



Fracking: A Citizens Deliberation

Preston, Lancashire 2016



A report prepared for the University of Cambridge,
with funding from the ReFINE
consortium: www.refine.org.uk

Acknowledgements

Thank you to the members of the project who placed their trust in the process and the facilitators. This diverse, inspiring group of Preston residents came together to share their opinions and experiences with each other and us in the expectation their deeply considered and independent conclusions will form part of the wider often hotly contested debate on Fracking. Thanks also go to the volunteers from Runshaw College who gave up their spare time to deliver recruitment letters across Preston and to talk to people on the streets. This project was funded by the ReFINE consortium. Please see www.refine.org.uk for more information.

About Shared Future

We are a community interest company primarily serving the North West of England, and with associates based across the UK. Our aim is to provide an excellent service that makes a difference to communities and individuals and works towards a fairer, more equal society.

Our mission is to move those we engage with towards greater individual and collective authority and autonomy, by supporting their ability to act wisely, confidently and in community with others. Since setting up Shared Future in 2009, we've built a team of experienced consultants and practitioners with a diverse range of skills. We work together on worthwhile and stimulating projects that reflect our personal values.

About the authors

Report prepared May 2016 by Peter Bryant of Shared Future CIC. High standards have been used in the preparation of the information, analysis, views and projections presented in this report. No legal responsibility can be accepted for any loss or damage resultant from the contents of this document. It does not necessarily represent the view of Shared Future in relation to particular policy or projects.

www.sharedfuturecic.org.uk



Contents

1. Introduction.....	4
Why undertake this deliberative process?	4
The Process	5
Oversight Panel.....	5
Oversight panel membership	5
Recruitment	6
Participant demographics.....	6
2. The sessions	8
Session 1: An introduction.....	8
Session 2-5: Deliberation and hearing from others..	10
Session 5: Preparing for the recommendations:	15
3. The Recommendations	20
Appendix 1: Session 1: 'What is Fracking?'	22
Appendix 2: Commentator transcriptions	23
Appendix 3: Oversight Panel: Ways of Working Document.....	40

1. Introduction

This deliberative process looked at how people feel about Fracking when they are given an opportunity to learn more about the topic and consider and discuss the issue as part of a group. The goal was to stimulate discussion and deliberation on a contentious subject and to better understand how people process information and discuss the subject. The project brought together a diverse sample of around fifteen residents from Preston, Lancashire over four evening sessions and a day. Participants heard from a range of ‘witnesses’ or ‘commentators’. During the sessions, led by a team of independent facilitators with extensive experience in deliberative process facilitation, participants were given an opportunity to question the commentators, share opinions with each other, to deliberate, challenge each other and ultimately reach a set of conclusions.

The group considered the following two questions:

1. *What are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed?’*
2. *What recommendations would you give to Government on the future of Fracking in the UK, if you were given the opportunity to do so?*

The process was overseen by a project Oversight Panel whose job it was to ensure the project design was fair, balanced and rigorous. The work of the Oversight Panel was guided by an agreed ‘ways of working’ document. This document stated that all members of the Oversight Panel *‘are serving in a personal capacity and so any contributions made do not represent the views of their respective organisations’*.

The Oversight Panel consists of the following members: Chair: Dr. David Reiner (Senior Lecturer in Technology Policy, Cambridge Judge Business School, University of Cambridge), Dr. Grant Allen (University of Manchester), Dr Oliver Escobar (University of Edinburgh), Mark Linder (Bell Pottinger), Doug Parr (Greenpeace),

Professor Zoe Shipton: (University of Strathclyde), Professor Mike Stephenson: (British Geological Survey), John Thrash: (eCORP).

This report is a summary of the process followed and a record of the conclusions of the group, and will be made publically available. Our role has been purely to facilitate the considerations of the participants. At no point does the report seek to interpret any of the information gathered. As the facilitators of the process we have taken every effort to be impartial and to document a citizen led deliberation about a complex and often highly contested issue of public concern. A detailed analysis of the findings will follow this document by David Reiner of Cambridge University.



Why undertake this deliberative process?

Fracking and its role in the UK is a hugely important issue for politicians grappling with the energy challenges we are faced with now and in the future. Gauging public opinion is an important consideration, but often this is seen through the lens of media reports, lobbying and public campaigns, with opinion polarised on each side. Surveys give us a clue what individuals think. However they don’t help us understand what citizens will conclude if they are given the

time and space to be able to deliberate at length with each other and consider a range of differing perspectives; to share opinions, to challenge and disagree with each other, to appreciate other viewpoints and ultimately come to their own conclusions. The Fracking Citizens Deliberation aimed to bring together a diverse 'mini public' to share their initial opinion, listen to each other and external 'expert witnesses', to ask questions and then deliberate their way towards a set of 'refined' conclusions.

Please note: Fracking is the commonly used name for hydraulic fracturing, but is used within this context for the entire process of Shale Gas extraction and collection.

The Process

The project was initiated in June 2015 and was co-designed by Peter Bryant of Shared Future and Dr David Reiner of the University of Cambridge, who is leading the overall project on public attitudes. This was followed by the formation of the oversight panel, the selection of the best location to undertake the deliberation, agreeing the questions for the deliberation to consider, identification of potential commentators and finally the recruitment of the participants.

The Inquiry took place on weekday evenings (and one Sunday) in April 2016 and consisted of five sessions. An average of fourteen people took part over the five gatherings completing some sixteen hours of deliberation. During these informal and relaxed sessions, those taking part were encouraged to think and talk about the issue, to share opinions and to challenge each other. A number of 'experts' ('commentators') agreed by the members of the Oversight Panel, spoke to the participants and were in turn cross-examined.

Elements of the Fracking Citizens Deliberation were based upon the model of the Citizens' Jury. Deliberative processes such as Citizens' Juries have been widely praised for their ability to allow citizens to question the 'expertise' of others, to appreciate the knowledge and opinions of others and after intense deliberation

to strive towards producing agreed conclusions which are for the public good.

During the final session, participants spent time reflecting on their discussions and producing a set of recommendations.

Oversight Panel

Central to the success of deliberative processes such as this is the engagement of a diversity of key stakeholders who meet separately from the Citizens Jury as an oversight panel. The role of the Panel is to do the following:

- a) Ensure that the project design is fair and rigorous,
- b) Agree on the question to be posed to the citizens in the process,
- c) Suggest topics to be considered by citizens in the process,

Oversight panel membership

All members of the Oversight Panel *'are serving in a personal capacity and so any contributions made do not represent the views of their respective organisations'*.

The Oversight Panel consists of the following members:

Chair: **Dr. David Reiner** (Senior Lecturer in Technology Policy, Cambridge Judge Business School, University of Cambridge),

Dr. Grant Allen (University of Manchester),

Dr Oliver Escobar (University of Edinburgh),

Mark Linder (Bell Pottinger),

Doug Parr (Greenpeace),

Professor Zoe Shipton: (University of Strathclyde),

Professor Mike Stephenson: (British Geological Survey)

John Thrash: (eCORP).

- d) Identify commentators/witnesses best able to present on these topics,
- e) Monitor the process of citizen selection,
- f) Advise on the form and dissemination of the findings

One of the most important roles of the panel is to identify and agree the commentators who present at some of the sessions. Due to the contentious nature of the issue under consideration, Oversight Panel members agreed to sign up to a ways of working document (see Appendix 3).

This agreement laid out very clearly the roles and responsibilities of the membership. This included a commitment to not attend jury sessions or be able to influence the deliberations of it.

Over the course of the process the oversight panel met on four occasions (via Skype) as well as making decisions via email. Peter Bryant (lead facilitator also took part in all oversight panel calls).

After having been presented with suggestions for the themes of each of the five sessions, oversight panel members went about the task of suggesting potential commentators. This long list eventually led to the identification of five commentators.

If it proved impossible to agree on a suitable commentator it was agreed that two commentators may present at each session. All sessions were audio recorded so that Oversight Panel members could check that the facilitation is unbiased.

Recruitment

A mixed method approach to recruitment, as agreed by the Oversight Panel was used. The aim was for a sample profile that was balanced in terms of age, gender, ethnicity and education background.

Recruitment took place in November 2015, through the delivery of one thousand recruitment letters delivered direct, door to door to every third house within neighbourhoods in a



Participant demographics

Demographic breakdown of the fifteen people that attended two or more sessions:

Gender:

Females: 9

Males: 6

Age:

20-35: 4,

36-45: 6,

46-59: 3,

60+: 1

Ethnicity: White: 9, Asian/Asian British: 4, Black/Black British: 2

Educational background

- GCSE/O level/CSE: 1
- Vocational qualifications (NVQ1+2): 1
- A level or equivalent (NVQ3): 5
- Bachelor degree or higher (NVQ4): 7
- no formal qualifications: 0
- other (Btec 1-3 HVC 1-2): 1

one mile radius of the Preston venue. This was carried out by a team of briefed local student volunteers from Runshaw College, who were uninformed of the topic of the process. Conversations on the street (through approaching every third person that was seen) during the delivery of letters, was another recruitment method employed.

Forms were returned in the freepost envelope attached (or taken to a local community centre).

Each participant was offered the incentive of a £20 shopping voucher for each session they attended and if required support with any childcare or transport needs (or any other support needs as appropriate).

This process produced a long list of 45 potential participants. The subject of the deliberative process at this initial stage of recruitment was only in the most general terms (i.e. 'an important issue facing Preston and Lancashire'). Due to unavoidable delays with other elements of the process, the original meeting dates had to be changed. As a result it was a further two months before the applicants were re-contacted.

Part of the aim of the process was to have a balance of people who are supportive of Fracking, neutral and uncertain about Fracking and those that oppose Fracking. When the 45 applicants were re-contacted they were asked a question about their opinion on Fracking. Some failed to reply while others were unable to make the new dates. This gave us a list of 26 people who were both interested in continuing and were available for all the new dates.

The new short-list of applicants were asked:

What is your view on Fracking? do you:

- a) *Strongly support it,*
- b) *Slightly support it,*
- c) *Neutral/uncertain about it,*
- d) *Slightly oppose it,*
- e) *Strongly oppose it*

None responded that they strongly supported Fracking, three slightly supported it, eleven were

neutral/uncertain, six slightly opposed and seven were strongly opposed.

In order to ensure we have representation from both sides of the argument we offered places to a total of seventeen people. Eleven of whom were 'neutral/uncertain', three people who said they 'slightly support it' and three people who said they 'slightly oppose it'. Sixteen different people attended the sessions with an average attendance per session of fourteen.

All sessions were facilitated by Peter Bryant and Jenny Willis

2. The sessions

The first four sessions took place in the evenings (6:30-9pm) at the Media Innovation Suite at the University of Central Lancashire in Preston.

Session 1: An introduction

Experience of previous deliberative processes demonstrated how important it is to develop a warm and friendly environment from the outset, to begin the process of supporting strangers to become a coherent team.

Session One (April 11th) introduced the participants to each other in a relaxed manner. After hearing a brief introduction of the history of the project and the process ahead, participants started to get to know each other through an ice breaker activity.

The aim of the first session was firstly to enable participants to learn more about the project and secondly to allow them to talk about Fracking before receiving any external input.

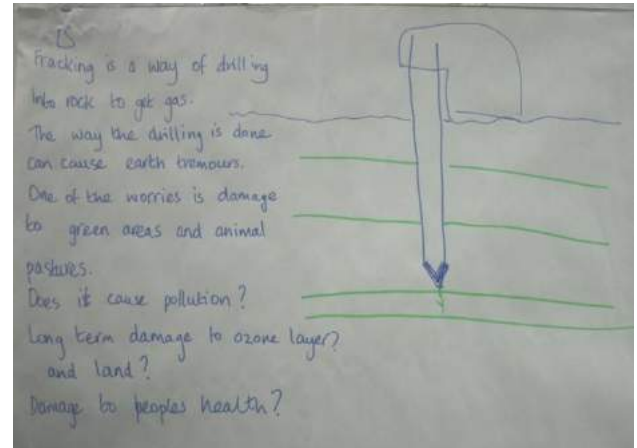
After the introductions participants were asked to go into pairs and to write and draw the answer to the question

'What is Fracking?'

The pairs produced the following sentences and drawings (photographs of all the drawings are in the Appendix 1)

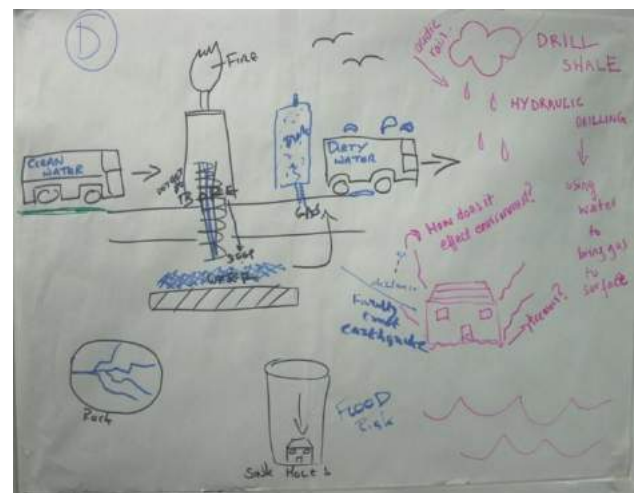
1. 'Fracking is fracturing the earth to release shale gas which is then collected and used as fuel. The process also forces water to cause cracks. Worries/concerns: are the cracks dangerous? Do the cracks/gas cause explosions? Is it hearsay or fact that earthquakes are caused by Fracking?'
2. 'A drill goes into the ground to extract shale gas which is later used as energy. Effect: water can become contaminated'.
3. 'Extraction of shale gas through drilling of some sort causing fracturing of rock for gas to be forced out'.

4. 'The extraction of gas from shale rock. The gas is forced out of the rock using highly pressurised water. Shale rock is located underground, deep underground'.



5. 'Drill shale - hydraulic drilling - using water to bring gas to the surface'.

6. 'Fracking is a way of drilling into rock to get gas. The way drilling is done can cause earth tremors. One of the worries is damage to green areas and animal pastures. Does it cause pollution? Long-term damage to the ozone layer? and land? Damage to people's health?'



Participants were then divided into two groups and asked to identify what they felt are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed? Each group was then asked to try and rank these factors.

‘What are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed?’

Order	Group 1
1	Local residents and their safety
2	Must benefit national economy
3	Balanced understanding of the facts. Both sides widely heard. Different people affected, residents, companies, scientists.
=4	Local residents must agree to it.
=4	Minimal impact on people and communities, be able to put things back the way they were.
=5	Environmental –wildlife. Will it be affected?
=5	Environmental- water pollution.
6	Sustainability of other options.
7	Fine companies should not profit.
8	Economic considerations. Is it beneficial to the local economy? Long-term prospects – what are they? Are they sustainable?
Order	Group 2
1	Effect on environment - land, animals, nature, water pollution. Long and short-term
2	How it affects the ecology of the countryside / urban areas. Sinkholes?
3	Linked to cancers/health? Water
4	How many countries allow it? Any lessons learned?
5	What systems if any will be in place to monitor the impacts?
6	How will it affect the next generation? Environmental and economic
7	What happens to the water? Is it contaminated? Can it get into the water supply?
8	Level of public awareness/education?
7	What impact will it have on the local economy?
8	Who profits from the drilling?
9	People’s property – buildings insurance covered?
10	Before fracking – measure of density of ground, constituents and strength deep underneath and how many miles ground is safe after effects?
11	How many years will it be viable?
12	Is it for private/public use?
13	What alternatives – electric cars/windfarms?

Session 2-5: Deliberation and hearing from others.

The process now moved into the Commentator phase.

All commentators were sent a commentators briefing paper prior to their session. This was usually followed up with a telephone conversation with David Reiner.

Each commentator was invited to talk for 15 minutes on their topic and encouraged to use clear, simple, easy to understand language. Facilitators and participants used a red card system where people are encouraged to show the red card if they are having difficulty understanding what is being said. PowerPoint presentations with lots of text were discouraged. After having made their presentation, the commentator was asked to leave the room to allow participants the space to talk with each other about their learning. In small groups participants were then asked to think of any questions for the commentator. These were written with marker pens on pieces of A4 paper. The commentator was then invited back into the room and asked the questions identified during the previous activity. Participants decided if the questions were to be asked by the facilitators or by themselves. This slot lasted a further 25 minutes.

Finally, time permitting, in the absence of the commentator participants were asked to reflect on their learning and deliberate with each other.

Session 2: Current energy challenges facing the UK

Professor Jim Watson: (UK Energy Research Centre):

A full transcription of Jim Watson's presentation is in Appendix 2. After having heard the presentation participants wrote and asked the following questions:

- Would it be possible to be completely 100% renewable energy? (Ireland, Norway, Austria)
- What do they do with the toxic water after the Fracking process?

- Why has Fracking not been done here yet?
- When you mentioned 'enough power to put lights on' can you clarify yourself? Will Fracking help this situation?
- Where will we export to? If anywhere?
- What is going to replace powerplants? What happens immediately after they've gone?
- Energy consumption is dropping but we import more rather than producing it like we used to. Does that mean the drop in energy consumption is not mirrored globally?
- Does being in the EU have a significant impact on our power resources in terms of supply, cost?
- If 'most' energy sources are in decline what research is going on to find more sustainable alternatives?
- If solar power is the way forward for cleaner/cheaper way to produce energy why has the grilling/energy companies dropped the price it purchases surplus energy at?
- Given that some of our power stations are coming to the end of their economic life we know that EDF are finding it difficult to justify investment in new projects and we are pressing the Chinese to invest in UK infrastructure/power stations. Why is the government not doing more to invest in energy security?
- How much shale gas reserves is the UK estimated to have? Will we still need to import from Qatar/Norway?
- Would it make our country more of a target if we start Fracking in England/UK?
- How would Fracking affect our energy bills?
- What is the process of producing bioenergy and heat?
- Wouldn't it be more efficient to burn hemp instead of wood?
- Do we need the gas or can we get our energy from renewable resources (Norway/Iceland/Austria)?
- What will happen to CO2 (waste disposal) storage underground what will be the advantage and danger for storing underground (earthquakes)?
- If Fracking went ahead how much electricity (kilowatts) would it produce? Will it be enough for one part of the country e.g. the Midlands?

- Is the use of shale gas cleaner (more environmentally friendly) than the gas we use now? If not, given the gradual phasing out of natural gas use surely the whole Fracking argument is already redundant?

Session 3: The basics of shale gas exploration

Liam Herringshaw: (University of Hull)

A full transcription of Liam Herringshaw's presentation is in Appendix 2. After having heard the presentation participants wrote and asked the following questions:

- How many miles deep underground is Fracking required to extract shale gas?
- What will happen if we get oil together with gas?
- We calculate approximately 16 years supply of shale gas. In terms of other extractive industries this appears very short?
- Based on the information available now (regarding shale gas quality) is it worth proceeding with Fracking operations?
- What is the best way to establish if there is enough shale gas?
- Has Refine considered any after effects of Fracking for example what happens to waste, what happens to the land, what happens if people live locally etc?
- Is the technology to extract likely to change?
- How do you use a sample to calculate the amount of shale rock in a certain area?
- Have you done research in other areas or just Lancashire?
- Which of these rocks would be best to break someone's window?
- Who is funding refine and what is their purpose?
- What risk assessments are being taken into consideration in regards to Fracking?
- What do you think to Frack for gas or not?
- Who can we trust to provide the general public with independent unbiased facts, when even research will be funded by interested parties?
- From the reserves we can only use 5%, what will happen to the excess gas stored or exported? How will they transport?



- Is the wastewater toxic or can it be treated?
- What happens to the well/site at the end of the well/fields life?
- Is there shale oil or just gas?
- Is American shale the same components as English and could we learn from their experience in the business?
- Are US and Canada the only two countries where Fracking is conducted on a commercial scale?
- How do you get water into the rock?
- How do they know Lancashire is rich in shale?
- How much more research is needed and planned into oil extraction from chalk shale?
- What chemicals are added to the water used for Fracking?
- What other information could be gathered from exploration when looking for shale gas?
- From your figures will the gas only last 16 years, the overall cost is it going to be worth it?
- How much damage has been done with conventional drilling to the land and how does this compare to Fracking?
- What is chemical feed stock referred to in the research handout?
- What effects would there be of the exploration of shale gas?
- Will it not be worth looking to the USA and learning from their mistakes etc. prior to commencing any Fracking operations?

Session 4a: Implications of proceeding with Fracking in the UK, at the local level, at the national level, at the global level

Jamie Peters: (Friends of the Earth)

A full transcription of Jamie Peter's presentation is in Appendix 2. After having heard the presentation participants wrote and asked the following questions:

- The countries that have banned Fracking have done so because of what?
- Can Fracking pollute the food chain as in farm/livestock i.e. mad cow disease and how bad will it impact our wildlife?
- From the leaflets I see that a lot of things 'could' happen (risks to health) but what do you think 'will' happen?



- Was the Blackpool incident a real earthquake or a natural tremor?
- Where if any has agricultural land been affected by Fracking? Be specific.
- You mentioned taxpayers paying for cleanup how accurate is that? Considering BP cleanups?
- Has any country been successful in Fracking i.e. financially prosperous, no health or pollution problems?
- What are the main implications for health? Any examples?
- Taking our human rights into consideration and the known health risks. Why do you believe companies will be able to frack near water supplies seeing as they need permission?

- Why don't we invest in nuclear energy as an alternative?
- Why does London get to choose if Fracking happens in Lancashire?
- Why has Little Plumpton and Roseacre been chosen? Where is Roseacre?
- Can we reduce the health impact of Fracking by purifying the wastewater? What are the health impacts of drinking this water?



- Have countries actually banned Fracking or were there more on economic grounds?
- Regarding Denton (Texas) when and why was Fracking banned there?
- So what health implications are there due to Fracking?
- Texas banned Fracking was due to lobbying from the large oil companies or something else?
- Please expand on the effects in relation to climate change?
- Are Barbara and Pat members of friends of the Earth? If so would their experience not be biased then?
- The flyer says 26% of the country are in favour. Have you been around the whole country?
- So the earthquake in Blackpool, five years ago, was it a genuine earthquake or was it just tremors and was it really Fracking that was the cause?



Session 4b: Implications of proceeding with Fracking in the UK, at the local level, at the national level, at the global level

Corin Taylor: UK Onshore Oil and Gas (UKOOG)

A full transcription of Corin Taylor's presentation is in Appendix 2. After having heard the presentation participants wrote and asked the following questions:

- How do we know Fracking for shale gas is being regulated with the cuts in the Department of the environment?
- What is the main motivation of your organisation? Money, profit? Making the country self-sufficient?
- How long does the construction phase last?
- (Referring to one of the photographs handed out) is this a Fracking well? What does a typical Fracking well look like?
- (Referring to one of the photographs handed out) how did these wells originate, where they Fracked?



- Are these pictures of natural gas sites or Fracking sites?
- The geologist gave us different figures 1,300 trillion equated to 5% produced lasting 16 years?
- Independent medical report stating concerns for health, can you comment on that?
- Why can't the CO2 emissions be used to produce bi-products to reduce the effect on the ozone layer (what medicine and fertiliser can be made using CO2?)
- How many of the sites will end up as small as the ones in the pictures?

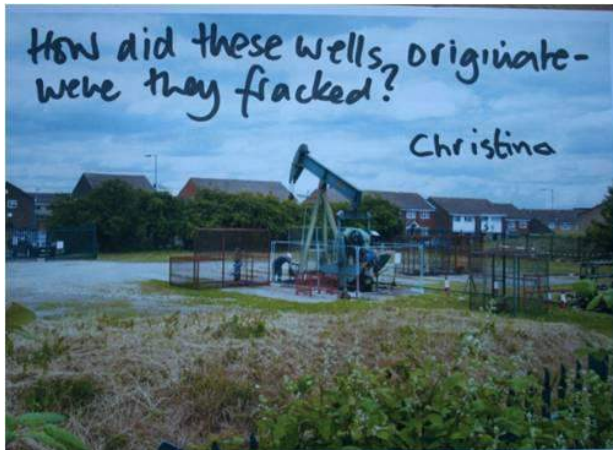


- How does Fracking affect the communities around the sites? Are there instances of increased cancer rates, or other health issues?
- Do you truly believe you can 100% guarantee safety through self-regulation?
- Is the glass of water in my hand going to be polluted for 40/50 years then?
- Would home insurance prices increase due to Fracking in local areas?
- What do you think the consequences of Fracking are? Have you thought of them?
- With your images of Elswick what point are you trying to make?
- What method was used in the Second World War to drill wells?



- Given that some countries have banned Fracking, your organisation seems to be promoting it please comment?
- Is Fracking economically viable given the current oil price?
- What do you have to say about water contamination? Considering 50% of the water is lost underground?

- Should we not be aiming to be 100% reliant on renewable energy?
- There is a correlation between the location of earthquakes and the location of Fracking (Oklahoma) what risk assessment is the company preparing to study this and reduce risk of earthquakes?
- Why no photographs of the intensive phase?



Session 5: Stakeholder Dialogue

Steve Robinson, Sciencewise. (Stakeholder Dialogue designer and practitioner).

A full transcription of Steve Robinson's presentation is in Appendix 2. After having heard the presentation participants wrote and asked the following questions:

- What type of consultation was carried out in other countries before Fracking was given the go-ahead?
- What are the three common pitfalls?
- Do you think there will be more projects like this?
- Will anyone take notice of our recommendations?
- Other governments in the Western world operate a more open policy? Or conduct public consultation?
- Preston voted 'no' for Fracking however, London overruled that decision. In such circumstances who should make the decision and why?
- Would you be able to recommend types of dialogue?
- Is it too late to have more public dialogue?
- Running out of shale gas? Cost to the company, cost to the public and cost to the government?
- How does the government decide on which issues should be decided by them or by the public?
- Who should make the decision to Frack? Local government, national government, local public, general public?



- How do you build trust?
- How would you suggest trust could be built regarding Fracking?
- Can you make an example or two of trust being broken over an issue?

Session 5: Preparing for the recommendations:

For the final session participants met for a whole day (Sunday April 24, 10:30-4:30). After having heard from their final commentator (Steve Robinson), the group started the task of writing a set of recommendations.

A speed-dating exercise was facilitated, with participants arranged in two rows facing each other. Each person was asked to explain to the person opposite them for one minute their answer to the question *'what is at the heart of this matter for you?'*

People were encouraged to share certain life experiences that are important to them in explaining their perspective. After a minute one row shifted to the right so that everyone was facing a new partner, the process then repeated for twenty minutes.

Participants were then asked to go into threes and to list on slips of paper their answers to the question *'What are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed?'*

During lunch facilitators placed the factors into themed groups displayed on one of the walls. People then chose which themed group to go into (e.g. 'economy') and then were tasked with tightening up the wording of the factor, making new factors/combining some etc.

The new refined set of recommendations, were then displayed on the wall and everyone was asked to read through them to check clarity before being invited to vote on them.

Anonymous voting sheets were handed to all listing all the letters of the factors before everyone was asked to vote for their top nine:

'factors which you think need to be taken into account when deciding whether or not Fracking should proceed'.



Factors

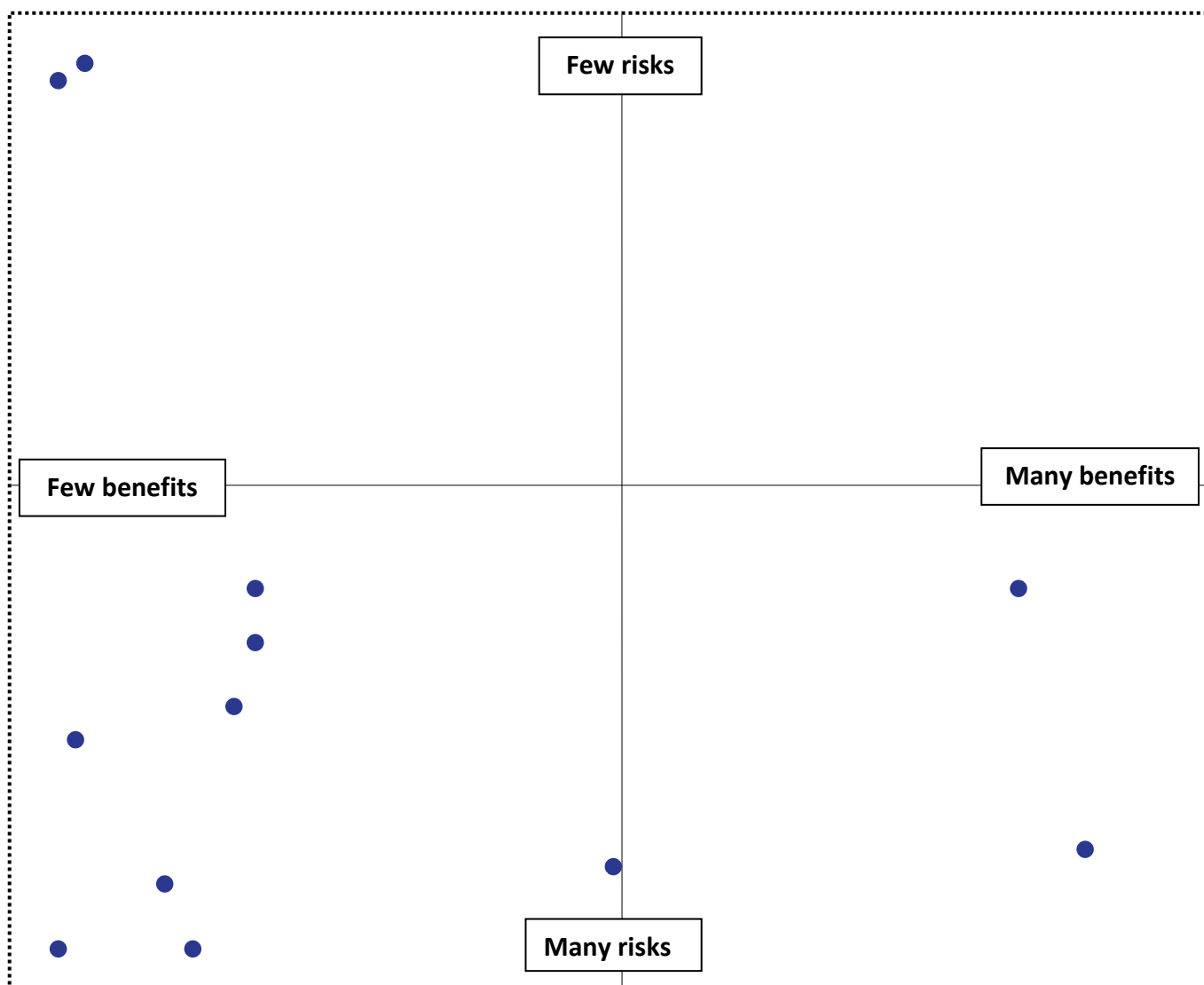
'What are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed?'	Number of votes	Position
Impact on people's health at a local and national level: These questions remain unanswered: a) Are there enough health professionals involved in this issue? b) Will there be testing by health professionals? c) Will there be long-term health risks which have not been assessed yet? d) Will any polluted water be disposed of to a safe place (not near homes, farms, wildlife)? e) Will polluted water affect people short and long-term? f) Is there a risk to pregnant women of miscarriage? g) Who will monitor major health problems related to cancer, skin, asthma etc.	13	1
Will local people make the decision of whether or not Fracking will go ahead?	12	2
Water contamination: will our freshwater supply be affected? Rivers/lakes? (Fish, plants, human use) Aquifers?	11	3
Impact on the environment (Farming), food chain/agriculture/livestock. Would it affect the food chain via crops/cattle?	10	=4
Strict regulation by a government body or department:	10	=4
Before opinions on Fracking are formed and the decision is made people should be educated on what it is and what it involves.	9	=5
How damaging would it be to wildlife and nature?	9	=5
We are moving away from fossil fuels so is Fracking necessary?	9	=5
Communities – how will they be affected e.g. noise, heavy machinery on roads, pollution.	8	6

Lancashire already has flooding issues, could Fracking make this worse? Could contaminated water get into our water supply in the event of a flood?	7	7
What will happen when the shale gas runs out? Is it worth going through this if it will not last? We already know it's a limited resource so why put so much money and effort in to get so little out?	5	8
How many jobs will be created for 'local' people.	4	=9
Whether revenue from Fracking will be used to support public services in the local community?	4	=9
The availability of existing energy sources – impact of not doing Fracking. Fracking is not yet safe. The money required to research, test etc to make it safe would be far better spent exploiting other potential energy sources.	4	=9
Climate change: Would Fracking cause an increase in CO2 emissions? Is it damaging to the ozone layer?	3	10
Whether there will be further positive knock-on effects for the local economy.	3	=10
Will our future gas supply be affected by being in/out of Europe?	3	=10
Will Fracking make our gas supply self-sufficient?	2	11

Before working with the group to write recommendations they took part in another activity to encourage some deliberation amongst the group; an opinion grid.

A large cross was marked out on the floor. The end of the four axis was labelled 'many risks', 'few benefits', 'few risks' and 'many benefits'. Participants were asked to place themselves in the relevant place on the grid and then (if they so desired) to explain why they placed themselves where they did. During this activity no-one was forced to speak.

A large paper version of the grid was displayed and to finish the activity participants were asked to mark where they stood on the paper grid. It is reproduced below. Participants were asked to place themselves on the opinion grid according to their perception of the relative risk and benefit of proceeding with Fracking.



The final activity of the day saw the facilitators lead a similar process to that employed earlier to produce the factors. Small groups were formed and recommendations written. These recommendations were then themed and people chose which themed group to go into. In their themed groups the team edited their recommendations before choosing to go into other themed groups to continue the process.

The recommendations were then displayed on the floor while a facilitated group discussion took place to ensure that everyone was clear about the wording of each recommendation. This discussion led to some editing of the recommendations prior to the anonymous voting process (eight votes each, for a total of sixteen recommendations).

Everyone was also asked to identify their top 3 recommendations on the anonymous voting sheet. The prioritised recommendations are listed in the table overleaf.



3. The Recommendations

What recommendations would you give to Government on the future of Fracking in the UK, if you were given the opportunity to do so?

	Number of votes	Position	Number of times chosen as first choice	Number of times chosen as second choice	Number of times chosen as third choice	Number of times chosen in the top 3
Research all aspects of Fracking more before <u>any</u> Fracking begins including: a) quantity of extractable gas, b) alternative ways of extracting it e.g. less intrusive, c) understanding additives and chemicals in the water.	12	1	5		3	8
There needs to be education for the whole public on what Fracking is and what it involves, pros and cons from independent experts. This must be completely honest regarding all aspects good, bad, indifferent and include all risks, (e.g. impact on insurance) real or perceived and why it has been banned in other countries, e.g. website	10	2	1	3	1	5
More investigations into what health risks there are, if any, and how to regulate and prevent these.	9	=3	1	2		3
It is essential that an independent regulator(s) supervise every single step of the Fracking process from the very start! Funded by the Fracking company!!	9	=3	2	2		4
Put more money into the research and development of renewable energy sources.	9	=3		2	2	4
In potential Fracking areas there must be extra investment in education for the local public on what Fracking is, what it involves, pros and cons from independent experts. This must be completely honest regarding all aspects, good, bad etc. and include all risks, real or perceived. E.g. impact on insurance and why it has been banned in other countries e.g. community consultation/meetings.	9	=3	1	1		3

Continues on next page

What recommendations would you give to Government on the future of Fracking in the UK, if you were given the opportunity to do so?

	Number of votes	Position	Number of times chosen as first choice	Number of times chosen as second choice	Number of times chosen as third choice	Number of times chosen in the top 3
Future decisions about whether or not Fracking should proceed, at a local level, should be made by local people <u>not</u> central government e.g. a referendum.	9	=3		2	2	4
If a major Fracking disaster should happen the Fracking company must pay the compensation to the public.	8	=4			1	1
Consider trial Fracking sites away from: a) habited areas: b) agriculturally sensitive areas: c) water tables/aquifers	7	=5	1			1
Any visible physical damage done by Fracking must be replaced like for like.	7	=5				1
Investigate possibilities to increase the extraction yield i.e. can 5% become 50%?	5	6			1	1
Consult stakeholders in other countries on the long-term viability and impact of Fracking.	4	=7		1		1
Public reporting on the environmental impact before, after and during.	4	=7			1	1
Future decisions about whether or not Fracking should proceed at a local level should be made by: central government, local government (council), local people.	4	=7				0
Do not proceed with Fracking as there are few benefits and many risks.	4	=7	2		1	4
Constant monitoring of the affected populations collective health (but not by the Fracking industry)	3	8			1	1

Appendix 2: Commentator transcriptions

Jim Watson, UKERC (The UK Energy Research Centre), (Current energy challenges facing the UK)

Clearly we use energy, er, across the economy and society all the time. So those of you who drove here, you used it in the car that you drove. We've got lights here and we've probably got a heating system on somewhere, although we perhaps don't need it today because it's a bit warmer. Entertainment – er, y'know, the jazz we had on, you know, that's all, energy to produce the, the, y'know, the music that's transmitted and to power the device that was giving us the nice music. So we use energy, we take it for granted, in many many different ways. Um, and I think it's important to remember – 'cos often when people talk about energy, they, they often end up focussing on, on electricity because it's a bit more visible. But actually, we use a lot of our energy not for electricity but for things like heating spaces, heating buildings, er, schools, hospitals, offices, and also for getting around. So about a third of the energy that we use is for getting around, for mobility – cars, buses, planes, etc – about a third for heating and a third for electricity. So that gives you a, sort of, a breakdown.

Now, the first page I've given you here, number seven, erm, just gives you a snapshot, and I'm really just going to, erm, refer to the graph at the top, just to where we get our energy from. And usually – These figures are all from government, and they're pretty good statistics – they're never perfect, but at least they give you a sense of where we get our energy from. And what they do usefully is contrast a bit of history as well, so they've got 1980 and 2014 quite often on these diagrams.

So probably a couple of things just to note from this. One is that it's clear from the – if you look at the couple of graphs – most of our energy comes from fossil fuels. And that's been the case for – well, since the Industrial Revolution. That's when we switched over from using, basically, wood, to

using coal, and actually the North – this area, Yorkshire, etc – were really at the forefront of that revolution, and that's partly why – they were sitting on big piles of coal. We still use a lot of coal in our energy system – you can see between 1980–14, that's shrunk. So coal has been in long-term decline in our energy system. And really it's only used in, in power stations now – because we've still got some coal-powered power stations – and some specialist areas like steel, which has of course been in the news quite a lot recently.

Um, gas we use mainly for heating, but we use it in industry as well, and for, again, power stations. So there's some power stations in this region of the country that use gas. And then oil: the majority of the oil that you see on that diagram is being used for transport, for cars, buses, planes, etc. The other thing I think to note is that we've got a small wedge but starting to grow called, well, called 'bio-energy' or what's called 'primary electricity' – now, that's nuclear power, but also increasingly it's renewable energy from a whole range of different technologies. So, windfarms – there are some windfarms in this area I saw from the train. You'll have seen some solar going up in, in buildings around, 'cos people have had the incentives to do that. Bio-energy gets used as well. And nuclear power has been used ever since the 1950s for electricity production.

'What is bio energy?'

So bio-energy is... there's a range of different uses, but it's basically – the, the biggest use actually is in big power stations – there's one in Yorkshire which uses wood fuel. A lot of that wood comes from the United States; it gets pulled down into small pellets and fed into the power station and then burned, just like you burn coal. So a lot of the bio-energy's used that way. You can also make bio-energy as a transport fuel, so you make a fuel that's very like petrol or diesel, but it's quite small in its use because it was quite controversial when it was introduced. People worried about the competition with food – growing crops on land rather than food, so that

created quite a bit of controversy. So that gives you a bit of a sense of where we are, and how it's changing.

I think the final thing on that diagram, and now going on the second one, so perhaps let's move into page eight, actually, is that the amount of energy we use in the UK is actually falling. And I often hear politicians, particularly, saying 'We must do X – we must do something because our energy demand is growing.' Well, actually, since about the mid 2000s, they've been wrong: energy demand is in decline. And part of the driver for that – you might have picked up from some of the news about steel – is that there's been a big shift in the industrial use of energy. So – I'm not sure if you can see 'cos it's in black and white, but one of the wedges in that, I think it's the one in the middle, is industry use, and that's the one that's shrunk over time quite rapidly. Partly that's industry using energy more efficiently, but part of it is industry starting to move to other countries because it is cheaper to, er, make steel, make cement and make other products that use a lot of energy in other countries. So there's some changes there, whereas transport demand for energy – any of you using cars and other things – has remained relatively constant, demand for energy in our homes has declined, but more slowly. But overall, we're using less energy than we did ten years ago.

So that's a few trends – am I going to say anything else on that? Um... I think I've said something about the role of gas. I mean, clearly you've all picked up that we don't get any of our gas from shale gas development at the moment, um, in the UK. Um, the amount of gas we use – I think this is illustrated in one of the later charts – in fact, I'll talk about it now. Number 23 just shows the trend on natural gas. Um, and what that shows is across the economy – it's not just in power stations or homes or industry and so on – and gas has been important for the UK since about the 1970s when the North Sea was developed, so that's all the gas fields off, off Scotland, and more recently in Morecambe Bay, which is very near here. We will see – actually if you go to the beach there and Blackpool, you can sometimes see the flares off shore, so that's some quite important gas fields here. So that's

been developed, and initially it was for home and industry, and then power stations in the 1990s. So we use gas across the economy. As you can see, gas use is falling off pretty dramatically, and that's partly because we're using less in power stations than we did, because actually coal became much cheaper, so we started using more coal. But again, we don't use any gas from Fracking there. Most of it, historically, has been from our own fields, Morecambe Bay and the North Sea. Increasingly now, we're starting to import a lot of gas because our own supplies are declining, and that gas is mostly coming from two places: from Norway, and from Qatar in the Middle East. We don't, contrary to what some media reports often say, use very much gas at all from Russia – so it's about 2%, last time I looked, of our gas from Russia. Erm, so it's often – it's one of those myths that gets recycled in the media. Now, we may use more Russian gas in the future, but at the moment it's, it's very small for us.

So quickly through a few issues which I've already touched on. I mean, one is emissions reduction – climate change, climate change is very important, there's quite a big consensus among scientists that we need to do something about the emission of what's called 'greenhouse gases'. Carbon dioxide is the biggest one, and that comes from burning fossil fuels, but there are other greenhouses gases as well that cause climate change and the planet overall to warm. And that's already happened, to date, since the Industrial Revolution, and the projections are that will continue and will start to cause some quite big disruptions to weather patterns, erm, and to other things in many countries. So that has really moved the UK to act quite quickly to implement legislation to reduce emissions. So it's one of the big goals of government policy is still – even though we've had changes of government, different political parties in power – is climate change. So a lot of the policies that are put in place are designed to reduce our emissions, and I think you'll see from one of these other handouts, I can't remember which page – there's one on emissions in there... somewhere... er, it's probably at the back... Is it page thirteen? Yeah. And you can see there that emissions have actually fallen over time, um, partly due to these shifts in demand, partly because we're using less

of the more carbon-intensive fossil fuels. The decline of these (....??) has really helped us reduce emissions. So a big issue for the future is how do we get those emissions to continue to fall, to do our fair share of reducing greenhouse gases, alongside many other countries – so, many other countries also. That's one of the key issues.

A second one is security, which you might have heard discussed. That is keeping the lights on, keeping the gas there when people need it in winter, er, y'know, are we going to have any disruptions and so on – it's something that politicians take extremely seriously, partly because if anything goes terribly wrong, they'll be the first person to lose their job. So it's the number one priority often. It doesn't matter what political party's in power, that's often what they'll say. I think there are two issues there that they discuss more than others. One is, as I've said, we are no longer self-sufficient in energy, particularly oil and gas – we import more and more of the energy we need, so that leads politicians to be quite nervous, y'know, about 'Where are we getting it from? Can we rely on the countries? Do we have enough sources, so if one goes wrong, we can get it from somewhere else?' Actually, the situation is relatively good for gas – we have a lot of different sources that we can get gas from – and for oil, clearly, we have different sources, we do get a lot of oil from the Middle East because it's the biggest producer. And clearly over the last few years, as in previous decades, there's been a lot of conflict there and, and, and reasons to make people worry about security of oil supplies. So that's one set of issues.

Another is, are we going to have enough power to keep the lights on? And that's been subject of a lot of media stories over, y'know, the past few years. We've got a very tight margin now between the available supply of electricity and the amount we need. Erm... We're in that situation for various reasons. We are getting new power stations coming on stream, but that's certainly something the government needs to act to make it more comfortable. We're in rather an uncomfortable situation. I personally don't think the lights are going to go out, but it's a little bit close for comfort, and will be for the few years to

come. But very happy to answer more questions about that. One of the big challenges is, some of the very old power stations are closing – some of the power stations, the coal-fired ones, are 45 years old, including a number in this region, and so they're inevitably closing, they're very expensive to keep going. Some of the nuclear stations, again, they're coming to the end of their lives. I think Heysham's going to be there for a little while longer.

One more issue which I think has been very important is, is bills, and that's perhaps something that you'll recognise perhaps more than the first two. You know, you all pay energy bills, we've all seen energy bills rise over the last few years, you know, to quite high levels, especially if you're on a low income. The size of that bill can be quite hard to pay. And that's partly because the price of fossil fuels has risen very sharply over the past few years – of gas and of oil. Now, we've seen now a reversal in that trend, so oil prices are actually now very very low, erm, they've come down very rapidly, gas prices have started to come down. What you won't have noticed yet is your energy bill falling very quickly, and there's a lot of controversy about why that is. Part of it is that it takes a while for the price of gas and oil to feed through to your bill, but there's also some quite good questions to ask about whether your energy company is actually playing fair and is passing on the full benefit that they're getting from the, the price of fuel, through to their customers. So I think there are some interesting questions to ask there. But that's –

That's good. In terms of options for the future, I've talked about them, but in terms of climate change, I guess there are two big categories. One is, well, going to more low-carbon sources of energy, so the sorts of energy that don't give rise to greenhouse emissions is one of the areas, and that's something which has been growing in the UK. So we now get, for example, 25% of our electricity from renewable energy, and a further – I think the last time I looked, about twenty-ish percent from nuclear power, so we're at record levels of a share of electricity from non-fossil fuel sources. But that's going to change further, but the question is how far can we go with that? What that hasn't done is help us reduce

emissions from our heating systems and our transport systems, so that's something which is happening much more slowly. And, for example, I think one of the best ways to do that in the short term is to be more efficient. So the idea of more efficient vehicles, which we can do – you've seen, y'know, hybrid cars like the Toyota Prius you might have seen around, which can get more miles to the gallon out of the, the car. There are more gains you can make: you can insulate homes to make the use of energy in homes more efficient, and buildings, put in more efficient boilers, so there's a number of things you can do. But as time goes on, that's going to get more and more challenging. So I think, y'know, it's, those are the kinds of strategies. And then there are some new technologies as well. So one is carbon capture and storage, er, which you're welcome to ask questions about – that's the idea that you still use fossil fuels, but you capture the emissions rather than them going into the atmosphere, and then you will pipe them to a place underground to store them safely for many, many years. Now, that's a challenging technology. It's being trialled in a number of places round the world, but not in the UK. It could allow a way to use more fossil fuels while still tackling climate change, so that's a potential option.

And what of the role of gas in all of this? Well, if we take our climate change targets seriously, I think the headline is that the role, the use of gas is probably going to have to fall over time. If we have those carbon capture and storage technologies I've just mentioned, it can fall more slowly, but probably by 2050 we're going to end up with at least a level maybe half as much gas as we're using now if we're going to meet our climate targets. And there's an open question then about where we get our gas from, because that will change – it's probably going to be more from other countries. Big questions about whether Fracking can play a big role in the UK in supplying that gas, and there have been some estimates of that, but, er, they're quite speculative because at the moment we don't have a lot of evidence about how much gas we can actually get out the ground.

Liam Herringshaw, University of Hull (The basics of shale gas exploration)

Good evening everyone. My name is Liam Herringshaw and as I say I'm a geologist, I am lecturer at the University of Hull, teaching Geology and Geography. My, my interest really is in shales, as to what they are, how they form, and then why they are of interest at the moment. So, we talk about Fracking. We talk... Typically, Fracking... the word means different things to different people. If you talk to me as a geologist and say 'What does Fracking mean?' I regard that as literally just the process of hydraulic fracturing – so 'Fracking' is the shorthand term for hydraulic fracturing – of rocks deep below the ground, to extract something from them. Now, many other people would look at Fracking and have a much broader definition of lots of other things that might fall within that, that term, but for me, Fracking is, is, as a word, simply applied to that, that approach of hydraulically fracturing – so using fluids, water particularly, but with other things to, to create fractures in a rock, deep below the ground, to extract, help extract something from it.

Now, say, in the case of Lancashire recently, erm, all the sort of Fracking focus has been on shale gas. Um, and I thought it might be quite useful for me to talk a little bit about what shale is, why some shales have shale gas in them and some of them don't, and then the sort of broader geological – It is quite funny, actually, because if you talked to people in the broader geological community – I would count myself in that – about five to ten years ago, certainly in the UK, and said 'Are you interested in shales?' they'd have said, 'No, shales are, shales are boring. Shales are of no real interest to most people.' And the reason is because most of them just look, look like this. These are pieces of shale. I'm going to pass... Always useful to have some rocks as props. So I'm gonna pass a few... I can pass them in different directions... hand out a few more bits. You may want to get the light on it to look at it more clearly, there's various bits. – And shale, as you'll see from most of these specimens, tends to be a fairly dull-looking grey rock, and people therefore don't tend to be very,

er, immediately excited about it. And the reason why many people probably weren't very excited about it, erm, until recently was that shale was not thought to be, er, a rock of particularly significant economic value.

Um, so you're probably aware of the UK having had a fairly big offshore gas and oil industry, both in the Irish Sea and the North Sea, and that really sort of kicked off in the 1970s, and that was from what we would – I guess a system we would call conventional oil and gas exploration. Has any, has any people heard of 'conventional' and 'unconventional' as words in...? So, basically, when people talk about Fracking and shale gas, they often talk about it being an 'unconventional' hydrocarbon, an unconventional oil and gas source. And the reason for that is that in a conventional system, such as the North Sea, the rocks that have had, erm, enough, er, fossil material in them to generate oil or gas, don't actually retain the oil and gas – the oil or gas actually escapes and gets trapped in a different rock. And the shale – so the reason that most of the pieces I've given you are quite dark, these are actually shales from the Yorkshire Dales – 'shales from the dales', there you go, I'm talking poetic. And when you look at them in the right light, you find there's actually quite a lot of fossils in them. So if you get the light right, there are shells in many of these pieces. So those are fossils, and we talk about fossil fuels – it is literally that we are burning fossils. Shales are the, the types of – they're basically mud that has been extremely squashed and compressed. So mud is a very very common material – you can go round the surface of the earth, mud is just about the most common material. And most mud does not turn into shale. It needs to be buried deeply – typically many kilometres in depth, so you've got to get that mud down over, typically over millions of years, more mud piles up on more mud and eventually sort of squashes it and compacts it, and you go from mud to mudstone, and shale is another word, really, for mudstone. And if that mud had a lot of plants or animals in it, and they didn't get, erm, destroyed during the burial process, then they can, if they get 'cooked' enough, turn into oil or gas. And it's basically, once mud with a lot of plant or animal matter in it gets down to a depth of about three kilometres or so below the surface, so three

thousand metres below the earth's surface, the temperatures begin to get warm enough that they start to break down those, those dead bodies and start to generate smaller, erm, chains of carbon, basically, which is what oil or gas is. So you need to cook – you need to bury your mud, compact it, turn it into mudstone, and then cook it.

Now, say, in a conventional oil and gas exploration system, what you tend to be looking for is a rock into which the oil or gas that's been created during that cooking process has escaped, and then moved into. So most of the, the North Sea, most people are drilling into sandstone – so, again, sand that has been turned into, into stone during the burial process, and that sandstone has a much greater permeability. That's probably my first jargon term. 'Permeable' just means how well does fluid flow through a material. So sandstone has high permeability, normally, which means that water or other fluids can move through it. And so oil and gas can move through a sandstone relatively easily. So if they escape from, from a rock having been – basically when you start to cook the animals and plants that are dead bodies in this mud and forming the mudstone, the shale – you start to get escape of the oil or gas. It tries to reach the surface. Once it's become smaller particles it starts to rise, it's more buoyant, so it tries to get upwards. And if it can flow upwards into something more permeable, it may stay there if there's another barrier above that that stops it going any higher. And in the North Sea that's kind of where people have found conventional oil or gas reservoirs.

The reason that Fracking and shale gas is unconventional is that people realised in the US in really – well, in the 1940s they began to realise it, but really in the 1990s in a big way, that where there was an area that had fossil-rich shales, some of those shales may well have produced oil and gas, it may well have escaped into overlying rocks that we were able to drill into and extract the hydrocarbons from, the oil and gas from. But many of those fine-grained shales, these mudstones, did not release all of their – in fact probably kept much of the, the fossil material. And part of the reason for that is that – compared with sandstones – mudstones, shales have very low permeability, so it's very hard to

get stuff to flow out of, er, of shale. Over geological timescales, over millions of years, you can do it, very slowly, but over a human timescale, if you try to get water to move through a shale, it's very hard to do it, normally. Erm, and it's also very hard to get oil and gas out of a shale. So what – but when people began to realise that a lot of these deeply buried shales still had oil or gas trapped within them, they thought, 'Well, actually what we could do is to create permeability.' So if you drill down into those, those rocks that you knew had some oil or gas still in them but they didn't naturally have the ability to flow, the oil or gas couldn't flow out of them, if you could then inject pressurised fluids into those rocks, you could create little fracture networks, you'd create little cracks in those rocks, and that then creates a pathway through which fluids, oil and gas included, could move.

So really this, this sort of began in the US in a big scale in the 2000s – it's really quite a recent thing. It was the '90s that they began to realise they could do this. Erm, and so various companies began getting into this, this process of going 'OK, many of our conventional systems have been exploited for quite a long time now and they're not, they're not as rich as they used to be – we've used that up... Can we then target for unconventional, erm, sites instead?' And in fact there are many places in the US that are slightly separate from the areas that they were exploring for conventional hydrocarbons, oil and gas, which are unconventional. And so regions of the US that perhaps hadn't been big oil or gas producers, necessarily, started to become economically significant producers of, particularly of shale gas. We can get shale oil – it depends how, how well-cooked the rocks have been and what their original composition was.

Erm, and so then of course what's happened is that other countries have started looking at the US having become suddenly, er, very capable of producing large quantities of gas by hydraulically Fracking, Fracking the shales that it has, and gone, 'Maybe we can do it.' And so in the UK, erm, where we have a lot of, a lot of shale, people have begun targeting regions, and Lancashire has been an area of particular interest. And then the government's got quite

excited off the back of that, thinking, 'Well, the North sea is declining, we, y'know, we've produced most of the oil and gas from the easy places in the North Sea' – there is still quite a lot in there, but, but in terms of the easily produceable oil and gas, the levels are dropping – 'so is there a possibility of exploring onshore?' And so suddenly people have become aware of this new, seemingly new industry.

Now, as I say, I should say, speaking from a geological perspective, an exploration perspective, Fracking has been used in various other cases. So we might think of it now in this shale gas and Lancashire and perhaps the big sort of news story, but hydraulic fracturing has been used in a number of different geological contexts, in rocks that don't have much natural flow, to create flow. So it's not something that's completely unknown, it's just the large scale that has gone on in the US is something that we're not familiar with in the UK, um, and so then a lot of questions about... will it happen, should it happen, how would it happen, erm... And I would say – I would speak in a biased fashion as a geologist – we always need more geological information, and actually in the UK, no-one's ever in the last – no-one ever really has been particularly interested really in the deeply buried shales that we have. So no-one's ever drilled down to those depths in (almost?) any places. So a lot of the knowledge that people have is based on quite limited data. People are predicting what they think might happen, based on their geological understanding of the region, but in many cases there's been very limited drilling in those areas because there's been no reason to do so. You don't drill a borehole really deeply – because it's very expensive – unless you have a very good reason to do it. So there are areas that have had a few drilled, but in many areas no-one has ever bothered previously to go in there. So then you start saying, 'Well, there has to be an economic imperative to make people want to actually, er, do it.' And Lancashire has become the sort of first area of particular interest, because a company, erm, Cuadrilla, decided that there were shales in this area that were potentially a source of significant quantities of, of gas. And then big numbers started getting talked about. You may – you may or may not have – the British Geological Survey produced a report a few

years ago, about 2013, to try and estimate what level they thought the amount of gas in the shales of Northern England was, and they estimated that the resources were about 1300 trillion cubic feet. And you say, 'That's a number that means nothing to me.' The UK consumption of gas is about three to four trillion cubic feet per year. So if you have 1300 trillion cubic feet and we consume about three to four trillion cubic feet a year, that seems like an enormous amount of gas. However, it's very, very, very difficult to get much of that gas out. So what we know from the US is that a few percent of that big number is normally what can be extracted from, from a shale. So you're probably looking at about five percent of that big figure, if it works. And of course, that number is based on quite limited data, so there's an issue of trying to know what really is going on beneath, beneath our feet. So this is a really important factor for a whole variety of other things as well. Knowing more about the deep geology of Britain may help us understand all sorts of other things, about aquifers and geothermal energy and so on, but particularly on the shales and Fracking subject.

Okay. So you'll probably have seen various sort of news stories suggesting big numbers. Erm... geologists like me tend to be a little bit cagey, because a lot of the time a company is trying to make itself look like an attractive investment, and most of the companies looking at the moment in the UK for shale are quite small companies, and so they want to, to maximise their return and then maybe encourage a bigger company to, to buy them. So they want to tell people they've got a good prospect. Um, and geologically, a lot of the areas in the UK are not very well known at great depth. We know there are probably shales there, but how good those shales are, how much gas is in them, how much oil might be in some of them is, is a bit of a question. This white piece of rock is also a kind of shale – it's a rather different shale, it's a chalky shale. Chalk is a kind of mud as well. This is from Dorset, and recently this rock, er, was identified by companies as being a potential source of billions and billions of barrels of oil beneath, beneath the Southeast of England. But that was based on one borehole. They drilled one hole, and then said, 'There are – there's billions of barrels of oil here.' If you drill one hole, are you

absolutely sure that's going to characterise everything? So you have to, again, be a little bit careful.

And I guess more generally what's happened is, because of what's gone on in the US, and people have seen incidents that they think might be associated with the processes of Fracking for shale gas, people in the UK have started to go, 'This is a potential concern – does this process of injecting water into the rocks and fracturing them cause earthquakes? Can it create pathways through which fluids can move through the subsurface into areas we don't want it to? Could it pollute groundwater?' All sorts of, of topics of discussion have come out, and at the moment, y'know, the industry hasn't yet taken off here, so it's at a point we don't, we don't know about the impact it will have. But there are obviously lots of topics of concern that people have had, based on, rightly or wrongly, on data from the US. The problem with the US is there was no baseline data before the, the shale gas Fracking industry really kicked off, so we often don't know for sure whether things were the response to that industry, or was it something else that we just, we hadn't quantified before. No-one had bothered to collect the data before the industry started.

'Is that what baseline data is?'

Yeah, baseline data is what is it like now. So if you said, 'Fracking hasn't yet started on any large scale', you could go and collect all the data on water quality and earthquakes and whatever it might be, to be try and say 'This is what it's like now – this is our baseline.' And then we can look at what happened subsequently, monitor that, and see if there are demonstrable impacts. So it's a, it's, a... yeah. Trying to get that level of understanding. And I should say – I should just finish off really by saying I'm part of a project called ReFINE, which was researching Fracking in Europe. It's now just researching Fracking, because I think Europe is actually, not a lot is happening here – mostly it's happening in the US, and that project, one of our aims is to try and make all the work we do publically available. So all the information that we generate in the studies that any of my colleagues do on any of the aspects of this topic, is made available for anybody to then go and read about. So, erm,

again, we'll probably come back to it later anyway, but ReFINE is a website you can have a look at and... You maybe still think that some of our things are biased, but we try and be as neutral as we can in terms of what we assess on various issues relating to the geology and the science of, of shales and Fracking.

Jamie Peters, Friends of the Earth: (Implications of proceeding with Fracking in the UK, at the local level, at the national level, at the global level).

Okay, great. I gather you've all got red cards that you are to wave if you don't understand anything I say. I guess that normally means if it's jargon but might also be my accent, so feel free to, to put it up.

I'm also going to use some notes just so I remain under fifteen minutes rather than, er, go on about too many things. I'll just introduce myself first: um, so I'm Jamie, from Friends of the Earth. We're a charity who work on environmental issues. One of the issues that we started working on a few years ago is Fracking, which you're here for. And the reason that we started that was because one of my colleagues – she's from Leyland, and she was very concerned when she heard that Fracking was going to come towards, come towards her mum and dad's house, so she started to speak to Friends of the Earth and she convinced them that this is one of the most important things that we could be working on. So that's how Friends of the Earth started to work on this issue.

Now, I'm not one of the technical people at Friends of the Earth, I don't work on the regulations. My job is to go and speak to people in communities to ask what they think about Fracking, but number one to help the communities affected defend themselves from Fracking. So I spent the last three days in Yorkshire, er, where there's a Fracking application that'll be heard next week – sorry, next month. I spent the last three days there; I only found out two days ago I was definitely

doing this, so that's why I've got running shoes on and had to borrow a shirt from my colleague. I'd have dressed up otherwise.

But for over a year or so I've been working in Lancashire, um, with the two affected communities at Little Plumpton and at Roseacre. I've really grown to become friends with the people in those communities. We've helped them however they've wanted – through legal work, through planning work or through campaigning work. So my job's really to speak to people about Fracking, er, and I gather you have some questions later, so just to give you that information. And I've also come to really sort of love Lancashire, which really not many, not many Scottish people say about English places, but is definitely the case for me, er, and I really don't want to see this area fracked.

There's many reasons to be against – for us, for Lancashire, for the UK to oppose Fracking. I'm going to just touch upon some of the environmental ones. I'm not going to spend too much time on each of them, just 'cos we've got fifteen minutes, and I gather you're going to hear from other experts. Because for me, this is becoming less and less an environmental issue and more about people, er, more about human rights, more about democracy. But I'll go through these local, national and then global impacts that Fracking could have on environment, and why they're all going to be relevant to whatever conclusion the government or maybe your own group comes to on Fracking.

One of the first ones that has been very controversial has been waste water treatment. So I'm not going to talk too much about the Fracking technique, but they send a lot of water down when they do their drilling, and some of that water comes back, er... The UK has no established record treatment for this type of waste. That's to say we don't have the capacity and we don't have a track record for looking after the waste that comes back up. Not all of the Fracking waste comes up; a lot of it stays under the ground, which is equally worrying because we have even less control over what happens under the ground as we do over it. We have to learn lessons from other countries where Fracking's taken place, and those lessons are very hard ones for those communities. From the

USA, Australia, we've seen that water and treating this waste water has been hugely problematic. It's linked to air pollution, so the stuff that goes into the air from this waste water is giving huge concerns – I'm going to touch upon that in a minute. Whilst we're on water, it's worth pointing out one of the number one reasons that people oppose Fracking that I work with is down to water contamination. So most of our water is in aquifers, which is under the ground. The government have left no regulations to stop Fracking going right through aquifers. Aquifers is where our fresh water's stored, and they've not put anything in place – they said that they would, but they haven't – they've not put anything in place to stop Fracking going through our aquifers. The problem with that is, if your fresh water supply gets contaminated underwater, you can't un-contaminate it. You just have contaminated water. There's not any money in the world that's going to make that up for communities – you simply have contaminated water. And we've seen that happen in other countries. Pennsylvania – I think you might hear about Pennsylvania from the industry, to say this is a good example of Fracking. Pennsylvania's been one of the areas of the world, in the USA, that's had the most Fracking. And they've had water contamination. You might have seen some of the movies with people lighting their taps, flames coming out – that's probably from Pennsylvania. The industry used to say – I heard them say, when I went to the council meeting to discuss Fracking – that if it was so bad, then how come they've never been sued by anyone. Well actually, last month, Cabot Oil & Gas Fracking company, they had to pay four point two million pounds in compensation to the communities of Pennsylvania because of water contamination. So that's how well things are going in the USA – the success story of Fracking, you'll be told – over four million pounds given to a community for compensation. Now, if you had to ask that community now, after the years of campaigning they've went through to get that money, they wouldn't swap their contaminated water for any money. They would much rather things the way they were, they had their normal lives. Because of course it took years to prove this, to go through the courts the emotional toll on the people. So water has been contaminated. And we rely on our fresh water, but we're an island,

we're not the USA – huge country – we're very different, so the water's even more important to us. And especially for Lancashire – our farms, our produce, that all relies on our water. Would you buy produce from a fracked land, or would you give produce from a fracked land to your children or family, given the choice between fracked land and not fracked land? Because that's what we do – we do have a choice. Fracking's not inevitable. We've stopped it for five years in Britain. The last time there was a frack here was five years ago near Blackpool, and it caused an earthquake. They don't have a good track record, these companies. So, just to give you a bit of optimism, there's been no Fracking for five years despite the government openly saying they're all out for shale gas – despite the government openly saying they'd give the most generous tax breaks in the world to the shale gas industry. That was George Osborne and David Cameron's words.

You're going to also hear a lot, I imagine, from the next speaker or from other days, that these problems that happened in the USA or Australia or every other place where Fracking's taken place – they won't happen here because we'll have gold-standard regulation. 'We'll have really good regulation, so it won't happen in Britain.' Well, that's exactly what the communities were being told in the USA, it's exactly what the communities were told in Australia, it's exactly what the communities have been told everywhere – 'Don't worry, those mistakes happened somewhere else but we'll have really good regulation.' The thing is, the regulation, it doesn't matter what you do, it doesn't change the actual process itself. There's no regulation that can make Fracking safe. Regulation maybe can make it a bit safer, but it can't make it safe. And that's not the words from me, that's the word from the United Nations environment programme. They're saying that regulation cannot make this safe.

And the other problem with it – the people we're asking to regulate it, the Environment Agency, they're suffering huge cutbacks, like every other public body. The Environment Agency, they're the ones that told us, 'Don't worry about flooding, we'll be safe.' Well – you guys are from Lancashire. You knew that wasn't the case, because they didn't put any money into flood

defences, they didn't have any staff to help with it, and they're the same guys that we might be expecting to help regulate Fracking. When it comes to regulations, actually, you're really talking about self-regulation. You're asking the companies to regulate yourself. We tried self-regulation on other things: we've tried it with the banking industry and we know how that worked. We've seen what Northern Rock done. And who does the money come from to bail out the banking? It comes from taxpayers – from us. And we've seen in USA when it comes to Fracking, they don't do the clean-up themselves, it comes from public money. And that's what the real worry is, it could potentially happen to Britain. We tried self-regulation for even air pollution. You might have read about Volkswagen this year – it turns out they had a whole department for self-regulation, but they were just lying about it, because they could make more money from lying and saying there was no air pollution. So when it comes to regulation, bear in mind when you're told that later, maybe tonight, it's gonna be self-regulation. And I certainly don't trust these companies with such a poor track record to do safe regulation.

Now, part of my job, I've been sitting in the council chambers, erm, last June specifically, when Cuadrilla, the Fracking company, er – I believe they're Spanish – they were sort of doing the presentation about how safe it could be. And the rest of the room was filled up by community members – people from Roseacre or Little Plumpton or elsewhere in Lancashire, or experts speaking about, erm, why Fracking couldn't be done safely. And one of those organisations was MEDACT. Now, they're an independent group of health professionals. They're not like me – I'm from Friends of the Earth, of course we'll be against Fracking, it's really bad for the environment. They were health professionals. And they'd done – they commissioned a report into the potential health impacts of Fracking. I'm just going to read one line out, which I think really jumps out at me. It says, 'One can state categorically that Fracking poses threats to human health.' That really jumped out at me. You've got independent health professionals saying it poses a threat to human health. Indeed, New York State, they banned Fracking, based on health impacts. I had some friends who helped

campaign on it, and they came over to Lancashire. Now, New York, a place that I always associate with – if there's money to be made, New York'll do it. They says – and the governor that made the decision, he's not an environmentalist, he says it could pose a threat to human health, so they banned it.

And they're not the first. I was thinking about other places that banned it, just before this talk, either permanent or temporary bans to some sort of Fracking. Do you know, just in Britain, Scotland has a temporary moratorium, Northern Ireland does, Wales does – it's just England' who's pursuing Fracking at the moment. We've got France that's banned it, but we've got French, partly-owned French companies who want to frack in Britain, but it's not good enough for France, it's been banned. It's been banned partly or temporarily in Holland, Germany, Venezuela, New York, Florida, other parts of USA, Bulgaria... Now, if it's not good enough for these areas, how could it be imposed upon Lancashire? Just this week, Italy had a vote on Fracking, and 83% of the population, of the voters, rejected it. Unfortunately it wasn't passed, 'cos enough people didn't vote. So when it comes to health, that's one that really jumps out. And when a doctor or public health people say something to me, I really listen. Breast Cancer UK also came out with anti-Fracking positions. There's more and more evidence building up over what the potential health implications for Fracking could be, and none of it's good news.

And then you've got other environmental things. The visual impact of Fracking. You've got the noise that would come from the Fracking. You've got the increased traffic, because you don't just set up a traffic rig, you have to have lots of high loads going down these narrow roads. I've been down them. There's a lot of cyclists. If I had children and there was Fracking going ahead, I would not allow my children to be doing horse-riding, to be walking or cycling down these roads. I personally would be too worried about it. And when you add all these things up, you start to get a picture of what Fracking really means to Lancashire. You're talking about industrialisation of this county. Because you can't have one or two wells: for this to be economically viable, you need thousands. And the CEO of Cuadrilla, the

Fracking company, he said he wanted to make this the biggest gas fields in Europe – in Lancashire. Just to give you an idea of what this means. We're not talking about one or two rigs that you won't see, we're talking about an industrialisation of the country. And believe it or not, all the licenses pretty much from the north of the country, they've not been given, by and large, to the south, which tells me a lot. If it's not good enough for some parts of the country, how can it be ok for Lancashire or Yorkshire, where I was today?

And when I sat in that room, that the council were debating on, they talked about the eleven thousand objections against Fracking that had come from within the county, against one or two hundred in support. And I only seen a handful – mainly old white guys in expensive suits – who were saying Fracking was a good thing, and they all stood to gain from it. The rest of the people were diverse bunch of the community, and close friends of mine. You might also hear people are NIMBYs, they don't want it in their own back yard. I'll hand out a leaflet at the end – these are two of my close friends now. They live right beside the Fracking sites. Like most people, they didn't know anything about Fracking until they did their own research, and those communities came to the conclusion they don't want it. Once they won last June, they then went to Paris with me in December to help other communities stop it. 'Cos once people know about Fracking, they say 'No Fracking here, but no Fracking anywhere.' So this isn't a case of not wanting it beside you, it's about a case of really going for it. And the last thing I'm going to talk about is climate change, just really quickly. Fracking, you'll get told, is a clean fossil fuel. There is no such thing. This is an additional fossil fuel that'll contribute to climate change, to global warming. We've seen the impacts just ten miles from here with the floods in December, and that's linked to climate change. Fracking is not clean. We've heard from the experts from climate change, and they say it's going to be an additional fossil fuel that sometimes can be even more polluting than coal. So when we talk about the global things it's bad news; when we talk about the local – the global things, it's contributing to one of the biggest problems in the world, which is climate change.

So I've been speaking about environment. Don't tell Friends of the Earth: I'm not – I'm a reluctant environmentalist. I care much more about people, much more about democracy. And this is an issue about people. The people in these communities don't want it, and they're looking to get it imposed on them. 'Cos Lancashire council made the right decision in June – the elected officials of your county rejected it, and then you had London say, 'Actually, the people of Lancashire shouldn't decide what happens to Lancashire – London should decide.' And that's just not good enough. So I'm totally passionate about having a frack-free Lancashire, and I'm hoping more and more people in this county are. I'll finish off there.

Corin Taylor, UK Onshore Oil and Gas (UKOOG): Implications of proceeding with Fracking in the UK, at the local level, at the national level, at the global level

Well, evening, everyone. Thanks for inviting me, and thanks for taking the time to listen and learn more about this subject and hear the arguments both for and against shale gas exploration and production in the UK. So, my name's Corin Taylor, I work for UK Onshore Oil and Gas. We're the trade association for the onshore oil- and gas-producing companies in the UK, and also the companies that serve them in the supply chain. And we represent companies that have been quietly producing oil and gas onshore for many decades, as well as companies that are exploring for shale gas. We represent both parts of the industry.

So I've got a few things to show you, and a couple of photos and stuff, but I wanted to start off really by making three points. Firstly, natural gas is a really important source of energy for us. It's going to remain a really important source of energy. The second point I want to make is that we're importing more and more of that gas. And then the third point I want to make is that there's a lot of shale gas in the ground, and if we are able to extract it, then that could reduce our dependence on imported gas.

So, gas is a really versatile source of energy. We use it in all sorts of different ways. So if we start off with heating – so 80% of domestic, commercial and industrial heat in the UK comes from gas. And if we think about just our homes, 84% of our homes are heated by gas, with gas boilers. It's also really important for cooking. So a lot of us have gas cooking hobs, and across the country about three in five homes use gas for cooking. Gas is also used, erm, to help make fertilisers, it's also used in the production of food, so you have natural gas which is used to make ammonia, ammonia is then a key component of nitrogen-based fertilisers, and they're spread on around three quarters of our farmland in the UK to help us grow food. So it's important both in cooking food but also in growing it.

Gas is also used for electricity. So we get about a third of our overall electricity from gas, and it's very versatile, so you can have gas on all the time or you can turn it on and off quite quickly. So if you think about the fact we're building a lot more wind turbines and solar panels and so on – now, sometimes they generate a lot of electricity, when the wind's blowing; sometimes, when it's still, they don't generate very much. So you need a backup source of energy when the wind isn't blowing. And actually, gas is quite useful as a source of backup energy 'cos you can turn a gas plant on and off pretty quickly. So it's actually quite a good complement to wind.

Gas is also a really important raw material in products, so you'll find gas in plastics and all sorts of everyday items we use in the home, including cosmetics and medicines, and also things like loft insulation – those are actually, natural gas is one of the components of that, so in everyday lives we use gas. You'll probably find gas in these seat covers, actually – manmade fibres, polyester, that sort of stuff, will all have natural gas in it. That's one of the raw materials. And I guess finally gas is important to help us in efforts to improve sustainability. So if you think about recycling, for example. Y'know, if you want to recycle glass you need to heat it to melt it, and then you can remake that glass. Well, the heat for the furnaces that melt that glass comes from gas. So we use gas to help us reuse materials. So we use this wonderful energy source right across

the piece – we use it for heat, electricity, manufacturing and also things like recycling. So it is an important source of energy, and I think it's going to remain important, because even as we build more wind turbines, more solar panels which we absolutely need to do – even if we build new nuclear power stations, we're still going to need gas for heat. So those renewables will provide electricity, but gas will continue to provide the majority of our heat. We're also going to use it as a raw material. So it's going to stay important as a source of energy for the UK. So I guess that's my first point, really, that, y'know, gas is useful, gas is important.

The second point that I want to make is that we used to get all of our gas from the North Sea. So they started producing natural gas offshore about in the early 1970s, so nearly fifty years ago. And that allowed us to convert all our houses to be heated by natural gas, also allowed us to convert a lot of coal-fired power stations and build gas, gas-fired ones instead, which are much cleaner than coal, so it's good for air quality and also, er, reduce carbon emissions. And we got all that energy from the North Sea. So fifteen years ago we produced more gas than we consumed, so we actually were able to export some. But since then production for the North Sea has declined a lot. So we now get about half our gas from the North Sea, and we import about half of that gas. And that – those imports come from different countries. We get some from Norway by pipeline. We get some from Belgium and the Netherlands by pipeline, although some of that gas that we get from the Netherlands or Belgium may have originated in Russia, it sort of goes through the various European pipelines and we're kind of at the end of that line. Um, and then we also get some gas by ship, so we get some of it tankered over... Er, the biggest country we import gas by ship from is Qatar in the Middle East. So we import about half of our gas now, and by 2030, that import dependency is expected to rise to three-quarters. So at that stage, we'll be importing about three-quarters of our gas, producing about a quarter of it in the UK. So at that stage we'll be very dependent on gas coming from overseas.

And then the third point that I wanted to make is that we've got a lot of shale gas under our feet.

So I'm gonna throw a few numbers out here and try and explain what they mean. So the British Geological Survey looked at several areas of the UK to see how much shale gas, and indeed oil, is there in the rocks under our feet. If we just look at the North of England, the Bowland shale, the British Geological Survey think there's 1,300 trillion cubic feet of gas in the ground. Now, we'd only ever get a fraction of that gas out, we'd never produce all of that, but let's just say we could get ten percent of that gas out, that's 130 trillion cubic feet. Now, what does that actually mean? We use just under three trillion cubic feet a year. So you could produce 130 potentially; we use three every, three trillion feet a year, so it's equivalent to sort of forty or fifty years of consumption. So it's a lot of gas I think is the point I want to make. And that's really why the industry is, is, is seeking permission to carry out exploratory hydraulic fracturing to test whether or not that gas can flow to the surface in enough quantities. So we know there's a lot of gas down there. Whenever companies drill and take rock samples and analyse them in the lab, there's a lot of gas in those rocks, which is great. What we don't yet know is whether it's going to flow to the surface in, y'know, sufficient volumes. And that's where, that's where the industry is, and that's why it wants to sort of appraise that gas, find out if we can actually produce it, and if we can, then we have a great energy resource that can be used to reduce our dependency on imported gas and provide a, y'know, a British sort of homegrown source.

So I guess those are the three points I wanted to start off with. I've got a few pictures and a few kind of, couple of maps to kind of show you. I wanna start off actually with this one, so if you could... I only have five, so if you could sort of... if people could share, that'd be fabulous.

So there's three maps here. So the one on the left shows all the wells which have been drilled onshore in the UK over the last hundred years. And these are all available on the web – there's a website called UKOGL, where you can actually go and click on all those wells and find out when they were drilled. It's quite a good useful source of information. So you can see that we've done – there's been a lot of oil and gas production in the UK onshore over many decades. We've drilled

about two thousand wells in total. Just to point out a couple of areas, if you look at the sort of middle to the right of the map, this great blob of wells – there's quite a lot of oil wells that were drilled in the Second World War, in Sherwood Forest, and that produced oil for the D-Day effort; it was actually used as part of our war effort. If you then go to the south of the map you can see a sort of blob here in the kind of bottom left corner – now, that's on the south coast, it's near Bournemouth, it's a very sort of affluent area, a very environmentally sensitive area, it's on a world-heritage coastline – we've had an oilfield there producing for the last thirty years, and at peak production it was producing a hundred thousand barrels a day, which is a lot of oil. And it's still producing, and probably will carry on for the next couple of decades. So we have actually done quite a lot of production across the country. Now, the middle map, this one here, shows where the British Geological Survey have assessed how much gas and oil there is in the ground. So the blue sort of ring bit in the middle is, is mainly gas. Then you've got the kind of purple bit in the south, which is mainly oil, and then you've got the red bit in Scotland, which is both oil and gas. So those are the areas where you're most likely to see shale gas production. And you can actually see they match up pretty well to where the industry has already drilled quite a lot of wells in the past. Then the map on the right shows where the actual licences are, so this is where companies have a licence to explore. Now, that doesn't give them permission to do stuff – they still need to get planning permission, they still need to get approval from the Environment Agency, Health and Safety Executive – but it does show where you're likely to see activity take place. And again, you can see there's quite a lot in the North of England, and quite a lot in the South in various locations as well. So I guess that was the kind of the first map I wanted to show.

Now, I'm sure you're going to have seen, erm, pictures of sites, erm – if you could hand these ones out, and also if you can hand those out as well. – So, so I'm sure you may have seen, y'know, pictures of sites with big drilling rigs and everything else. What I wanted to show you in these pictures is sites that are producing oil and gas after you've done the drilling and hydraulic

fracturing work. So all the heavy equipment, all the kind of unsightly stuff, is there at the sort of start of the process, but when you've done that, the heavy equipment moves away and then you have these well-heads which quietly produce gas, or you have the nodding donkeys which quietly produce oil, potentially for up to twenty years. So you've got the one with the blue sky, that's a gas site there, and the little red things are the kind of well-heads – they're not very big, but that's where the gas will come out the ground. Erm... And you can then see there's some tanks, some storage tanks, on the site – but that's kind of what it looks like when you've done that intensive phase of production. The other one, the picture with the nodding donkey, is an oil well in Nottinghamshire, and what's interesting about that one is the houses were built after the oil well. So the oil, oil well was drilled first, and the houses were built out around it. And, y'know, clearly it's not been actually a big issue, because the houses were built after the oil well was drilled.

I then want to show you a couple closer to home here. So again if you don't mind me handing a few more out, if that's all right...

'Just about two minutes left'

That's fine, yeah, OK, then I'll stop. So... So, just in the last couple of minutes I'd like you to try and spot the gas well in this picture. This is the big picture here, right, this big one. I'd like you to try and spot the gas site here. Now, this is in Lancashire, the town you've got up here is Elswick, so it's sort of between Preston and Blackpool. There was a site here which was drilled in 1993 by British Gas, it was... produced gas for twenty years. It's just, just finished producing gas now, and they used the gas to generate electricity which – they had a little generator on site and they fed it into the electricity grid. Erm, but it was, as I said, drilled about twenty years ago. So I just wondered if you can spot it on this picture. – Sorry? Do you think you've found it? This one here? Yeah, that's right. So it's this one – for the rest of you, this little site here, basically, it's this one there. So if you look at it – it's an aerial kind of long shot – it's actually, y'know, you can see some other things in this area, some farm buildings and other stuff. It's not actually kind of much bigger

than some of these other little developments. And then the other photo I've given you gives you a close-up aerial short of it. It's the same site. So you can see that the building in the bottom of the picture is your electricity generator, and then there's a little tiny well-head in the middle of that gravel patch, and that's the well. Then you've got a pipe which then produces – takes that gas, there's a few sort of containers which separate out the water, and the gas goes into that generating site. So you know, when you've had the more intensive phase of development on a site, those are what its going to look like. And a shale pad's not going to look that different, really. You may have sort of ten or twelve of those little well-heads on that site, but fundamentally it's going to be of a similar size to that. So I guess I'm probably running out of time, so I'll stop there – y'know, really happy to take your questions in the next session and talk more about it.

Steve Robinson, Sciencewise (Stakeholder Dialogue designer and practitioner).

So I'm going to talk... about five different areas, and they all relate in some way to this issue of engaging communities on contentious issues. I've listed them up, up there. Closed versus open policymaking – I'll explain what that is. A difference between public and stakeholder dialogue, because they each, they each relate, and usually in a situation where, er, there's a contentious issue affecting a community, those communities have a stake in something happening, so that's the significance of stakeholder dialogue. And I mentioned the costs issue as well, 'cos all this stuff costs money, and also as taxpayers you'll be interested to know how much. We're also world class in the UK at wasting money on not talking to people properly. So we'll mention that, and you can go and bother your MP about it. And there's also some common pitfalls we find in these situations, where there is some kind of contention around a community. And then something that also crops up in these situations as well is trust. Usually if there's a conflict going on, then there's a lack of trust at the moment. And you hear a lot of about

how you build trust, and so I'm going to talk a bit about how, how that actually occurs in practice. Okay, that all right? And the point about it as well is that you can attend workshops on these sorts of things where for a whole week you can talk about a single case study – you can do courses, y'know, you can do PhDs studying stakeholder dialogue... I'm going to do it in fifteen minutes. And also I suspect that the, the points of greatest value probably come out in the interactions, when we start – you think 'How does that work, then?' You know, so we might, we might get more specific then.

"Will you explain who you are as well, Steve?"

I'm going to do that. I am! So I'm Steven J Robinson, I'm an independent practitioner in both public and stakeholder dialogue. What that means is, er, that I, as an independent practitioner, I don't take a position on the issues. So if somebody was coming to frack near your house and the likes of me appeared, I wouldn't be saying whether or not it was a good idea to frack near your house or not. But what I would have a very strong opinion on is the best way of discussing that sort of situation, to reach outcomes that, by and large, everybody could agree on.

I think it's because a lot of contention over this, and Fracking probably falls into this, is because somebody somewhere has made up their minds what's good for all of us, and then told us what's going to happen. That is the closed approach to making key choices. These things crop up a lot, for instance, (...??) about whether it's a good or a bad thing. Are there any teachers here? Good, then you won't sit there fuming when I mention... Everybody's going to be an academy in 2020, right? Does anybody remember that being discussed? No? It's just happened hasn't it? Came out of a Christmas cracker somewhere. Those sorts of choices, which quite often they're evidence-led, so they've said 'This is the right thing for everybody, we'll just get on and do this.' Well, there are certain types of big decision where it might be good if someone just took action straight away, like there's some national threat or some horrible illness that suddenly broke out – you'd want them to just get on and

sort it out. But turning your school into an academy, and you're a parent, governor, nobody told you that – where did that come from? Fracking's another one, where one minute we, we hear: 'Fracking, what's that?' and the next is, 'We're going to do Fracking. That'll be good, won't it, 'cos we need the gas.' And quite often you then hear this phrase: 'public acceptance'. 'We'll get on with this – we've got public acceptance.' And usually when you hear the phrase 'public acceptance' being used it's associated with one of these closed decisions. 'We've had the discussion, we've made the choice, so now we're just going to make it acceptable to people.' And practitioners, in which I count the likes of Jenny and Peter and so on, actually talk about public acceptability, because acceptability is something that you strive to achieve through discussing things with people: 'What's the right way forward?' Now, there's a contrast between Fracking, where the policy appeared from nowhere – and there were discussions about, about Fracking, but it was how to engage with communities when it went ahead, if it was going ahead in their area. There's another one, which is the geological disposal of nuclear waste – has anyone heard of that? No? Some have, some haven't. Yeah, yeah? Well, there's a lot of nuclear waste at the moment. It comes from many years – there's been a nuclear industry in the UK since the 1950s or whatever – so a lot of the people who did the early development work, experimental reactor designs and will be other stuff that they got on with, they're all retired. Some are no longer with us. But the waste is still here, and in the mid-1970s there was a report by someone called Lord Flowers, saying, 'What're we going to do with the waste?' And here we are in the year 2016 – so that's quite a long time later, isn't it? – and we still don't know where we're going to put it. It's in interim storage, but there's no long-term solution. The point about it, though, is that the government here is going down what's called an open policymaking approach, where they've decided that 'We'll see if communities can come forward and volunteer to host waste.' So, rather than trying 'It's coming, it's coming to a field near you – we'll dig a big hole. You won't mind that because you won't see it, we'll plant some trees round it...' Rather than doing that, they're saying 'We'll find somewhere they can volunteer to

host this site. You get the jobs, y'know, we'll pay you a million – a million pounds a year if you host, if you offer...' And the thing is, well, when they investigate they your place isn't suitable, but you still get your million pounds a year until they find that out. That's food for thought, isn't it? So, so that, that's a route where they've tried telling people where this stuff is going to be sited. It didn't work – and I'll come back to that later on – so now they've gone down the volunteerism approach. So within the same government, different departments, we have two different approaches of policymaking. One of them was closed – Fracking: 'Get on with it, needn't ask' versus 'How can we get people to host, or consider hosting, the facility?' Very different approach.

Okay, so, let's talk about this difference between stakeholder and public dialogue. Has anybody heard about stakeholder dialogue, talked about stakeholder dialogue? No? No. Okay, well, it's a term that emerged in the UK in the early 1990s. I was in the meeting when we invented it – the term, not the approach. And the principle is quite simple: it's saying, if you're affected by something, if you have an interest in a situation, that means you have a stake in the situation. Therefore, you have a right to have a say. And, and your say should be listened to as well. Now, it's something that's more than just 'Ooh, let's get together in a big room and shot at each other'; it's a highly structured approach. It feels very relaxed – quite often the format's very similar to this, y'know, with notes being taken on flipcharts and so on – but it's a highly structured approach to undertaking, exploring options and situations and so on, in a non-threatening, mutually respectful environment. You might have things like working agreements or ground rules. You might have options, you might call for further information and so on. And so essentially is somebody's coming to a field near you and saying 'We'll do a bit of Fracking here', you might say, 'That'll be all right, then, keep the gas on.' But you might say, 'I can see it. What about the trucks? What about the effects on my health? Is there something that might affect the children with all this traffic going on in the neighbourhood for a few weeks?' In which case you'd have a say. Therefore, you should have a say. Stakeholder dialogue is different from public

dialogue, which was done by a centre I did some work with called Sciencewise. The website's still there – sciencewise-erc.org.uk I think. And, public dialogue was undertaken in groups like this, around aspects of emerging science and technology policy, and there was lots of different things that we held public dialogues on, to give an additional strand of evidence to policymakers about what they should do. So Three-Parent Families – do you remember that one that was announced last year? Y'know, mitochondrial DNA, where people with certain types of genetic illnesses, and you could have a three-parent baby rather than a two-parent. But that was, that was something that was done as part of public dialogue, where people said, 'We think this is, erm, this is something that should be explored.' And another one that you might have come across was a sort of concordat on circumstances under which you might undertake animal testing – highly contentious, but again people agreed, how you might engage with people around what you might have to certain tests on in certain circumstances. There's been a lot of public dialogue about geological disposal of nuclear waste, and how do you actually activate things like volunteering as a community. The one that... confuses everyone, and I welcome you to all go away and think about this and then write to the government, because nobody knows, is: how do you define a community? Because you think, 'I know, I know how you do that' – but when you actually get down to it, it's a very difficult thing to actually define. There's been a lot of discussion about that. So public dialogue tends to be about policy in principle, and so on, that may happen nationally. And the geological disposal one is interesting, because you can have national discussion about, about how you bring to life this policy of volunteerism as a community. But if somebody near Preston says, 'A million pounds a year? I like the sound of that! Let's put Preston forward as a potential host community.' Well, if you live in Preston, you're a stakeholder in your community being volunteered. Therefore there probably should be some kind of way of engaging with you locally, to test your opinion about whether or not you think this is a good idea. And again, built into the policy are formal tests of public support, as ways forward. So that's broadly the difference between public dialogue – things in principle that are of interest to us all –

and stakeholder dialogue, which is things that go on nationally. Now, in the case of, of Fracking, I would say that public dialogue about Fracking in principle never occurred. Okay? There was, there was one day – I don't know where the policy came from, but it was sort of implicit in other aspects of energy policy – and I think – y'know, you may have spoken with energy experts who might throw more light on that than I have. But, er, one thing that we found in the public dialogue about engaging was that people were really keen to see that if there were any Fracking in an area, that people were informed in advance, that they were engaged with, that there was also benefits to the community if things went ahead in an area. Now, that's now reflected in the policy, but there was never, there was never the overall discussion about whether or not this should, this should occur.

Now, all this sitting around in groups and chatting sounds very expensive, and that's what ministers say. Y'know? 'Why don't we just get on with it now?'

Okay. Okay, well, costs, then, are considerable. Okay? When they try to impose a, a site, six hundred million pounds. Two hundred million maybe in the public record. The site for Heathrow, supposed to be agreed, the site for a third runway – twenty million pounds and still they don't agree. Fracking, Balcombe. Police overtime costs for protests – four million pounds. As dialogue practitioners, you can do stakeholder dialogue or public dialogue, for many, many multiples less. So it's just a sensible way forward.

The two other points. Common, common pitfalls – the main pitfall people make is about the facts. Okay? Which is when you look at the facts, do you agree where you're getting the facts from at the moment? Who provides the facts? How do they do the methodology? All that's to be agreed in advance, and that is what naturally drops out of a stakeholder dialogue. And finally, building or breaking trust. You can't do trust. When you get out of bed in the morning, are you more trusting today? Doesn't work. So what people tend to say is, 'Well, we just have to be open and transparent. "I'm going to frack under your house." That's being open! "I'm going to frack under your house because you're not as important as the nature reserve up the road."

That's being transparent.' And, er, again, so it's not really open and transparency that's the key. What is key is trust – two sides to the same coin – is respect for people. So if you're making policy nationally, make sure that you involve people. And if you, if, if implementing a policy involves people in a locality, you have to make sure that people in that locality are engaged effectively, otherwise you get a lot of conflict, as we have seen. Okay

Appendix 3: Oversight Panel: Ways of Working Document

We summarise below the Fracking Citizens Deliberation process and the role of the Oversight Panel. We hope that this can serve as an agreement between all the members of the Oversight Panel to help ensure that the process runs fairly and smoothly¹.

The Citizens Deliberation process is underpinned by a clear set of values including equality (everyone's opinion is of equal value), accessibility, transparency, integrity, and empowerment. We also seek to obtain consensus on all important matters. This agreement is an attempt to reaffirm these values and help Oversight Panel members to realise these values in the working of the project.

What is the Fracking Citizens Deliberation?

This research project will look at how people feel about Fracking when they are given an opportunity to learn more about the topic and consider and discuss the issue as part of a group. The goal is to stimulate discussion and deliberation on a contentious subject and to better understand how people process information and discuss the subject. The process brings together a diverse sample of around 20 residents from Preston over four evening sessions and a day. Participants will hear from a range of 'witnesses' or 'commentators'. During the sessions, led by a team of independent facilitators with extensive experience in deliberative process facilitation, participants will

have an opportunity to question the commentators, share opinions with each other, to deliberate, challenge each other and ultimately reach a set of conclusions.

The group will consider the following question: *'What are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed?'* Participants will have an opportunity to prioritise these factors. Finally, they will decide *'What recommendations they would give to Government on the future of Fracking in the UK, if they were given the opportunity to do so?'* All recommendations irrespective of the number of votes they receive will be recorded in the report. More background on the process is contained in the appendix including the jury participant recruitment process that was agreed at the first Oversight Panel meeting and the briefing for the commentators.

What is the role of the Oversight Panel?

Central to the success of the process is the engagement of a diversity of key stakeholders who will meet separately from the citizens. The role of the Oversight Panel is to do only the following:

1. Ensure that the project design is fair and rigorous,
2. Agree on the question to be posed to the citizens during the process,
3. Suggest topics to be considered by citizens during the process,
4. Identify commentators/witnesses best able to present on these topics,
5. Monitor the process of citizen selection,
6. Advise on the form and dissemination of the findings

OP members will not attend sessions or be able to influence the deliberations of it. The OP will not seek to resolve the question posed nor wider

¹ *The approach suggested draws upon Citizens Jury good practice and experiences such as Nano Jury, the Citizens Inquiry into the National DNA database and Citizens Juries on onshore wind farms in Scotland.*

questions on the merits of Fracking but focus on the fairness and integrity of the design and implementation of the process.

What process will be followed?

The project aims to recruit a diverse sample of twenty Preston area residents with a balance of age, gender, education background and opinion on Fracking. The agreed recruitment strategy is outlined in Appendix 1.

The group will meet over four evening sessions and a day. The structure of the sessions is outlined in detail in Appendix 2 and will be as follows:

Session 1: April 11 *Introduction*: A series of participatory activities designed to enable participants to start to feel relaxed with each other and the facilitators. During this session there will be no external input of information, it is only an opportunity for participants to share their own knowledge and opinions on the issue.

Session 2: April 13 *The basics of shale gas exploration*: (presentation by one commentator agreed by the OP)

Session 3: April 18 *Current energy challenges facing the UK*: (presentation by one or two commentators as agreed by the OP)

Session 4: April 20 *Implications of proceeding with Fracking in the UK, at the local level, at the national level, at the global level*. (presentation by two commentators agreed by the OP)

Session 5: April 23 or 24 *Best practice for engaging local communities on contentious issues* (presentation by one commentator agreed by the OP). Participants will then spend the rest of the session attempting to answer the following questions, 'What are the most important factors that need to be taken into account when deciding whether or not Fracking should proceed?' and 'What recommendations they would give to Government on the future of Fracking in the UK? This will be achieved through a combination of small and large group discussions.

The commentators selected for the sessions need to be agreed by the Oversight Panel members. If it is impossible to agree on a

suitable commentator then it is possible that two commentators may present at each session.

All sessions are audio recorded so that Oversight Panel members can check that the facilitation is not biased.

The only people in attendance at each of the sessions will be the project lead Dr. David Reiner and the two facilitators, Peter Bryant and Jenny Willis.

What will happen with the information gathered?

During the last session of the process there will be an attempt to facilitate consensus, however, this may not be possible. The participants will write (in their own words) recommendations that will answer the two questions. The recommendations will be ranked by the participants themselves (each participants will score each recommendation).

Within one month of the last session, a brief process report will be produced containing a) an explanation of the recruitment process b) an explanation of the structure of the sessions c) a list of the recommendations (in their own words) d) transcriptions of all the commentator presentations and the questions asked by citizens. All recommendations will be recorded irrespective of how many votes they received. The report will contain no third party analysis of the conversations and will be made public.

A separate analysis of the process will be subsequently written by Dr. David Reiner drawing upon the transcripts of the audio recordings and the recommendations written by the participants, which will focus on both the content and the framing of the discussions. This will be a public report and will be made available later in the year on the ReFINE website. Both reports will be disseminated widely and we will benefit from any Oversight Panel suggestions on the best mechanisms for distribution of the findings. The goal of the project is both publication in the peer-reviewed and wider public distribution of results.

Oversight panel members agree to the following commitments:

Commentators: No Oversight Panel member should attempt to influence any of the commentators. Each commentator will be sent the commentator briefing paper (see Appendix 2) which details the subject on which they are being asked to present. It will then be up to each commentator to decide what they want to include in their presentation.

Citizens: No Oversight Panel member shall have any contact with any of the project participants or enable any third party to have contact with them or their family members. The project has a duty of care over the participants and so their welfare is of paramount importance.

Panel: All members will have an equal right to express views and are expected to engage in a fair and constructive manner. Members are encouraged to share emerging concerns and provide informal feedback on matters related to the OP and the process.

Outputs: In the interest of transparency, we will be providing OP members with access to all data collected, but we ask that they do not release the data more widely and that any embargo periods (such as pre-publication) are respected.

What time commitment does an Oversight Panel member need to make?

We expect Oversight Panel members to participate in a minimum of four meetings. Given the geographic spread of Oversight Panel members and our sensitivity to the time commitment involved meetings are organised via Skype. The agenda and any meeting papers will be distributed at least three days prior to each call. Meetings will be no longer than one and a half hours in length.

Who is on the Oversight Panel?

The Oversight Panel consists of the following members:

All members are serving in a personal capacity and so any contributions made do not represent the views of their respective organisations.

1. Chair: Dr. David Reiner: Senior Lecturer in Technology Policy, Cambridge Judge Business School, University of Cambridge and lead researcher on public engagement on the ReFINE

(Researching Fracking in Europe) project, which is funding this project

2. Dr. Grant Allen: (University of Manchester)
3. Dr Oliver Escobar: (University of Edinburgh and What Works Scotland?)
4. Mark Linder: (Bell Pottinger)
5. Doug Parr: (Greenpeace)
6. Professor Zoe Shipton: (Department of Civil and Environmental Engineering, University of Strathclyde)
7. Professor Mike Stephenson: (British Geological Survey).
8. John Thrash: (eCORP)

Project facilitator: Peter Bryant, from Shared Future, a community interest company based in the North West, who has run some twenty Citizens Juries, will lead the facilitator team for the process and will help guide oversight panel discussions.

How are decisions made by the panel?

Oversight Panel members will bring with them a diversity of experience and opinion. It is conceivable that sometimes it will be difficult to reach unanimous agreement on some issues although we will strive for consensus if at all possible. In the spirit of transparency, we outline the panel decision-making process should such a situation arise:

A range of perspectives and a variety of stakeholder interests are represented on the panel and so we do not require that all matters will be resolved unanimously;

If there is disagreement, we will seek to understand what are the specific concerns and try to address those concerns insofar as possible;

Members of the panel are encouraged to suggest revisions to the process as it goes along; David Reiner, as project lead, has the final say on the decisions made relating to the design of the process. The Oversight Panel is designed to act as an additional safeguard of the fairness and competence of the process. As noted previously, if it is impossible to agree on a suitable commentator for a session or because of

restrictions on the availability of suitable commentators, then it is possible that two commentators may present at a session.

If any panel member feels that their views have not been sufficiently taken into account they can withdraw from the panel at any time during the process although they should first explore ways of resolving any concerns. Anyone who terminates their association with the process may ask to have their name removed from the list of OP members from the date of their withdrawal.

If any of the invited panel members does not agree to participate or decides they need to resign for whatever reason over the course of the process, we will still seek to find an appropriate replacement to ensure continued balance on the oversight panel.

Appendix 1: Participant recruitment

All participants will receive a £20 gift voucher for each session they attend. A mixed method approach to recruitment has been used comprising the following stages:

1. The aim is for a sample profile that is balanced in terms of age², gender and education background³.
2. Recruitment has taken place through the delivery of 1000 recruitment letters delivered direct, door to door to every third house within neighbourhoods in a 1 mile radius of the Preston venue. This was carried out by a team of briefed local students who are uninformed of the topic of the jury. Conversations on the street (through approaching every third person that was seen) during the delivery

of letters was another recruitment method employed. This has produced a long list of 45 potential participants. The subject of the process at this initial stage of recruitment is only in the most general terms (i.e. 'an important issue facing Preston and Lancashire').

3. A follow up contact with all on the long list reveals the theme of the deliberation and asks participants if they are a) in favour of Fracking b) against or c) unsure or neutral.
4. Short list agreed and any gaps in the profile identified (e.g. males aged 18-24).
5. Additional outreach work attempts to fill any gaps in the profile.
6. Participants who have a place are phoned to confirm their participation.
7. We will seek an even balance of participants (roughly equal number of pro, con and neutral/unsure), which will allow us to focus more on understanding where the citizens can reach consensus (e.g., on best practice in public engagement) and how they process evidence rather than having a goal of reaching a simple verdict on the future of shale gas exploration.
8. This recruitment process reflects the reality that no recruitment process is flawless and that perfect representation is impossible. The participant profile will reflect local diversity but cannot be described as representative.
9. The support needs of all participants are considered and where possible addressed, i.e. a recognition that not all are comfortable with the written word, many of us have care responsibilities, additional support needs and transport requirements in order to take part meaningfully in such a process. Participants are telephoned between sessions to 'check in' with them and to see if their support needs are being sufficiently met.

² Age groups: 16-19, 20-35, 36-45, 46-59, 60+

³ Educational background a) GCSE/O level/CSE b) Vocational qualifications (NVQ1+2) c) A level or equivalent (NVQ3) d) Bachelor degree or higher (NVQ4) e) no formal qualifications

Fracking: A Citizens Deliberation Preston, Lancashire 2016

This deliberative process looked at how people feel about Fracking when they are given an opportunity to learn more about the topic and consider and discuss the issue as part of a group.

