit more of a song and dance about it than you know, there'd be a big panic, but that fact that it's sort of, we don't know when this is going to happen, you know, it might be 100 years, 200 years.

Interviewer: So we're talking about running out.

Female C: It might be 50 years, we don't know. Sort of thing. If it was going to happen in five years' time we'd all be there thinking, blimey, you know, we'd best do something about this. But there doesn't seem to be an urgency.

Interviewer: Do you think we will wait until it's just around the corner?

Male G: Imperially, yeah.

Female A: I think that's human nature, generally. Most.

Interviewer: Hmm.

Female A: It's not going to affect us.

Male G: People respond in a crisis don't they, and that's when people respond, when there's a crisis.

Male E: It the same in world, well the world, third world countries now, they're trying to take off, so the world can't sustain all of the world's population can't live like we do.

Female A: But I think –

Male E: Depends on all the power.

Female C: I think there's a certain amount of, like, optimism because we always think, oh, they'll find something by then, you know.

(overspeaking)

Male E: The demand's there for energy. There is a demand, there's money to be made, so I'm sure that they're looking, but I don't think they've found it yet.

Interviewer: Does everybody agree that, in this kind of optimism that they will find something?

Female B: Yeah.

Male D: Yeah.

Female C: They've go to, I think.

Female A: Oh, they will do.

Female C: But, it's not that is it? It's like you said earlier on, the worry is, these up and coming countries, China and so on, the, we are just in Britain, we're just a small speck, we don't matter at all. You know, when you think of great big continents like Asia and so on using all this energy, and to a certain extent, you know, the Americas and so on.

Male F: You think we could be self-sufficient though as a country to create our own energy?

Female B: I hope we can, but.

Male F: Because I think that the bit I was talking was that ozone, green thing, that's coming, but I think from an energy thing, you know.

Female A: Exac-, that'd be great, but I think we'd be too damn soft. We get it like that.

Male E: More than the gas.

Female A: If we were self-sufficient and China suddenly decided that they'd used all their energy was running out, they'd be at us like a shot, wouldn't they? Yeah.

Male F: Yeah, it was interesting that thing …

Female A: We'll have some of that.

Male F: … you say, because when we had that freeze, they said that we were 48 hours away from running out of, but then they diverted some oil from Russia and you the thing is they're it from Russia but you didn't go, you think, what do you mean divert some oil from Russia? How does that work?

Male D: They said the prices are obviously going up because Russia are supplying China now, aren't they?

Male F: It's amazing, isn't it when you think about it. But I think, going back to this bit about, I think there is solutions out there. I think there's solutions now and I think that, actually I think they're probably out there.

Female A: Yeah, I do.

Male F: You know, there's some side of recycling way, I think it's the, I probably watched the (inaudible 00:40:37) the machines, crunching all the waste up and creating gas and this renewal energy and things, but I think the problem is, is as we said before, is there's some probably great scientific formulas out there, but the people who are, have got their hands to the tiller are saying forget about that because that's too expensive to put in place. We've not finished this yet, we're still raping them for this.

Male E: I see the prob- …

(overspeaking)

Male E: … just using what we got first.

Female A: I think it might be a bit, even more sort of global than that. I think like half the wars are all about oil, aren't they?

Male G: Yeah, course they are.

Female A: Right. And the power and the money, you don't have a war without arms, right, so the people, the countries who are selling all this, like to keep things going because it's all money. Everything.

Female C: It does make you wonder, doesn't it? If there are things in place and things that could be happening now, but aren't because we've got to keep a lot of people in jobs in all these different energy industries and maybe being suppressed to an extent because it's like putting, and they got us all to give up smoking, didn't they? And what happened, because of the pay, the revenue from all the cigarettes and cigars and whatever were being sold, saying booze now, they're trying to put the prices up. But, once again, they're going to lose the revenue.

Interviewer: So, that's really an idea called "lock-in" which is you get used to something, all the infrastructure is there, people's lifestyles kind of mould around the idea of owning a car, for instance, and you know, living here, working there, enjoying your kind of weekend in the hills and also there's a lot of incumbent interests, lobbying groups and so and so forth. And all of that kind of acts together to make any change to that system really rather difficult because so much is geared towards this.

Female A: It's got its own structure, hasn't it?

Female B: And you're going to break a structure.

Male G: I think structures breaking anyway, isn't it? I think, you know, you look at all students that are sort of leaving university now, starting life with £30,000 worth of debt, you know, how are my grandkids ever going to be able to go and afford their own house? It's never going to happen. You know, I think what will happen is like Germany, is people will inherit a mortgage here, they won't inherit people's houses.

Female A: They build another layer on top.

Male G: Yeah.

Female A: My cousin lives in Germany and she built another layer on top.

Male G: But, you know, it's must impossible, and there isn't work, you know, there isn't the work available for people so I don't see things getting better, I just, it just seems like doom and gloom to me.

Female A: Coming back to what you said though about could we be self-sufficient, if you look at.

Interviewer: I think it was Male F that posed that question.

Female A: Oh, was it? Sorry.

Interviewer: No, it's all right.

Female A: If you look back, which obviously we're too young to do it, but during the war England virtually had to be self-sufficient. We had to cope. We'd no choice. Now, we are so highly populated, isn't it that there are more people on the earth at this moment in time than there every have been ever right through history? So given that that's the situation, we've got to do something pretty radical. We'd never be self-sufficient on this island. It's too highly populated now. There isn't

enough land left to grow things to feed each individual person. Let alone provide energy sources.

Interviewer: If we can go back to this idea about science being, you know, this place where solutions might come from, but there might be certain incentives and constraints that might be, you know, slowing that down, what do people think about the direction that science goes in? So, in terms of talking about whatever solution you might, it's moved on about maybe hydrogen car earlier on, or if it's kind of carbon capture, the stuff you can put on the coal power stations, to kind of clean those, make those much cleaner sorry, rather, I mean do people ever think about the direction of science or do people just assume that scientists are working on good causes that will kind of benefit society in the end?

Male F: I don't ever see a line, a lining up of business, so I think obviously within universities and learning centres and resources, I think there's always this, this need to discover things whether they be a pharmaceutical thing or a drug or whether it be renewal energy or whatever it is, but I don't see it connecting to Shell Oil for instance or, you know, the big companies, it always seems to be somebody's discovered it within a learning resource somewhere, but not attached to a business who can take it forward. So I just think there's a misalignment with science and what it provides.

Female A: Or would it be better for science to be independent of that? Because otherwise there will be a vested interested in suppressing something maybe that's being discovered? You know, because I was saying the.

Male F: Yeah, I take your point, but I wanted, how are you going to bring it forward if you've not aligned it with business?

Female A: Yeah.

Male D: Is the end of the time, it's just something like Shell Oil, then they've got to look at improving and you know, change.

Female A: Shell are oil.

Male D: Well, just for an example, you know, I think it should be attached to a business.

Male F: Yeah, but I .

Male D: And they're working at, you know, improving, you know, refining and making things better.

Female B: But when, he says business, but then you said earlier that you thought maybe things should be that neces- nationalised so that it was non-profit making. As soon as you get business involved, you're into the margins of profit.

Male F: Yeah, I agree, I think I was just answering that -

Female B: It's like that, isn't it?

Male F: It a balance, isn't it? I just think like science within business then, I think it's scientists in business who are doing, who end up doing stuff in renewal energy, sorry, in just in energy, let's say, fracking or whatever, they're looking for, for the same solution that they're providing now, just better and cheaper ways of doing it.

Female B: Yeah.

Male F: Rather than alternatives. So I think there's grain of science that's probably not aligned with business.

Female B: Hmm hmm.

Male E: You know, I'm a builder and I mean, the main thing I've seen, government regulations brought in in selection. I mean like just started as single blades -

(overspeaking)

Female A: Cavity walls.

Male E: Cavity walls, redoing up old houses, that's to have the insulation, cavity walls, double glazing, triple glazing, loft insulation, and there in some places it's ridiculous, under concrete floors, it's that thick.

Male ?: Yeah.

Female A: Is it?

Male E: Oh, aye, yeah.

(overspeaking)

Female B: I live in an 1850s house. We don't have things like that, just have drafts.

(laughter)

Male E: Well, obviously it makes a difference, you know.

Male ?: Yeah.

Female C: Whether it's help for you, you know, whether it's healthier, you know, I mean, things like that, I think you could sort of insulate a house too much. You need a little bit of.

(overspeaking)

Male E: I have done old houses, and old houses are built to breathe, so if you insulate it, you can't breathe, you end up with condensation. I've seen that. Obviously the new ones, they are built to cope with it, but if you're doing out an old property you have to do it correct, or it's like you say, the house breathes or it lies damp.

Female A: Really?

Interviewer: If we can go back to kind of different sources of energies, energy, rather, different sources of energy and if I could just get a sense, which ones you're kind of optimistic about, maybe kind of being an important part of the future and kind of which ones you maybe think might, ought to be phased out and maybe aren't?

Male D: I think wind power. Because I mean if every home, everything runs out of fossil, you can't, you can't put those all over the place, can you, it's just not practical.

Interviewer: So, you doubt the kind of capacity, you know?

Male D: I don't know whether they could cope really, no.

Female C: But they can't supply enough energy, can they?

Interviewer: Hmm. Not, well, I mean they don't have to make.

Male E: Say in my room, so you get a day with no wind. No electric.

Female A: What is it, one windmill supplies about 12 houses or something, or 16 houses.

Male G: I think it's less than that, I think.

Female A: Is it? Something one in 12? One windmill does 12? Oh.

Male G: I sort of think it's really quite low.

Female A: So you've got 30 windmills, do you now.

Male G: Just that way a lot.

Female A: 300 houses?

Female C: You'd need one on your roof wouldn't you?

Female A: You know.

Interviewer: So, if we're not sure that really wind's worth the kind of space it takes up really in terms of what capacity, I mean there's always the possibility that somebody might be able to improve that, but if we take that for the moment, what else would you have instead then?

Male F: I think wind is, you're right, just exactly he said, if something like, I don't, the dykes of Hoover or whatever, you know, how it's improved that suction from 20 years ago and things like that, I think wind will be, you know, will create energy for us. I don't think it'll probably be as it's doing it now. But it will do, won't it? You know, you think about that, just think about that (inaudible 00:49:56) retire, you know, about 20 years ago we had that foot pump didn't we, and I'm sorry to keep going back, but they were there for everybody, and you stick it now and you think, how's it done that?

Male E: But it's only temporary. To be plugging it in, though isn't it?

Male F: Yeah, no what I'm saying, the power though, is, that power can regenerate so it's about catching it, isn't it, and somebody somewhere will use wind as an element to create energy better than it's been.

Female B: Then it's done, yeah.

Male F: So I don't think they'll sort of that's it, wind, take it off, you know, not having it. I think we'll still do it.

Female A: What was that, I can't understand why they went ahead with all that. If one windmill is only going to power 12 houses or provide enough electricity you think, why did they do that?

Male F: You go back to this though, you can't have, you can't have –

(overspeaking)

Interviewer: What do people think about nuclear, because that's a low?

Male E: I'd say that's the most efficient.

Male D: That's the way we're going.

Male E: Nuclear is the best, but obviously, it's nuclear, isn't it? It's dodgy.

Female A: Yeah.

Female C: I don't know anything about it.

Female B: My cousin's husband actually did some work up there because he was a deep-sea diver and he had to do something, he had to, they brought water in and the fish were coming in as well, I don't know what it was it had to be sorted, but anyway, I had a cousin that lived over on the Northern Irish coast and along the eastern coast of Northern Ireland they had a much higher instance of cancer and they believe it was the winds coming across from Sellafield.

Interviewer: So, there, I mean, nuclear's –

Female B: So that's dangerous.

Interviewer: Nuclear is seen as being dangerous and there are seen to being risks attached to it?

Female B: Hmm.

Interviewer: But, you know, so, experts and scientists have obviously looked at that and decided that that risk can kind of be managed.

Female B: All right.

Interviewer: Otherwise they wouldn't have built it and they wouldn't still be there, would it? I mean, if you think about the regulation we have, so, how do people feel that, you'll never really know the reasons because you were just saying earlier that you don't really know that much about it, so, I mean, for all we could know, I mean, it could be hugely dangerous and we could be, you know, ten minutes away from a disaster, or it could be completely safe. But we've got to go with kind of the expert's opinion on that. How do people feel about that?

Male E: It's like I say, we're like Chernobyl aren't we?

Interviewer: Hmm.

Male E: In Japan, they say it weren't as bad as they thought, or was it, they don't. Is it being covered?

Interviewer: As I understand it, it was, you know, it flooded by kind of a freak weather event. So, maybe if now people build nuclear power stations away from areas likely to get flooded, maybe that fixes that issue and with Chernobyl, a lot of people put it down to kind of poor regulation in kind of the Soviet era. So do people kind of believe experts when they say nuclear we can manage the risk? Because there are inevitably risks there.

Female B: I don't think the average person knows enough about nuclear power and so on, I think, you know, you'd have to be.

Male D: I think the average person knows that you wouldn't want to live on it's doorstep.

Female B: Yeah.

Male F: Or, having said that, I know I wouldn't want to be. If plans went in to say they were going to put one in the middle of Rochdale we'd all start getting genned up on it and no, I wouldn't be at all. I mean, I think, it's obviously, it can't be safe because there's been half a dozen, you know, incidents that everybody knows and there's been even some at Stockton and the likes of there where, where things have been released and you don't really know –

(overspeaking)

Male D: It does go wrong, but –

Male F: Yeah.

Female B: They've still been allowed to keep it going, aren't they?

Male F: I think they had to do it to test it almost, didn't they? I think a lot of the political fellas now are saying right, we've done that. And it's not fire safe because there's going to be some human intervention somewhere. Or some element, but certainly, you know, if some human intervention does something wrong or some nutter gets it and at least it's all nuclear. That's it, isn't it? So it's never going to be, as you just said, completely safe. I just, you know, nobody can guarantee.

Female B: If that was our only option, then you're talking about experts, and the experts are saying this is the only option that we've got, the experts then have to become more expert. They're only exp-, I mean, you've got to keep moving, you've got to keep progressing, so maybe eventually they could make it that wee bit safer. And maybe the safety measures will grow over time. But in the meantime, there is a very real danger from it.

Female A: I think we'd all feel a lot better if it was like in the middle of the Atlantic. Or the middle –

Female B: Yeah. Yes, you're right. Not in my backyard, I don't want it. Round here. But if it was in the middle of Atlantic and it couldn't affect us, if it did blow up. I'd say yeah, carry on.

Interviewer: That maybe not learning the lessons from Fukishima.

(laughter)

Interviewer: But I know exactly what you're saying.

Male D: In some desert somewhere.

Female A: Yeah, I'm with it. So long as it's not affecting me.

Male D: In a different country or a different continent even.

Female A: Yeah.

Interviewer: Female C, what do you think about nuclear? Does it?

Female C: The way that they were talking then, I was sat here listening, I'm just thinking, yeah, experts, in every walk of life they've got experts and we trust them experts. I work in the medical profession so we trust our doctors, so to me, you've got to put some trust into experts and when you were all talking then I were all, I were listening because really, I don't really know, and you know, I'm sat here listening to you all and I'm just thinking, yeah, but we've got to have an element of trust.

Interviewer: It's quite a big thing to trust somebody with, kind of messing around with atoms.

Female C: But you trust somebody with your life, don't you?

Interviewer: So would you trust the nuclear scientists?

Female C: What I'm trying to, yeah, well, what I'm trying to say, because I really don't know that much about it, I think I would trust, well, I would try and trust, that's what, my way of thinking then, this is what I'm, when I'm listening to everybody.

Male E: It's saying can you trust them, isn't it?

(overspeaking)

Female C: Do you trust, you should be able to trust an expert because they are experts.

Interviewer: Okay.

Male E: It's like a private company or something, like that were going to, or a nuclear station, it's the government aren't they, control all that.

Interviewer: Hmm.

Male E: Nuclear power stations and all that. They're not privately run are they, or are they?

Interviewer: I think it's a kind of a mixture of between, it's kind of public/private thing quite possibly only that, is it EDF, that's part owned by the French government and they build a lot of our nuclear.

Male D: They're involved in some –

Interviewer: So I think there might be private companies involved, I'd assume, but going back to experts, in set down regulations which you'd have thought would be pretty stringent.

Female A: I suppose there have been, I think it's the leaky thing, I think it's long, the bits that escape into the atmosphere, rather than one big disaster.

Interviewer: Oh, okay.

Female A: But that's from personal experience.

Interviewer: So what do people think about fossil fuels then, because we haven't spoken about kind of gas or coal for a while, we maybe did at the beginning. Is that part of the future for people? Will it be, should it be?

Female A: Well that thing that you corrected me on, what's what?

Interviewer: Fracking.

Female A: No, not fracking, no the one where we're using the –

Male E: Plastic bottles, yeah.

Female A: Yeah.

Male E: Taking the oil out of them.

Female A: Well, that sounded a good idea to me.

Female B: And that one that's supposed to save us all, this methane that.

Interviewer: So, methane is natural gas, that's what it is.

Female B: Yeah, it'd be brilliant. Problem solved. Tick the box.

Interviewer: So, methane is a greenhouse gas. So, there might be some people that argue that that probably won't save us.

Female B: Ah.

Female C: Same thing. Don't know enough about it, so. We go with what we're told, don't we? We go with the experts.

Interviewer: How do you feel about going with what you're told? Because we talked before how this was so fundamental and so important and you can't do without it and you're dependent on it. Does that sit well with you this kind of, well we'll just have to believe what we're told on this one?

Female C: Yeah, because we don't know any better. And it's always been like that.

Male G: I heard something about a mean table(?), they reckon with all the global warming, they say, if all that defrosts we're goosed.

Male F: I think it's how they relate and put into policy or actions or commands, I'm trying to think of the right word, about what these experts say. So we've had this chap on television the last few days, haven't we, because of the wind, and he was saying that the North Pole defrosting as such a rate and it's going to do A, B and C, but it's about something, well, not the television but it will, all these scientists are getting round the table saying, is it right what he's saying and do we trust him as an expert and if we do, then what do we do to stop it? Because all these experts have different opinions, so they'll be an expert that'll say, nuclear fuel, you don't want any of that because in 20 years' time you're all going to have six toes and eight fingers and children with six ears and whatnot, and then somebody else'll say, no it's fine what are you worried about, so I guess it's about trusting them experts to say right, shall we still be digging for coal? Did we stop that too early in this country for whatever reason? Should we still be digging for, you know, drilling for oil?

Male E: Are you trying to say?

Male F: Should we be - ?

Male E: Are you trying to say, if the North Pole melts?

Male F: Yeah.

Female A: Yeah.

Male E: All the seas'll rise.

Male F: Exactly.

Male E: But that is already in the sea.

Male F: Yeah.

Male E: Right, it melts but it takes up the same space. So if the North Pole melts they won't rise.

Female ?: Well –

Male F: I'm sure this fella'll tell us it is.

(laughter)

Male F: You know, I've got reason to say why, you know I said it before and I was oh, right, right. It sounds sensible. But he's saying, no, you're going to have tidal waves and everything to it. I think it's about putting all these experts together and saying, well, that's an opinion, is it true? And if it's true, what's the impact and then what's the action out of that impact?

Interviewer: So, is this a process of facts and just facts, or do you think there's a kind of a politics and an ethics to this as well?

Male G: It's a combination of everything.

Interviewer: Is it a combination?

Female B: Not so much politics.

Male F: I think there's an ethics and facts are two, yeah, two things that should be aligned, shouldn't they?

Female B: Yeah, they should.

Interviewer: So, if you're having experts around a table, I mean, will it just be scientists?

Male F: You'd have to have a project manager in there to stop all.

Female A: Downgrade it.

Male F: Yeah. Well, it wouldn't go, would it? But, yeah, I think we're going back to this, you know, degrees of being global and being universal or certainly this lot are being, you know, a national one. So yes, somebody has to get all these in a room and then say, right, this is what we're going to do. Because if they didn't do that and it went back to old individual business, they'd just wouldn't agree, they'd shut the door and say, we won't listen to this, we're just going to carry on doing what we're doing.

Male G: Yeah, I watched something on global warming, obviously there had like two sides to it. But you listen them. One was against global warming, said it's not and one said it was, but you listened them both, they both sound right to me like, well.

Male F: I change my mind every week depending on what I read.

Male G: They both make sense.

Female ?: Yeah.

Male F: They do.

Female C: Yeah, I see though, like with the sort of global warming. If you think, do you know, like, we are just a small speck in time, and the world started billions of years and we've had ice age, we've had desert conditions, we've gone back to another ice age, and then, you know.

Male E: We're only monitoring the last hundred years.

Female C: There's some warming up, aren't they? Is it still warming up?

Male E: They said we're still coming out the ice age.

Female C: Yeah.

Male E: The last ice age.

Female C: We're coming out of ice age.

Female B: Well, that's why it'll probably, you'd like, wouldn't you?

Male E: Yeah, global warming, like you say.

Female B: I don't know whether we're coming out or going back, but it's going to happen whether we like it or not. It, in our lifetimes.

Male D: I think you're right, but I think what they're saying is.

Female B: It's billions of years, you know.

Male D: I'm not sure it is, because, I think you're right, I think there's going to be circles and ice age and stuff, but, if we keep doing things that we're doing, as in –

(overspeaking)

Male D: So it's going to come a lot quicker, that's what, we started off where we said ages ago they said, don't worry, it's going to be another 200 years. All of a sudden everybody's seems to get 50 years closer.

Female A: Yeah.

Male D: Next year they might say, no, we're in some serious trouble here.

(laughter)

Male D: It is going to affect us. I mean, that's the issue. That some things that are going to.

Female A: That's do it.

Female B: First kicks out.

Interviewer: So, so.

Female B: Yeah, but I think this is where the education thing comes in.

Male F: Yeah.

Female B: It should get in, get over the China and Indonesia and all these that are doing all this massive damage, rather than just concentrate on us because we're try, I think as a country we're doing our best to try and save it, but the rest of the world don't give a monkey's really.

Male D: That would be interesting, wouldn't it? Because that's what they?

Female B: That's what I mean, yeah, go over to Indonesia where they're chopping all the trees down, but could they care less?

Female C: But America refused to sign something a few years back.

Male G: Yeah, remember …

Interviewer: That's was the Kyoto. So when we're talking about these decisions and these sorts of choices, what do you think, what sort of factors do you want to see prioritised? Whomever kind of makes these decisions whether it's scientists or the government or a combination of both?

Male E: I think I believe the scientists over somebody from government. I don't trust them.

Female C: No.

Interviewer: So, when you're talking about different sources of energy and whether we go for that or that or a combination of this and this and whatever the percentage is, what's, I mean, what's the idea behind that policy? What do you think we should be trying to achieve?

Male D: I think just to slow down, you know, sort of what's happening at this present moment in time, so it's about getting something that's got some longevity. So if, as I say again, if all this digging for coal and drilling for oil is having a massive effect on the atmosphere and causing whatever it is, then the factor should be, like we still want energy, but we don't want to carry on doing that.

Interviewer: So it should be a long-term kind of solution but it should also kind of guarantee energy, so in terms of security of energy or? And then also that there's going to be enough there? So we talked about windmills and how.

Female C: Sustainable.

Interviewer: Are they called windmills?

Male G: Yes.

Male D: Wind farms.

Male E: Wind turbines.

Interviewer: Wind turbines. And how we may be a bit sceptical about whether they'll do that. Are there any other, what about price, what sort of role should that play?

Presumably there must be some sort of level where you're saying, no that's too much.

Male D: Well, what would they do? You know. I mean, let's just imagine that it went up ten times as much. But what would we do? We're still. We put down individually.

Male E: The last one. I mean we are doing now, aren't we?

Male D: I thought about something the other day, remember the 1970s when we had them three days a week, when they cut the power off.

Male E: I remember that, yeah.

Male D: Oh good, because I would agree with you. We didn't care, did we? Because we only had three channels.

(overspeaking)

Male D: We did thought, didn't we? And people weren't bothered were they?

Male E: No.

Male D: Well, imagine there when we had three days where the power.

(overspeaking)

Male F: I think, I think prices'd say, well, hang on, I'm not buying that, not because it's dear, I'm buying it to just to, I'm not buying it because it uses too much energy. I think you'd cut down right in your house around. You know, I've had it in our house when my kids come up from uni, there might be five laptops going and, you know what I mean, and I'm watching Sky TV and then somebody's doing some, the music's on, or, you look round at all the electricity's using. So I think what'd happen, the price, you'd just start governing yourself, and I don't think people do govern themselves.

Female A: It went up dramatically but I think like, you know, like you said with the direct debit, we all pay direct, most people pay by direct debit. When they send you your bill and say, right, it's going up by £10 a month, you just think, right.

(overspeaking)

Female A: You don't like it but -

Interviewer: What I'm going to do now –

(overspeaking)

Female A: Still try to lock in.

Interviewer: Yeah.

Female A: I think our mind-set will have to change.

Interviewer: Hmm. Okay, well, what, sorry Female A, I'm going to move on.

Female A: Just carry on, I'm so sorry.

Interviewer: It's all right, don't worry. I'm just going to put a, I'm just going to stand a board with some information on, and that's what we're going to kind of talk about for the remainder the session which is just under an hour and that's to 8.30pm, isn't it? Not 9.00pm as I said on my, yeah. So I'm just going to, and, so this is what, just in the context of the discussion we've been having and I'm interested to see what kind of role this may or may not play. So I decided not to bring, I had the stand but it was quite big and I thought in this room it'd like kind of. So can everybody kind of make that out? And I'll kind of read it out anyhow.

Female A: No I can't.

Interviewer: Okay.

Male D: Me neither.

Interviewer: All right. I'll read it out. So this is about hydraulic fracturing. So is that something people in the North West of England I'm merely assuming a lot of people will have heard of this.

Group: Yes.

Interviewer: So, just, I'll go through this, given you've all heard of it, but I'll go through it anyway to make sure that we're all on the same page and so on. And so it's got a relatively long history in America actually, but it's start, they've started to take that very seriously over there and people are starting to see whether it could be done elsewhere in the world, including under Lancashire there's a place called the Bowland shale.

Female C: Oh yeah. Top of Bowland?

Male D: Top of Bowland. Yeah, on top of Bowland.

Interviewer: And so, there's these two technologies that have been refined to make this possible, hydraulic fracturing and directional drilling which is just so the well can go from vertical to horizontal so you can go within the kind of strata where this rock is and get a kind of maximum sub-sera(?) like that, but the main factor is that the price of energy means that it's economically feasible to kind of go to these lengths to get what are fossil fuels out of the ground, so that's the major thing that's changed in the last ten years to really kind of accelerate this. And so, the process works by drilling that hole into the, it's to get unconventional fossil fuels, I should say first, actually, and so that can be gas, or that could be oil, trapped in shale rock and there are various other types of unconventional fossil fuels, you might have heard of coalbed methane maybe. But most often people talk about shale gas, particularly in Lancashire, and so that's gas in the shale rock and so you drill into the shale rock and you pump liquid at high pressure into that rock and intentionally cause fractures in the rock. And so when the rock fractures, these molecules of gas escape and flow back out and then you have natural gas, methane, that you could sell onto the grid and so on, and we can either use it in our homes, for our heating or cooking, or it can be burned in turned into electricity. So that's, that's why people are doing it. So these fracking fluids, this high pressure pump down the high pressure is 99.5% there or there abouts water and sand and then there's 0.5% additives in that that perform various functions, like keeping the sand suspended and keeping the cracks open and stuff like that. There might be some bioscience to come back to.

[cough]

Interviewer: So, what people might have heard quite a lot about this, maybe it a lecture, so, what are people's impressions of this.

Male G: What, they have earthquakes or something?

Female C: I wouldn't like it under my house. It's fine, it's a brilliant idea, do it in open countryside or whatever.

Male E: In America they had it where the tap water's setting on fire or something, it's got into the water.

Female B: I wouldn't like it under mine.

Interviewer: There was a scene in the documentary from about this, where that happened and we might talk about that a bit later on, but that hasn't necessarily been proven that there was definitely fracking that caused that.

Female A: It's a bit erm, when you think of strata that we all live on, you're breaking up something that is quite essential to our whole lives. I mean, I live in a very, very old house and there was coal mining underneath it long, long ago. And when we bought the house, I bought it by myself originally, and it's, it, we had to have all these surveys and tests and in the village where I live, you know, looking at this, because of this coal mining people got up one Monday morning and an entire butcher's shop had just gone straight down into the ground.

Interviewer: Yeah, so that's subsistence.

Female A: So that's an experience, I mean it didn't happen while I was living there, but the ground just opened up. Now, I'm panicking.

Interviewer: So, you'd be concerned about how?

Female A: I'd be very concerned.

Interviewer: Creating any more holes in the ground and then. Okay.

Female A: If you could put it back together after that'd be a good one.

Male G: How do you once you've created fractures in?

Female A: Exactly.

Female B: How do you put it?

Female A: You can't. Because you're (inaudible 01:11:27) aren't you.

Male G: It's the foundation of this country and if that happens all over the country, I think it could make –

[cough]

Male G: It worries me and I think it would make them very unstable or I'd have that feeling of.

Female A: Yeah. Well fracture means break, doesn't it?

Male G: Absolutely.

Female A: You're breaking something.

Male F: It's that cheat thing I talked about earlier.

Female A: Yeah, exactly.

Male F: And that'd be worrying. And that bit, I think was it Southport? Where they first did, it was round Southport where they first, the first one and then there was a slight, was it Blackpool and there was a slight, slight tremor, wasn't there? Just round there. And then there was that big debate about whether the fracking caused it or not. And actually I don't think there was any clear evidence either way, but it was that bit around the company were obviously doing it for money, you know, wouldn't take it, wouldn't take it seriously I thought, or wouldn't accept any blame whatsoever that they'd just been drilling in this place on the coast wherever it was and then coincidentally ten days after there was a couple of tremors and.

Interviewer: We'll talk about that in a bit more detail.

Male D: It's right, isn't it that there's no real outcome from that. And if they want to go and do that all over the country, course, people's houses.

(overspeaking)

Interviewer: What do you make of this Female B? How would go about it?

Female B: Erm.

Interviewer: I mean, do you have a gut feeling, because we were saying before maybe, someone was saying that intuitively kind of nuclear just seemed, there was something inherently dangerous about this. Do you get a similar feeling or is it different somehow?

Female B: Yeah, I think, just have to, I don't know, I'll just have to leave it to the experts and you know, it just has to be done, doesn't it and. I don't know anything about it to be honest.

Male F: I think the fact is we have to get energy from somewhere. It's whether that's the right way to do it or not, and you know we're talking a little bit, I think it's the. We seem to have this thing about drilling into the earth to get stuff out. You know. Why shouldn't it be another alternative? You know, why do you have to keep just getting our energy, it's not reusable energy. Yeah, why's that all? You know it's almost as if.

Male E: Say it's a fossil fuel again, isn't' it? That burns and then. Carbon.

(overspeaking)

Male F: They'll be back in another 40 years' time when that runs out.

Female A: Yeah. By it's very nature fossil fuel is something that has been embedded down in the earth and we have built our world on top of it. Once you start.

Male D: But then you start destabilising –

Interviewer: All right, okay, I'll put the next board up and we can talk about that which is really about why some people are excited about this, why they think it's a good idea and then kind of I suppose it's the arguments for this, it's the possible benefits of it.

[cough]

Interviewer: I should have said at the beginning, by the way, because we've all had a drink and so on, so if you do want to use the toilet, I mean, do feel free to leave of your own accord, you don't have to ask for permission or anything like that. [pause] All right, so again, I'll go through this board for people struggling to make it out. I may should have done A0 rather than A1, but that wouldn't have been fun dragging it all around the country. So, "A Golden Age of Gas" which is a quote from the International Energy Agency. And so, I don't know if you can see, there's a map here which is kind of an idea of where there might be kind of shale formations where fracking could possibly go on, occur. And so there's a lot kind of North America, and South America as well, South Africa, Algeria, Australia, lots in China, and dotted all around Europe. So this is kind of all over the place. You know, that could potentially be fracked to get either shale gas or shale oil, another unconventional fossil fuel out. And so I'll just got through some of the language on this board which is, so there's the Sunday Times in 2011 calling it a wonder gas that could cut your energy bills. There's this idea of it being a "game changer" in the er, there's this Time magazine saying this rock could power the world, so there's some obviously very optimistic language used to described this. Does anybody see?

Male D: Well, there's got to be equally negative language as well, hasn't there?

Female B: Yeah.

Male D: They'll be some matching against that would be negative.

Male E: Yeah, but you say cut the energy bill, but anything that's too cheap, the government automatically put a tax on it. I mean, look, your petrol, it's 80% tax. So really it should be dirt cheap petrol. But because it's too cheap, the government tax it.

Female A: And because we're being over absolutely the habit

Male D: I mean, look at the pasty tax was something like that, they were trying to put a tax on that, weren't they because it was too cheap.

Male F: Just warm ones though so you're all right.

Male D: Yeah, it's cheap, it's a tax on it.

Interviewer: So this, this has caused energy prices to fall in America, the United Stated of America. What?

Male D: Have long have they been doing it in the States?

Interviewer: Well, I mean, as, on the other board it said I mean the first, the first hydraulic fracture process was in 1947. But really, it really started to be done on a large commercial scale in the last decade really. Maybe even, eight, seven or eight years, but certainly in the last decade.

Male D: On that probably wouldn't be enough time to see what the real effect of fracking was.

Interviewer: Okay.

Male G: Where are we now for earthquakes and tremors aren't they as well. What from seven or eight years, you know, I'm guessing they'd be a little bit later than that.

Female A: For all we know they might be sort of, you know, accelerating again this end of the world, they're trying to make energy cheaper and so on, but they might be sort of bringing the end of the world nearer. You know. They might be. You don't know.

Male G: Yeah, at what cost to the environment.

Female A: They don't know what they've done.

Interviewer: So is anybody kind of persuaded by sort of things on this board, I mean, there's this idea of price drops that have happened in the United States. There's this idea from Cuadrilla, who are the company who've been doing the kind of exploration and development in Lancashire.

Male G: Well, I know for us the price won't go up because the actually Minister for Energy actually saw the masking and said it's cheap, like you're saying, it's cheaper. I said well, and he wouldn't say. He wouldn't' say it would be cheaper.

Interviewer: Okay.

[cough]

Male G: They kept asking but he wouldn't' say we'd get it cheaper than normal gas.

Interviewer: So you'd be sceptical.

Male G: They'd probably keep it the same as it is now, they won't make it cheaper, they won't. Definitely. I know they wouldn't. They wouldn't make it cheaper.

Interviewer: So you'd be sceptical about whether they could actually guarantee that.

Male G: Yeah. That said, it would probably provide it at the same price as what it is now, the, well, extra tax onto it. As I say, it won't get cheaper.

Interviewer: I mean, let's just say, if for argument's sake this could and you know cause prices to fall in the United Kingdom, you know.

Male D: Oh, yeah, it would be a good thing.

Interviewer: Would that be worth taking a look at at least?

Male D: You'd have to say, you know, if you said it was, if you said it's going to be in the States for the last decade, then, what percentage has them fuel bills gone down in the States and has it gone down all over the States or just in particular?

Interviewer: So, I mean Cuadrilla are are saying that in the last ten years the price of gas in the US has dropped to just a third of its original price.

Male G: A third of its original price, which is, yes. It's not going to stay though, is it?

Female A: It says there at the bottom though, it says there is a year, 30 year lifespan.

Female C: Lifespan.

Interviewer: That's what Cuadrilla have said, that's what they're saying in, in Lancashire. There are other parts of the country where this might be able to be done. That's their figure.

Female A: So that's like immediate. What about. You know, what, same thing, what about the future generations?

Interviewer: So, 30 years doesn't strike you as particularly long-term.

Female A: No, it's very short, isn't it?

Female B: You know the first place they started it in 1947? Has it had any impact on their environment and their land?

Interviewer: So that's a question you'd want?

Female B: Yes.

Interviewer: You want to ask somebody?

Male D: You would before that, wouldn't you? You know, if it was going to cut your fuel bills and stuff like that, but again, I wouldn't want to live in the area where they're doing that.

Interviewer: Okay.

Male D: You know, I'd be happy to have the cheaper gas, but I don't want that on my doorstep.

Male F: You'd want to buy it from somewhere?

Female A: It will an issue.

Female B: We're talking about the immediate again. You know, 30 years it's like, yeah, it's good, it sounds good, doesn't it, immediate, all your gas bills, so you reap the benefits.

(overspeaking)

Female B: Well, what about after that, and what about if

Male E: But then again, what are the alternatives, aren't there?

Female A: Well about the ground started collapsing in 30 years' time? We don't know, do we?

Male D: Well, the roads collapsed, you know, the cars won't drive on them. I don't think, I say, it's not, it is short-term I think, and there's not enough about renewable energy that's sustainable, you know.

Male G: And what's the possible damage of 30 years of that? You know, is it worth 30 years for the long-term damage that it could do.

Male D: They go hydroelectric, don't they, Iceland I think, they're mainly hydroelectric now, aren't they?

Female A: Yeah.

Male D: Somebody used to go there.

Female A: Has North Sea gas gone? Have we used all that up now?

Male G: I think there is still some.

Female A: Still going strong? Because I care about, when did that come in? In the 60s or something? North Sea gas when they swapped everything over, didn't they?

Interviewer: Yeah, I think there's still some of that left.

Male D: I think it's running out though, isn't it?

Female A: So what's that? Fifty years, isn't it?

Male D: Yeah, but I think you'd probably sold that to all over the world instead of this bit, can we just do it for us?

Female A: But that was supposed to be the saviour, wasn't it?

Male D: Yeah.

Female A: North Sea gas.

Male D: It was the saviour.

Female A: And how long have we had of it? Fifty years? Which it's, you know, in our lifetimes so it's not that good, is it?

Male D: I think Maggie Thatcher sold a lot of it off to make a profits on it, didn't she?

Female A: North Sea gas.

Interviewer: Okay, that's interesting, I think because you're kind of itching to talk about some of the risks maybe, of, well, we'll talk about that now, I think.

Male D: Always look on the negative side.

(laughter)

Female A: Then the positive.

(laughter)

Female A: That's the surprise, isn't it?

Interviewer: All right, so same again, okay, I'll just go through this. So potential hazards, seismicity has already been mentioned and so two earthquakes in 2011 about a month apart, and actually, Cuadrilla are saying that, I mean, it, pretty much, almost certain that they caused those earthquakes, or then there's a report that they actually did and then the Department of Energy and Climate Change reviewed which basically concludes to that effect, but it's more or less certain that they caused those earthquakes.

Female A: Well, that's a no no then, isn't it? You don't need to go on any longer. It's a no no.

Male F: It's nice that they have done that and come back.

Female C: Been honest.

Female A: Admitted it.

Male F: Yes, they've sort of done a sort of mirror to themselves.

Female A: You can't have earthquakes.

Interviewer: So, the magnitudes were 2.3 and 1.5 which are quite low. And the Royal Society along with the Royal Academy of Engineers looked into this and they think that this is a manageable risk. And they look back at kind of, they looked at seismicity in this country and in particular seismicity that was caused by the coal mining industry, and they, and they said that actually, they're kind of comparable to what we might expect coming from coal mining and so that's part of their reasoning why they think actually that's acceptable.

Female A: Yeah, but, how do they know? What they going to do when they get an earthquake at 8.5?

Interviewer: So you –

Female A: They're going to backtrack like you wouldn't believe.

Female A: Simply don't do it. You know.

Male F: Yeah, I mean some of the buildings that have put up wouldn't be earthquake proof would they?

Female A: You can't risk it.

Male F: And it's all right if you're starting on a brand new landscape, and you said everything else'll be flexible and.

Male G: But at the end of the day, they're fracturing the foundations, aren't they, of you know, Great Britain I suppose, they're fracturing it and the amount of rain and water and waste that they, you know, the long-term effects and damage, the possible damage, it could be catastrophic and I think.

(overspeaking)

Female A: There must, there must be other ways. Zero.

Interviewer: You were saying?

Female A: Why do we have to have a risk? Do you know?

Interviewer: Sorry. You were maybe saying that you'd kind of almost be expecting a surprise so if we could just expect things to be around 2.3 and 1.5, would that be an A?

Female A: Yeah, it's not good to do any damage is it, 2.3 or what, you know, we can.

Interviewer: They say, they say you're, you might feel on the surface, but some action.

Female A: How do you really know, you know, they guessing aren't they?

Interviewer: Again, these are, so these are what we'd call experts and earlier on we were saying, well, you can't help.

Female A: No, but they're still guessing. Because it's for them, it's very lucrative to do it.

Female B: The experts, they're taking all the available information, and they're formulating a theory from that, but it is only just a theory.

Male G: They're calculating this.

Female B: Yeah, and it is, that's exactly, it is a calculated risk. Now, it's all very well for them to say, well, it is worth that risk. It is not worth that risk for the people who get harmed by it.

Interviewer: So you think if we're going use risk, work out probabilities of something bad happening and even if it's very small, you're saying that the people who are likely to have to deal with the consequences of those risks should have a say in whether that's an acceptable risk? Does that strike everybody else as kind of being fair?

Male F: I think it's that technology, it's a small risk, isn't it. Sorry, we just bypassed that quite quickly, this is more it, I think, but what we've been saying is, we don't actually believe it's a small risk.

Interviewer: Okay.

Male D: They're saying it's a small risk except they probably don't live there.

Male F: Yeah, if that was proven and it really was proven and we were all, you know, bought into that, then you'd think, well, all right then, we'll live with that. But I think it's now the fact we don't believe that it'd be.

Male G: But the place in Blackpool it was an experimental one, wasn't it?

Female A: It's not long-term.

Female B: If this is long-term is this going to keep carrying on?

Male G: That's right, but in a short-term experimental there was two earthquakes and I know they weren't massive, they weren't big, but there was two, nonetheless, you know.

Female A: But even the mildest one can affect your house and your foundations, can't it?

Male D: Well, when nuclear power came out they said that was safe as safe.

Female A: You know.

Male G: Risks can spread and cracks can spread, can't they?

Female A: Go back to the experts and just say, right, absolutely fine, you know. We'll listen to you when it's zero risk.

Interviewer: Okay, talking of calculated risk, if we talk about ground water contamination, have people heard about ground water contamination in relation to hydraulic fracturing?

So that's the idea that somehow the fracturing fluids gets into the water table. And there was that 0.5% additives, that's, it differs a bit company to company, but the general consensus is you wouldn't want that in your drinking water, so it might be toxic, basically.

Female A: So, if you don't die in an earthquake, you might die drinking poisoned water.

(laughter)

Interviewer: So there's a headline from the Guardian, they're saying fracking may be causing ground water pollution says Environment Protection Agency report which is the American regulator. So, that regulator are doing a big report that concludes next year, just in time for me to have finished my project and not be able to read it. But, so, that reports in 2014, so really at the moment nobody is sure whether this has actually occurred in America, as I've said, here's that scene that you were talking about from that film with the tap being set on fire, but a causal kind of link hasn't been proven between that and hydraulic fracturing. And so, there's a scientific debate and there's a degree of uncertainty about whether this has happened, whether it hasn't happened, and if it has happened, how it's happened. So, up here they're kind of talking about what, if methane and these other kind of fracking sort of chemical have gotten into the water, how has that happened? And they're saying there's three ways that might have happened. The first one is natural methane migration, which for most geology around the world if, they see as being very unlikely. And so the second one is this not particularly, not very, what was I going to say? It's a bit of a mouthful phrase, vertical propagation resulting from reduced hydraulic fracturing, so that's the idea that the fractures that you cause can travel vertically far enough from where the shale is to where the water table is. And there's scientists here who have done the study looking at all the evidence we have from kind of around the world from the behaviour of fractures, and he actually thinks the typical distance between the shale and the water tables may be one, 1.5 or two kilometres, so, quite a big distance for it to travel vertically and he's actually said that the probability that a stimulated hydraulic fracture extends beyond 350 metres, so, not even, you know, a third of the way it would need to go, is approximately 1%.

Male G: That's not a fact is it, that's a probability what he's saying there. But it's like, you know, what you were saying Female C, when you go to a doctor, or a surgeon, you trust the surgeon so you have to have some trust. But there's three different theories that when you do go to a surgeon, and he's fixing your heart or you know, it's a tried and tested, you know, method, so you do put your trust in people like that, but every scientist is going to have a different opinion of that so who do you trust and what, you know, where do you go with your?

Interviewer: So, on the more definitive answer.

Male G: There's three different theories there already, isn't there?

Female A: And if you think about that, he's saying it can, travel the kilometres, you say one and half, one point something kilometres?

Interviewer: The shale might be about …

Female A: The shale.

Interviewer: …three, four kilometres down, the actual fuel would like to be not as straight.

Female A: No. And an earthquake. How far down does that happen? And that affects us. You know. A volcano. How far down does that happen? That's affects us. You can go, whatever happens in the core of the earth is going like that, isn't it? It's happening on the top and it's magnified.

Male G: If it can travel into the water, then it get into the atmosphere, can't it?

Female A: It's the distance isn't it though? That is not a big, that is in terms of our earth, that is a tiny, tiny distance.

Male F: And I guess it's turning that probability into a fact and bearing in mind, you know, did they do that test on the same geology area that they did the stuff in Blackpool or Southport, or did they do it with the one in South Africa?

(overspeaking)

Male F: Yeah, that's what I'm saying, so it's all about, you know, having a real factual sort of, yeah, we've drilled down here and we've left it six months or a year.

Interviewer: So, from the impression I'm giving you here and I appreciate that, you know, it's only about an hour actually we've been talking about hydraulic fracturing. Is the impression you're getting that we actually don't know enough yet?

Female C: Yeah.

Group: Hmm.

Interviewer: What if, what if could never guarantee that we'd be certain about these things. What if these things were just very complicated and we could actually never be sure?

Female B: Then you can't risk the country for 30 years. You can't risk people's lives on not knowing for 30 years. You can't.

Interviewer: What do you think Female C? Do you?

Female C: Exactly, can we risk it?

Interviewer: And so, so, unless we achieve the certainty, would you kind of be inclined to be very cautious? Would you not do it unless somebody could tell you, could tell you for sure this will not happen?

Female C: Are they ever going to be able to tell us?

Male G: Yeah, can they research every surface that they fracture is going to be different, isn't it? You know. So they can say it's absolutely, this is categorically what is going to happen in this surface. Two miles down the road it might be a completely different surface and we're going to have a different reaction.

Female A: Yeah, and to us, we don't know anything about this. But we, it seems like common sense that if you've got something like rock and you chip away at it, all over, you're chipping away, it's –

Female B: Eventually going to.

Female A: It's going to weaken, isn't it?

Male G: If you fracture it's going to split.

Male D: Same with a fracture, it's there for eternity, isn't it?

Female A: And the, you know, this is us talking.

Male F: How come they picked that location? In this country?

Female C: Because that's where the, all the stuff is.

Interviewer: So there's a big, they must have had an idea that there was a big shale formation down there, I mean, this country's been geologically mapped pretty well and so I, within Lancashire, within the ground above that shale, I don't know exactly why they've gone on that site rather a mile down the road.

Male F: Because for me, I mean, they obviously did it in quite a populated area, though Blackpool is not known for its –

(overspeaking)

Male F: Because you think they could have tested it somewhere where it wouldn't have done as much damage if there was a seismic thing, just.

Female A: Did they not test it a bit out to sea? I thought there were some tests that went on and it, you know, that like the tremors hit the land.

Interviewer: I'm not sure, I haven't heard about that.

Female A: I thought they tested it a bit out.

Male F: It just shows the values that they have, you know, they don't value the residents or something like that very highly do they, so obviously they took into consideration that's where they were going to get more oil of or more fossil fuel out of that bit. Whereas saying a lot to, we might only get ten years out of this one, in the middle of where nobody lives, then let's do that there. They didn't do that, did they? They said, let's do it here and sod the consequences.

Interviewer: So.

Male G: It's like everybody has it's life, doesn't it? It's lifespan. And then they move on to something else, but it's the damage. The lifespan does.

Interviewer: So, France has put what they call a couple of states in America and a couple of other countries in Europe actually have put what they call a moratorium on this so it's a temporary ban and they're saying we're not going to do it until we know, kind of what you've been saying, until we know a bit more about it.

Female A: Well, good for them. That's a bit of common sense, isn't it?

Interviewer: Would that your, would that be the approach?

Male F: Yeah, definitely.

Male D: That would get me vote.

Male G: That's all they're going to be doing it in America.

Male F: Too early for the last eight years or so isn't it?

Interviewer: In an intense way, in a commercial scale, only really in the last decade. So what if we would have somebody here, I'll pay devil's advocate I suppose, are we not missing out on an opportunity there?

Male F: Well, it's not going anywhere is it?

Interviewer: Okay.

Female B: You're asking us to –

Male F: Well, it's not like a decision you've got to make now. It'll still be there.

Male G: You're right, yeah.

Male F: It's always there, isn't it?

Female C: We don't have to take an opportunity, do you? It's a choice.

Interviewer: That's interesting. And so, we were talking about risk and so we've got, there's a couple of other risks that, you know, there's risks and kind of issues so the water consumption is quite high, there's various levels of kind of good practice in terms of recycling the water but, but still, the water consumption seems to be high, you need a lot of water to do it. There's stuff to do with storing what they call the produced water and the water with these chemical in, how much they can recycle, where are you storing it, how are you disposing of it, there's stuff to do with that. There's stuff do with traffic impact and so on. There's also this idea of scale up of risks for fully developed nationwide industry so, you know, there's, I think there's three wells in Lancashire at the moment that Cuadrilla have, so to kind of get the kind of benefits that we're talking about at the last board, you'd needs hundreds of wells in Lancashire and maybe thousands in total around the country. So does, how do people feel towards that, this idea of scaling up of risks?

Male G: And they don't know how they're going to sort of dispose of the water that that generates? You said about storing that or, storage, so where do they put that when that builds up?

Interviewer: There are certainly questions that need, I think need to be answered.

Male G: There's far too many.

Male D: Do they remove all the chemicals or the chemicals that when they put all the gas, is all that chemical left down there?

Interviewer: So, you'd be wondering about?

Male D: Are they left down there, is it? Does everything come out, the chemicals and everything?

Male E: It's in the water so you have to make sure about that.

Male D: Because obviously if the chemical's left there.

Male F: There'd be no guarantee that they'd thought the water'd bring all the chemicals up that they'd brought down, would they? That's what you're saying, isn't it?

Male E: Yeah.

Interviewer: So you'd really be interested in the whole lifecycle of this well? What happens to it after 30 years when they go? If they do go after 30 years.

Male F: I think they're saying that France have made a really good decision.

Male G: Yeah.

Male E: With fracking, it's only fractured so far, but then again you've got where you've actually drilled down, that's a weak spot. It stops it coming.

Interviewer: Well, that's the third one where, isn't it? Kind of the well casings and the bit that actually passes through where the ground water is, that's the other alternative how it might get in there if that hasn't been properly cemented or maintained or whatever. So, we're talking about kind of experts disagreeing and that's a bit of that there. How do you feel when you see experts having a disagreement, one of them's basically saying that you haven't proven that it is fracking that's causing this and the other one's saying, yeah, that's true but you haven't proven that it isn't fracking.

Male F: So nobody knows.

Group: Yeah.

Interviewer: So there's an uncertainty.

Female A: It's good that they're having that dialogue, isn't it? Because it turns all sort of uncertainties to the fore.

Interviewer: Okay.

Male D: But nobody's signing from the same hymn sheet, are they? They're all.

(overspeaking)

Male D: No, you're right, I agree with what you're saying.

Female C: Let's have some more –

Male E: Well, you look at the big oil leak in the Gulf of Mexico.

Interviewer: What do you, what?

Male E: I mean that's supposed to, they're supposed to experts, everything. It came apart, never happened.

Female C: They're human, aren't they, not divine.

Interviewer: So there's the possibility of mistakes quite apart from whether this is going to be inherently dangerous. What do, I mean we've been talking about risk a bit, but we've been talking actually, you know, that's only a percentage, and we are uncertain here, I mean, what do you think should be informing the decision if it's not at the, if it can't be facts right now, and maybe it will never be facts, informing that decision, what do you think should be motivating the decision on this?

Female C: Safety. Safety. It's got to be safety, hasn't it?

Interviewer: Hmm.

Female C: I mean, it's a joke really, because the amount of health and safety that goes on in everyday life, and yet they're prepared to do something like this that can endanger thousands of people.

Female A: And think about it, we live in a litigious society. My goodness me, you just need one terrible accident from that, the company'll get closed down with the sheer volume of claims against it.

Male D: Well, like you say, it comes down to money again. Like you say, if they know there's that much of it, they can get, they'll be making, it'll be cheap for us, but they'll be making some money out it, won't they?

Female A: Bound to be, like you say guinea pigs. Why should we be guinea pigs for France and this that and the other. Why, you know, they've said no to it. So why should we test it?

Female B: And they're less densely populated than us.

Female A: Yeah. Especially with it being Lancashire.

Female B: Did they choose Bowland because it is the least populated area in Lancashire or something?

Interviewer: I don't know if that informed in their decision, it, they obviously thought it had a really good prospect of producing a lot of gas.

Male D: Yeah, I think it was something to do with the foundations and what it they were built on it, like chalk site.

Female B: Was it?

Male D: Hmm. Thinking about it.

Interviewer: So, what is it that kind of concerns most people, most on this board? Or would you not really pick a symbol for now?

Female B: I just think negatives that way.

Interviewer: That's a good point. Do people agree? Are these possible benefits and we've had kind of scepticism about whether they'll actually come off. Are they worth, do they seem worth the risk?

Male G: The negatives make you, well, they give, they certainly made me quite opinionated on the fact that I had been so concerned that I wouldn't believe it.

Female C: You can't take a risk with life. So, very slightly, I know, like my nephew did, had a research grant at the Middlesex Hospital for breast cancer, he's an oncologist, and he started to do the tests and they had the control group. The test was so successful, the control group had to come in. You don't risk lives. He didn't risk those people's lives to find a theory about something, and you can't do it with that either.

Interviewer: That's interesting that you raised that story because often people are, in the medical context, people are little bit more, maybe a little bit more trusting. Is that something you'd go along with?

Female B: I do, yeah. Definitely.

Interviewer: So, what is it about, because there are sometimes risks in new medicines that we develop.

Female A: Well, you go along with it because in that context if you stopped it and said, right, this is so successful, the people that my control group are going to have this treatment because it's been successful. And that's why we trust them more than that.

Male D: And most times in the medical profession you do sort of take risks because the outcome is going to be one thing or another. You do know that if you don't have this treatment, or you don't try this, you could die. Or you may not. But we have to take that. You're given that choice, aren't you?

Female A: Yeah, you're given the choice.

Male D: It's the choice that you take that, but something like that.

Male F: The big one for me, around choice, is that bit around, it's not usually done for profit. You know, you don't obviously put that ulterior motive into effect. I know you can do in the pharmaceutical bit of the drug, but certainly, if it's about your heart and your body and some kind of cure for cancer or whatever, you tend to think, they're not doing it to make money. That's not one of the factors that's going into you making your decision, it's purely based on getting somebody better, so, and this is all about money, isn't it?

Female A: Yeah, this sounds a bit shallow really. It's like saying to us all, right you can save £30 on your energy bill, but in 30 years' time, 30,000 people might lose their life. You know.

(overspeaking)

Male E: There are risks, and they're saying there are risks, but you can guarantee there's probably more risks.

Male G: That's it, I just say there's risk. Probably worse than what they letting on.

Interviewer: I'll put the last board up. Sorry, cut you off a little bit there. So this is the final one of these. So it was the budget, on Wednesday was it last week? And so George Osborne, he's quite excited about this, when he has a high profile speech he often says a couple of lines about shale gas, erm, we had the quote on the second board about a generous new tax regime to try and get the industry up and running, on Wednesday he said, for him that shale gas is part of the future. And so unconventional gas, I pre-empted that, I designed these boards before he said that but "Tomorrow's Energy Source?" I mean for you, is shale gas part of the future? Maybe, do you think it will be and do you think it should be and will there be a -?

Male G: I think it might be but.

Female A: I think he's doing it to get the votes, isn't he?

Male D: Tory politician.

Female C: A politician will say to you we're going to save money and a lot of people will just hear that.

Female B: Yeah.

Female C: When we've got all that information.

Female B: You don't know the consequences behind.

Male G: George Osborne doesn't live in Blackpool where they've done that, believe me, you know, most people are not going to be anywhere near that to make these decisions are they? And that's the thing.

Male D: I'd be really concerned about government making that decision, you know, a government that might not be in in the next four years and the factors, as we said earlier on, about making that decision, is it a financial fact? You know.

Interviewer: So you'd be interested in kind of really knowing what the motivation was?

Male D: Of doing it yeah. So obviously, America have come in and they can see it as a massive money making generating thing. They're not coming to save the world, are they? Not coming to adhere with our green policies and all that sort of stuff. They're coming in just to make money.

Male F: You've not said anything about it being sustainable, renewable, better for the earth, better for everybody else. It's not going to be that.

Male E: It's not, it's better for, it's not better for the environment, no matter what.

Interviewer: We'll talk about that a bit now because I mean, so in terms of how this relates to climate change, and you know some people are saying these two things aren't mutually exclusive, we can kind of exploit shale gas and respond to climate change. And the way they say that is this idea of a transitional fuel. So at the moment I think we're still 25% of our electricity still comes from coal. There or there abouts, or at least that's 2011's figures I think actually. And so over here the Tyndall Centre, which is a climate change research institution at Manchester University, they're saying that shale gas, subject to best practice extraction, so that and combustion, so there's that caveat, but will deliver power at lower emissions per unit of electricity generated than is possible from coal fire generation. So, it's, in a sense, in terms of burning it and producing emissions, it's better than coal. So, and one argument is we can replace our coal that we use with this and it would be step in the right direction.

Male D: That's only an argument for the use of it, not for the extraction of it.

Interviewer: Hmm hmm. That's true. That doesn't take into account the last board. What do other people think about these kind of transitional fuel argument? Could I persuade anybody?

Male ?: No, not me.

Interviewer: Why not, what's the con?

Female B: Too much risk.

Group: Risks. Risks too high.

Interviewer: Okay, I mean, so just to kind of finish that left hand side of the board off, so the Tyndall Centre actually kind of don't really like this transitional fuel argument. And their reasons are kind of two-fold. There's this story here from another of their reports about how the US is exporting coal so instead of burning gas instead of coal, they're still getting coal out of the ground, they're just exporting it. So obviously the transitional fuel argument doesn't work if you just, if that coal's just burned in another country, which is, you know, an obvious point. And then secondly they're talking about timescale as well. 2050 is an important, a significant date for things like the low carbon transition plan and the Copenhagen Accord which are kind of international, one's an international agreement the other one is a kind of government programme that are aimed at preventing the worst consequences of climate change by keeping temperature rise within a kind of 2°C limit and then that's seen as preventing the worst consequences of climate change. And so they say between now and 2050 there's not actually that long to get an industry up and running, exploit the industry to kind of exploit the shale and then perhaps in the future go from shale to something else or scale down at least how much shale we're burning. So they're just saying, you know, it could take two decades to get the industry up and running because the UK is quite different to America and there are all various sorts of reasons why it would take longer and so I think it's 2030, 33 rather, and then that doesn't leave us much time to first of all kind of up the game, get up and running, exploit the gas, and then maybe turn the tap off at some point. So, my question about that, sorry that was going through that was quite rambling, and I know that people are really worried about the risks actually, so maybe, climate change is another thing on top of that that just kind of weighs in one direction. Do people trust the kind of political processes we have to kind of make these long-term choices? Do you kind of think that we all finish these transitions, if you see what I'm saying?

Female B: No.

Male G: I think political decisions that were made ten, 15 years ago are coming back to bite us on the backside now, so why would you trust them, you know.

Male E: You like saying their just in it for themselves, in it for their elections.

Female A: They're in for a short-term, aren't they?

Male E: Yeah, exactly.

Female A: And this 20, 30 years down the line, they're probably not going to be politicians any more. So, and really, what they're looking for, any politician, is looking to win an election and any politician that stands up and speaks the truth, if it's unpalatable to the party, gets told to be quiet.

Interviewer: So, following the kind of, the Tyndall Centre, basically the fear they're putting forward is the idea that actually, kind of 30 years down the line, maybe there haven't been more earthquakes and ground wells contamination. The government might kind of just quietly change its mind and say, actually, we'll exploit this for as long as it lasts. Is that a fear that people would kind of also have or do you think we could actually kind of control ourselves in that situation?

Female B: I think it's like Female C said, that you know, that the one point something is going to end up as an 8 point something if that's what they do.

Female C: I don't, I think it's a different issue. Do you know, we're talking about a global thing and we've already said that it's the other countries like the Asian countries

and so on that are damaging sort of energy, you know, the green, the green thing. I don't think, our parliament should have much say in it really.

Male F: No, I think once it's.

Female C: You know, it's a world, it's a world thing. It's not just to do with England. This is to do with Lancashire. This is why we don't want it. Because it's to with us. And it's immediate, but everything else they're talking about is, it's too global. It's the whole world, it's not just us.

Interviewer: So, does everybody agree that they feel kind of more connected to the previous board in these kind, these kind of issues to do with climate change are a bit more remote and take, are of secondary importance.

Group: Yeah.

Male D: I think we should take a new set of promises but.

Female C: I do. I mean, it's this "not in my backyard", isn't it? We don't want it. And that's it.

Female B: But even if it wasn't in our backyard, the implications for everybody are quite serious aren't they?

Female C: Yeah.

Female B: Wherever this thing is done, the implications for people living around that area.

Female C: Yeah, but if it's done in Britain the implications are, and especially in Lancashire, the implications are for, you know, Lancastrians, aren't they?

Female B: Well, that's British people.

Interviewer: I've an interesting point on this, sorry to but in a little bit, but I think it was Monday, what we on now, Wednesday? I think it was Monday, there was an announcement made by Centrica who own British Gas, they'd struck a deal with an American company, to, from 2018 they'll be importing kind of by tanker and turning the gas into liquid and they can ship it across the sea like that, so they'll be importing fracked natural gas from the United States, and so, as soon as 2018, in our gas fired power stations, we'll be burning American, natural gas that came out the ground in America, using hydraulic fracturing. So, given that might be the case, and we were saying, we've been talking about nimbyism a little bit and you were saying we don't want this in our backyard. Would we be happy to burn this fuel that had been fracked out of somebody else's backyard, not just from another part of the UK but from America?

Male D: Well, we won't have a choice, will we?

Female C: Well, that's the Americans' choice, isn't it?

Female A: Well, very selfishly, yes.

Interviewer: Okay.

Female A: Because if it was happening in America and it saved £30 a month off your fuel bill, you'd be very tempted to say, oh, that sounds good, yeah. You'd do it. But.

Male D: What about if that's where our gas is coming from. You won't have a choice.

Female A: Yeah, but ultimately it's very selfish. I don't, consequently would the Americans think the same way? If we were saving them 30?

Male D: Well, they're selling it us, aren't they?

Female A: Well, that's what I mean. If they bother, would they bother about the risk to us?

Interviewer: There's a counter argument to that which is that it's, it says that the people that have the benefits from this, and the people that face the risks are maybe two different sets of people. So, you're talking about, okay, price drop's actually quite a universal one, but in terms of kind of people making money from this, that might not be the person that faces the possible kind of risk in ground water contamination. How does that effect?

Male D: It's never bothered us buying, buying oil off the Middle East and or in the Gulf when they had that leak the other –

Male G: It's been going for hundreds of years, it's never been a conscious thing that, you know, it's an available product and you buy it. Which is a bit like France wouldn't be too worried they were buying it off us, would they? We didn't make that decision, well, actually, they made that decision, hopefully, to stop it, but that won't stop us from procuring it because somebody else is doing it. We're not forcing them to do it.

Female C: Also you've got to think about the size of countries. Whatever you do here has an impact within a two mile radius. You could do something in America that didn't have an impact in a hundred mile radius.

Interviewer: And so that's exactly down here, Deutsche(?) Bank are saying they're just waiting for a shale gas revolution outside the US will likely be this kind of, in terms of both price and the speed of which high volume production can be reached. And they've got quite a few reasons for that, but one of them is population density and they're saying there's a big difference.

Female A: It's so important, yes it is. Do you think, huge swathes of America, that are unpopulated. We certainly haven't got that here.

Interviewer: So, if I ask you to kind of, it's kind of 8.25pm, so if I can ask you a final question which was kind of thinking back over what we've discussed, I mean, I'm getting the sense that I've kind of depressed you all actually a little bit.

Group: Hmm.

Interviewer: So I mean, have you felt.

Male F: Depression.

(laughter)

Interviewer: So, I mean, what are the major concerns for people about the discussion we've had tonight and is anybody kind of taking to the hills?

Male D: Like you say, we buy America's gas, and say, when theirs runs out, they come after ours.

Female B: Yeah, are we going to have to –

Male D: So, we've used all theirs up.

Male G: My concern is the government might even just decide it without consulting us.

(overspeaking)

Male F: The government will fiddle this all somehow.

Female A: They've said, what a good idea and no matter what we think, they'll just go ahead. But we now know the risks and if that's the frightening thing.

Male F: I think you've made us, it's funny how people do, you asked the question, and I'm not sure if you did or not at the beginning about, you know, would you go for an alternative gas, and you put it in that bit and transitional fuel as well, and it might be better for the environment etc, I think probably you might have got a 50/50 split, I don't really know, but I know now that after you've, we've got all the information, that 100% of people say, we're not having that. So I think it's really interesting what they do do from a decision making point of view.

Female C: I mean, how do they think we're going, they're like me and Female B that really, you know, before we started this, didn't really know lots about it. And now, you just know.

Male F: You've definitely vote no now, wouldn't you, I think everybody would. Would anybody not vote no now, given the choice?

Male D: Yeah, but how many people in Britain will have the opportunity?

Male F: That's what I'm saying, yes, but not many.

Female A: It does –

(overspeaking)

(laughter)

Male D: We'll start a road show. Let's have a road show.

Female A: Or if we could so good on YouTube that people would pay us.

Male F: Well, what's you thesis is going to be, enlightened.

Interviewer: All right, well, yeah. So, I'll kind of, I think we'll kind of bring the discussion to a close now, but just before I kind of, I call that a debrief, I think it always sounds alien, I'll debrief you.

Female A: Sounds like something –

Interviewer: Yeah, exactly. But, yeah, thank you all very much for coming. Pretty much you're travelling here and back it's your whole evening that you've given up to be with us, so thank you. And yeah, so, I'm researching into kind of the social acceptability of hydraulic fracturing and I was kind of, I suppose I'm a social scientist in training really. That's, so it's the kind of social science side of this that interests me and I kind of want to demonstrate a couple of things like, first of all I want to demonstrate that kind of people do want to talk about this, which is probably the

easiest thing to demonstrate because at every group, even those quite remote to this have been Newcastle, so, it was very interesting talking about this. Secondly, I kind of want to demonstrate that if you go about asking people in the right way, then non-experts are kind of perfectly capable to coming up with really kind of quite sophisticated judgements about this which I think previously, it's not really much the case anymore, but there's maybe this old-fashioned idea that the public might be a bit irrational about this, they might kind of, you know, you can't kind of trust them at all. Anyhow, I'm hoping to demonstrate, along with a lot of other people these days, that that's not the case and what, the last thing I want to demonstrate, I suppose, is that there is kind of a political and and ethical and a social side to this, beyond it being a discussion about facts. First of all because I think we actually don't have the facts at the moment and I think most people would agree that there's uncertainties about this. And secondly because, even if we did have the facts, I kind of, I look at science from a kind of sociological perspective as kind of a cultural activity, and I think there's lots of values and assumptions that goes into the production of a fact, and so I think actually there's kind of an inherent politics to science and so I think there are certain values and assumptions, certainly in hydraulic fracturing, and in talking to people, I basically want to get people's views on this and I'll be using your words to try and construct, see what arguments I can construct and see if I can demonstrate all three of things hopefully. So that's my research and does, I mean, does anyone have any questions just to finish off?

Male E: Do you think they'll push it, push it through, this fracking or?

Interviewer: No, no, no, no, I must kind of push it through, I suppose I've got to come at it from quite a balanced perspective, but what I really want, what I really think should happen is we have a public debate about it, because I think there are kind of political and social sides of it which, you say, oh, we just leave it up to facts and sound science, I think that, the possibility of us publically debating that side of things, well, it's just up to the experts to decide in a room, isn't it? And I don't think it should be.

Female C: Have you had that kind of response from other groups?

Interviewer: Obviously the fact that we're in Lancashire and this is precisely the reason I came to Lancashire, has coloured the group in a certain way. So, as this idea that it feels very immediate and very nearby has certainly had an effect, I think. But I mean there's certainly been concern about this up and down then country, but maybe not as keenly felt as.

Male F: Them southerners won't be too bothered.

(laughter)

Female C: Well, it could be them.

(laughter)

Interviewer: Before you go, what I would just say is, if you're interested in, kind of, when I finally write it me sending you a summary of my thesis, if you would be interested, if I just leave a pile of paper and a pen out, and if you could just jot your email addresses down. There's no obligation of course, but if you'd be interested in me sending that to you. I mean, don't feel obliged. That's somebody else's from last night.

[background chat and goodbyes]

[End of Transcript]

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