Energy Research Dialogue: A public dialogue on UK energy research priorities

Research study conducted for Research Councils UK

FINAL REPORT August 2007

Contents

Executive Summary

Background and Objectives

In March 2007 the Research Councils UK (RCUK) commissioned Ipsos MORI to conduct a major public engagement exercise to elicit and understand the public's priorities for evaluating energy research.

The exercise was intended to ensure that the public's voice was heard in the context of major spending reviews undertaken by the Research Councils to decide future energy research investment.

Process

In close collaboration with RCUK's Steering Group, Ipsos MORI designed and ran a three-stage deliberative dialogue exercise with a broadly representative cross-section of the population.

Initially, three one-day regional workshops were held in Birmingham, Oxford and Cardiff. These involved a combination of syndicate and plenary group exercises and stimulus presentations led by Ipsos MORI facilitators, and observed by RCUK researchers and an external evaluator.

Participants from these workshops were then given optional 'homework' tasks to complete, to provide personal perspectives on the issues and enable them to deepen their understanding (if they so chose).

Finally, a reconvened Summit event was held in Warwick over the course of a full weekend, at which 30 participants from across the regional events were joined by a team of energy researchers and Ipsos MORI facilitators. At this workshop, energy researchers themselves took an active role in participating in the debates and putting themselves forward for question and answer sessions with the public.

A number of lessons were learnt from this process about how to conduct public dialogue effectively on such a complex and multi-layered topic. These include the importance and value of 'expert' involvement throughout, the need to continually signpost participants about where they are in the dialogue process and how it all fits together, the need to strike the right balance between stimulus provision and time for free-flowing discussion, and the value of structured exercises to allow participants' underlying values and 'evaluative criteria' to emerge naturally.

Findings

A number of key findings emerged from the dialogue process, which indicate the way the public approaches both the wider issues of UK energy challenges and opportunities, and the specific topic of energy research. Highlights of the findings include the following:

- The centrality of public attitudes towards **climate change** (i.e. level of doubt/scepticism, attribution) as a guiding force in shaping the public's approach to the issues of energy challenges and energy research.

- Energy technologies and research tending to arouse **controversy and/or ambivalence** include biofuels, nuclear (fusion and fission –for different reasons) solar, wind and measures to instigate social/behavioural change.

- Energy technologies and research tending to attract a high level of **support and consensus** include energy efficient buildings, hydrogen fuel cells/economy, and tidal.

- Energy technologies tending to arouse **little interest or outright rejection** include conventional energy sources, carbon capture and fuel poverty (except as a hygiene measure).

- **Budget:** questions and concerns were raised over the **seeming lack of state funding for energy research** as a proportion of national spending. This however comes with a number of qualifications and may have been conditioned by the way stimulus was presented.

- **Social to technological:** overall, participants seemed to shift from favouring social and behavioural solutions towards technology-driven ones as the dialogue process progressed.

- **Trust in science:** stereotypical impressions of science persist but confidence in the motives of scientists is high overall. However, suspicion prevails with respect to the role and motives of private enterprise in funding science.

- **7 key overarching evaluative criteria** emerge naturally through process. These are: **Ethics and equality; Economics; Quick Fix; Sustainability; Legacy; Environment; Efficiency.**

- **Environmental impact, legacy and sustainability** emerge from the tasking phase and allocations as being strong criteria, underpinned

by sound **economics**. **Ethics and equality**, whilst important, seem to be relatively secondary, hygiene factors in comparison.

- Budgeting exercises highlighted the **'principled but pragmatic'** and utilitarian way in which public evaluate energy research options. Idealistic or open-ended "blue skies" approaches are not commonly adopted, especially once budget considerations and trade-offs enter the fray.

- Further findings are listed in the conclusions.

Emerging Hypotheses

A number of hypotheses and inferences have been drawn from the findings by the research team as an interpretive lens through which to understand what is emerging and make sense of the rich data we have gleaned. These are put forward tentatively as the basis for future research and investigation and are provided in summary form below:

Hypothesis 1: The salience and importance of energy research evaluation criteria are driven by the public's variable sense of a) Urgency and b) Agency with respect to the UK's future energy challenges, and by extension, the suitability of energy research programmes to address these challenges.

Hypothesis 2: By mapping these Urgency and Agency drivers against each other, we can identify loose themes and typologies of thought with respect to participants as they try to grapple with the complexities of this issue.

Hypothesis 3: Participants' sense of Urgency and Agency are influenced by the dialogue experience, as it alters the underlying assumptions and immediate contextual factors that condition their response.

Hypothesis 4: When it came to a specific and 'real world' budget allocation debate, public agreement or disagreement on funding energy research hinged on two axes: a) The pace of change required (incremental or radical) and b) the source of change required (social or technological). Together, these axes describe a "disputed territory" within which participants negotiated, in a manner likely to be similar to that of energy researchers themselves.

Hypothesis 5: As the dialogue exercise altered people's assumptions and knowledge about the topic area, it seemed that both their sense of Urgency and Agency increased, and that this broadly encouraged a more radical and technology-driven approach to be adopted with respect to energy research priorities.

Next steps

The following are shortened summaries of the 13 suggested next steps for future action put forward by this report for consideration by the Research Councils UK:

- **Quantitative segmentation research** to develop more robust profiles of public attitudes and demographics

- Construction of archetypal public response patterns or **counter-arguments** to enable the RCUK to incorporate the public's voice into their decision-making process..

- Construction of '**rich pictures'** of a range of hypothetical members of the public (i.e. based on narratives and character vignettes). These would bring the findings to life and provide a challenge and critical-thinking function to RCUK funding debates.

- Quantitative research to assess the **relative weighting of the evaluative criteria** and key drivers of these weights.

- Developing quantitative metrics to map where different members of the public perceive energy technologies and/or research projects sit within the '**disputed territory' matrix**.

- **Public criteria could be adopted as part of the formal submissions, evaluation and validation process** for all new energy research projects under the auspices of the RCUK.

- In **order for the RCUK to effectively communicate energy research funding choices to the wider public**, it is important not only to outline the potential results of the research, but also the framework underlying that decision.

- This could be done in the form of a '**fund management portfolio'** publication, with accompanying annual energy "shareholders" meetings to invite the public to talk to the RCUK and question them on their stewardship of the "fund".

- RCUK to provide the public with **more opportunities for direct interaction** with the energy research community to build trust and reduce suspicion.

- Provide **an overarching narrative** about the way the Research Councils see science and technology working to achieve energy goals. i.e. degree to which progress should be seen as incremental vs radical,

technological vs social or to collapse these distinctions i.e. full spectrum.

- Provide more **information/justification for social and behavioural energy research programmes** – to counter scepticism of behaviour change work.

- Use the findings provided as the **basis for submissions for increased state funding for energy research.**

- **Communicate the findings more widely through the research community** to enable them to incorporate these into their submissions for funding, thereby increasing the public accountability aspect of these submissions.

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Julian Thompson

Joe Ballantyne

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1. Introduction and Overview

1.1 Background and Objectives

The UK faces a number of major challenges over the next fifty years in providing safe, plentiful, sustainable and affordable power for use in transportation, electricity generation and heating. A number of energy technologies - from conventional and renewable sources in the short-medium term, to the radical technologies of hydrogen and nuclear fusion in the long-term - could provide solutions to these challenges. All, however, have potential drawbacks as well as benefits and therefore involve trade-offs, as well as varying degrees of uncertainty in delivering successful outcomes.

These complexities have long been recognised by scientific researchers, private companies, policymakers and funding bodies within the energy research field, and have been integral to their deliberations as to the most appropriate path to take, given finite budgets and wider political and economic constraints.

As a major funder of energy research, Research Councils UK (RCUK) has additionally highlighted the need to understand and incorporate the **general public's priorities for investment in energy research** into these deliberations. This is in recognition of RCUK's role both as a taxpayer – and ultimately, therefore as a source of funding - and as a wider stakeholder on the issues of sustainability, environmental protection and economic progress.

The recently published RCUK *Science in Society* strategy[1] outlines its commitment in the area of public engagement. It also recognises that it is vital that Research Councils identify public attitudes to be considered in the course of research, and foster debate that will enable the public to contribute to Research Councils' policies and research strategies.

Specifically on energy research, the Research Councils have an Energy Programme. This is bringing together engineers, scientists and social scientists from many areas to tackle the research challenges involved in creating new energy technologies and to assist in understanding the social, economic and environmental implications of energy research.

While currently, the Research Councils' Energy Programme does gather a broad spectrum of views when making funding decisions, **it does not explicitly include public views in this process.** The addition of the general public to the current stakeholder input streams will therefore increase accountability for the direction of Research Council-funded energy research.

[1] http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/scisoc/sisstrategy.pdf

Against this backdrop, Research Councils UK commissioned Ipsos MORI in March 2007 to undertake a major public engagement exercise to identify public priorities for energy research, to inform the Research Councils' strategic decision making. Through this work, Ipsos MORI has elicited the underlying criteria which the public uses to evaluate the importance of different types of energy research, and their priorities in this area. This is a complex area which therefore began with a debate about energy per se (before any discussion about energy research specifically).

The outputs from this public dialogue activity will be incorporated into the Energy Programme of Research Councils UK, directly via the Programme Co-ordination Group and also through the Programme's Scientific Advisory Committee. In addition, the findings will inform the relevant strategy boards within the Research Councils. Findings that fall outside the remit of the Research Councils will be directed by them to other organisations, and this report will also be sent by the Research Councils to interested bodies.

The goal for this project therefore has not been to gain a statistically representative view of national public attitudes, but to engage the public in an in-depth, qualitative dialogue on the energy and energy research challenges faced by the UK, the role of energy researchers in addressing these challenges, and the kinds of energy research initiatives which the public therefore prioritises.

Since the research aimed to cover a number of complex issues with a cross-section of the general public, a deliberative approach was adopted to achieve the Research Council's objectives. A brief rationale for this, and an overview of the deliberative workshop process is given below, which should be sufficient for those wishing to proceed straight to the findings, starting in Chapter 3. For those wishing to see a detailed description and evaluation of the method, this is provided in Chapter 2.

1.2 Overview of Research Process

The deliberative approach to research is used to gradually inform participants about the topic, and expose them to the debates and uncertainties that surround it, as the process unfolds. This allows us to understand both spontaneous and informed opinions, to track how these change, if at all, in response to the discussions, and mirror in a public forum the kinds of debates that often take place among decision-making groups to see where the similarities and differences lie.

The method adopted for this project was to conduct three one-day (Saturday) regional workshops in Birmingham, Oxford and Cardiff, and a fourth, two day reconvened event (on a Saturday and Sunday) in Warwick, throughout June 2007. The reason for the choice of locations for the regional workshops was that they needed to be within reasonably easy reach of the summit location (as some regional participants would reconvene at the summit), which in itself needed to be fairly central and have good transport connections for participants to get to.

Recruitment took place face-to-face, aiming to recruit a cross-section of the population in the three regional locations. Participants were recruited using a recruitment questionnaire, which asked questions about the subject of energy, as well as for demographic details by which quotas were set[2]. Selected participants from the regional workshops were recruited to attend the summit event in Warwick.

At the regional workshops, participants were introduced to the subject and invited to give their top-of-mind thoughts on energy and energy research.[3] They were also given a stimulus presentation, which highlighted key debates in the future of Britain's energy supply, before identifying and prioritising areas of potential energy research. Throughout this, the aim was to formulate a set of initial criteria by which people evaluate potential energy schemes. At the end of the workshops, participants were given a questionnaire to complete before leaving, as well as a tasking pack to complete at home.

Participants were given a pack with questions on and links to information about the future of energy use and energy research in the UK. The aim was to encourage engagement with, while allowing a more personal, impartial response about the topics under discussion. The tasking phase provided a degree of continuity between the regional workshops and the Summit event.

At the summit, participants were presented with initial findings from the regional workshops before undertaking an exercise to cluster the criteria

[2] The recruitment questionnaire appears in the Appendices. The way in which the topic was introduced to potential participants at recruitment was to say: '…We are inviting a group of people together to take part in a group discussion around the topic of exploring how, through research and development, we will meet our future energy needs by discovering new ways to power our homes, infrastructure and industry. The event will contribute to an important piece of work looking at people's priorities for meeting our future energy needs, and how we can achieve them. This is an important opportunity for people to have an impact on the way in which public money is spent on research. You will initially be invited to an event on…. , and then potentially to a second event on the weekend of 30th June-1st July.

[3] The topic guides for each of the workshops appear in the Appendices. The introduction for the Birmingham pilot regional workshop said: '…We're going to be exploring how, through research and development, we will meet our future energy needs, by discovering new ways to power our homes, infrastructure and industry'. For the subsequent Cardiff and Oxford regional workshops, this was slightly amended (though the sentiment was the same) to: 'We're going to be exploring how, through many kinds of research and development, we will meet our future energy needs, by discovering new ways to power Britain over the next 50 years'.

they had used previously into similar groups. In syndicate groups, they then discussed the relative importance of these criteria in applying them to 'real-life' situations, before undertaking a hypothetical budget-setting exercise. Following on from this, groups discussed a number of future scenarios, the advantages and disadvantages of them, as well as the energy research challenges that they may create. Throughout the day, there were formal question and answer sessions with energy researchers, who were also available to talk less formally and act as 'consultants' during the exercises.

The research design involved a wide variety of tasks and exercises that balanced spontaneous discussion with stimulus materials and expert input; and free-flowing, exploratory dialogue, with focussed, specific tasks (eg criteria-elicitation exercises; voting and clustering; and budget allocation); and small group or private activity with large plenary sessions.

Full details of the methodology are provided in Chapter 2, and further information (such as the facilitation plans and stimulus materials used in the events) are provided in the appendices.

1.3 Structure of the Report

This report broadly follows the flow of the stages of the deliberative process, from the regional workshops, through the tasking, to the Summit event.

This structure is suitable for presenting findings from deliberative exercises as each stage builds on the last, and the findings evolve accordingly as participants engage more deeply in the topic.

The Chapters are presented as follows:

Chapter 2: The research process – This outlines in detail the process that Ipsos MORI undertook, and that participants were taken through, from research design and recruitment to evaluation of the process. *Readers may wish to skip this chapter if they wish to engage only with the outputs and findings.*

Chapter 3: Regional workshops – This chapter describes and discusses the findings from the Saturday regional workshops at Birmingham, Cardiff and Oxford.

Chapter 4: Tasking phase – Following the regional workshops, participants were given the opportunity to complete a tasking pack containing background information and space for them to share their thoughts. The findings from these are discussed in this chapter.

Chapter 5 Summit Event - This chapter describes and discusses the findings from the full weekend reconvened event at Warwick.

Chapter 6 Conclusions – Having been through the process and the key findings from each stage, these are consolidated into a set of conclusions, the implications of which for RCUK are outlined in several recommendations.

Each chapter, with the exception of the Conclusions, follows a similar structure. Firstly there is a short explanation of the goal of this stage in the deliberative process, and therefore the range of exercises employed to achieve this goal.

Secondly, there is a review of the debates, comments and themes that emerged from the activities and discussions undertaken by the participants.

Thirdly, there is an interpretive section in which the research team attempts to identify underlying patterns in these responses and suggest hypotheses for these as a basis for future research and action by the Research Councils.

This structure is intended to provide absolute clarity as to the distinction between evidence and interpretation in the presentation of findings. There is a note below (1.4) about the interpretation of qualitative research

1.4 Qualitative Research

Two of the key strengths of qualitative research are that it allows issues to be explored in detail and enables researchers to test the strength of people's opinion. However, it needs to be remembered that qualitative projects are designed to be *illustrative* rather than *statistically representative* and therefore do not allow conclusions to be drawn about the proportions of the public who hold particular views, nor about the extent to which views are held in any quantitative sense. In addition, it is important to bear in mind that we are taking as evidence opinions, attitudes and beliefs, rather than "facts".

2. The Research Process

The research was conducted throughout June 2007 and comprised four deliberative events; three regional workshops and a fourth, reconvened, summit. The regional workshops, which involved around 30 members of the public in each case, took place in **Birmingham, Oxford and Cardiff**. The decision was taken to carry out the regional events in Cardiff, Birmingham and Oxford because this provided a reasonable geographical spread without any of the locations being too far from a central point for the summit. This took place in **Warwick** and involved 30 of the participants who had taken part in the regional events. Regional workshops took place on a Saturday, while the summit in Warwick ran over the course of a weekend. Between the two events, participants were invited to complete a "tasking pack", which contained background information, and provided an opportunity for participants to offer their thoughts and comments on a number of issues.

In this section we will run through, in detail, the process that participants followed, first for the regional events, then for the summit. We will also consider the strengths and weaknesses of various elements of the process, and what might have been done differently to improve the quality of future deliberative exercises of this kind.

2.1 Recruitment

Recruitment took place **face-to-face**, with the aim of recruiting approximate **demographic representation**; in each case, recruiters were instructed to recruit an even split of men/women, and of age ranges, with at least 4 BME[4] participants recruited per regional workshop, representing at least 13% of the total and therefore higher than the national average of 8%. This was both to ensure that BMEs, a minority group, had the opportunity to express their views and reflected the fact that in one of the locations, Birmingham, BME representation is higher than the national average. In addition, some attitudinal[5] and behavioural[6] quotas were applied to ensure a representative **range of opinion** relating to

[4] Black and minority ethnic group.

[5] Specifically, there were questions asking people: Which two or three factors, if any, from a card are most important for deciding which methods of electricity production should be used in Britain in the future? (with quotas set on types of people, according to 5 different responses, and designed to get a good range of people); their level of favourability or unfavourability on a list of energy sources for producing electricity currently (with 8 different quotas set - based on responses, and again designed to get a good range of people); as well as demographic characteristics. Those saying they were very concerned, fairly concerned, neither concerned nor unconcerned, or not very concerned about using up energy resources that are not replaceable, such as coal and oil were eligible to continue being asked the recruitment questionnaire, while those who said at this question (Q2) that they were not at all concerned were thanked and the recruitment interview was closed (on the grounds that if they were not at all concerned, it would be unlikely that they would be prepared to discuss energy and energy research issues for one or two days at a weekend workshop.

certain energy-related issues.

While there were potential risks associated with pre-alerting participants to some of the topics to be discussed, it was felt that these were more than outweighed by the need to convene a group with a spread of views on energy-related issues. Standard restrictions were placed on recruitment, such as not recruiting anyone who worked in Market Research, Public Relations, or Journalism, as well as those whom an interviewer was aware knew each other. Recruitment also took place at **different times of day**, and participants were called back on the day prior to the event. Participants were offered £65 each as an **incentive** for the regional workshops, and £100 for the summit. In each case, an additional £25 was available for travel and childcare expenses. The use of incentives is also not without risk; i.e. that participants may only attend for the financial reward. However, in our experience, it is difficult to recruit effectively for such an event without the use of any financial incentive and on this occasion members of the public were giving up large amounts of their time.

A summary of the recruitment targets compared to the numbers recruited for the events is outlined below. As can be seen, fewer 60-75 year olds attended than was anticipated (probably due to the large amount of time involved and the distance to travel, but possibly due to the topic under discussion as well). There were also fewer C2DEs in Cardiff than anticipated.

[6] A maximum of 2 'Socio-Political activists' were recruited for each workshop. They are defined as people who have done 5 or more activities from the list A-L at Q7 on the recruitment questionnaire in the appendices, which included activities such as helped on fundraising drives, made a speech to an organised group and and voted in the last election.

Regional Workshops

	Target	Birmingham (Saturday, 9 June)	Oxford (Saturday, 16 June)	Cardiff (Saturday, 16 June)
Total	30	29	32	25
1. Gender				
Men	At least 13	14	15	13
Women	At least 13	15	17	12
2. Age				
18-39	At least 9	11	16	14
40-59	At least 9	14	14	4
60-75	At least 9	4	2	7
3. Social Class				
ABC1	At least 13	16	19	17
C2DE	At least 13	13	13	8

The Summit

	Target	Attended at summit (Saturday 30th June-Sunday 1st July)
Total	45	30
1. Gender		
Men	At least 22	20
Women	At least 22	10
2. Age		
18-39	At least 14	14
40-59	At least 14	9
60-75	At least 14	7
3. Social Class		
ABC1	At least 22	20
C2DE	At least 22	10

2.2 The Regional Workshops

Overview of structure:

-**Introduction** to subject (Plenary)

-**Top-of-mind** spontaneous responses to "energy" and "energy research" (Syndicate Groups)

-**Stimulus presentation**: Key debates and uncertainties about Britain's future energy supplies, definitions of energy research, and topline figures of how much is spent on this in the UK (Plenary)

-Identifying **new ideas** for energy research, **challenges faced** and the **role of energy research** (Syndicate Groups)

-**Prioritising** categories (Syndicate Groups/Individual)

-Allocating proportions of **budget** to choices (Individual)

-Discussing **criteria** used to make decisions (Syndicate Groups)

-Exit **questionnaires**, opportunity to **feed back** (Individual).

The first session of the day comprised all participants together in the **plenary** room where the Ipsos MORI and RCUK teams were introduced, as well as the purpose and value of the research. Participants were told that we would be exploring how, through different kinds of research and development, we will meet our future energy needs, although at this stage the aims were kept purposefully general. The reconvened element (i.e. the summit workshop) was also introduced to the participants.

Participants then broke out into **three groups** for the first discussion – these were simply allocated according to the groups they were sitting in, although adjustments were made if there appeared to be a notable imbalance. The first group discussion within the regional event had several aims; first and foremost to introduce participants to the subject, to the moderator and each other. However, this session also served to introduce some of the language associated with energy, expose participants to certain debates and assumptions associated with the subject, and for moderators to gauge the level of knowledge that participants had of the area. Participants were invited to consider their **'top-of-mind', spontaneous associations with 'energy'**, trigger points for thinking about energy, the relative importance of energy concerns, how these may have changed over time, and who the key 'players' are in influencing our energy supply. The concept of '**energy research**' was introduced in the latter part of this group session, with participants asked again to consider their spontaneous thoughts, but also to discuss who undertakes research, how priorities are decided, as well as to think about the amount of money spent on energy research relative to other areas of national expenditure, such as that spent on health and education. Although this session was successful in the majority of its aims, it is less clear

whether it was successful in making an early distinction between energy and energy research. Throughout the events, it was apparent on some occasions that participants became 'stuck' on the former. Therefore, often when apparently discussing funding priorities for energy *research*, particularly in the regional events, participants may in fact be discussing funding for energy *projects*.

The groups then came back together for a plenary session during which Ipsos MORI gave a **stimulus presentation** including some of the key debates and uncertainties about Britain's future energy supplies, definitions of energy research, and topline figures of how much is spent on this in the UK.

Participants then returned into three groups for the first discussion – this time they were allocated in advance to provide a balance of age, gender and work status across the groups, with each of the three groups being given a different remit for the next discussion:

- Energy for **society**;
- Energy for the **home**; and
- Energy for **transport**.

In their groups, participants discussed each of these themes, based on participants' own knowledge or opinions, or in response to a stimulus. In light of what participants had heard, either on the day or previously, moderators asked for any **new ideas or opportunities in energy** (in relation to each of the three areas outlined above) of which they may be aware.

For each opportunity, participants were asked to consider the **challenges** that are raised by this, and the **role that energy research could play** in overcoming them. These were all noted on flipcharts, and copies of the slides from the presentation were available if required. Having produced a number of energy research 'ambitions', participants were then asked to **vote** for those they considered to be the most important, on whatever grounds they thought relevant. As they were doing so, they were asked to reflect privately on what those grounds were. At this stage, the principal aim was not to gather the priorities themselves, but rather to gather the **criteria** used by participants when voting on their priorities. Participants were then asked about their criteria in detail, discussing their relative weighting and reflecting on the level of agreement or disagreement about them, as well as simply defining them. This was a successful and effective way of eliciting participants' own 'lay' criteria naturally, as opposed to forcing participants into pre-ordained criteria, not of their own language.

After lunch, there was another plenary session, during which a **stimulus presentation** was given specifically relating to **energy research**, covering the different types, the differences in cost, and the lack of a linear relationship between funding and outcome.

Following this, the themed syndicate groups (Society, home, and transport) re-formed to consider a number of RCUK **research categories** specifically. With the criteria they had recently discussed placed before them, participants were asked to place, as a group, each of the research categories into **'high', 'medium' and 'low' priority**, using sticky notes. Groups were limited in

terms of the numbers of categories they could place in each priority level, so that they were 'encouraged' to make decisions.

Once completed, participants were then invited to vote for those that they personally considered to be the most important, and then to **allocate proportions of the budget** to high, medium and low options (for example, 60% on high priority choice, 30% on medium priority, and 10% on low priority). This was to ensure that the group work element had not distorted the views of individuals. Again, at this stage, the key aim of such exercises was not so much to examine the figures themselves, or even where participants had placed options in terms of prioritising, but to note the arguments used to do so, the arguments used against them, and how the criteria were applied to the various options.

At the end of each regional workshop, each group nominated **a spokesperson to present** to their peers, explaining the conclusions and the debates they had had in reaching them. Before leaving, participants were given a **tasking pack**, the results from which are examined in Chapter 4. Participants were also given a **questionnaire** to complete before leaving the regional workshops; the results of these are used to inform this report, but are not explicitly reported on due to the small base sizes involved.

As well as the questionnaire on the subject of energy and energy research, participants were also asked to complete a **feedback** questionnaire. This was part of a wider **evaluation process** that accompanied the events, carried out by **Shared Practice**, which aimed to ensure that the process was being carried out effectively and fairly by Ipsos MORI, and to provide recommendations for how such events may be executed to a higher standard in the future.

2.3 Tasking phase

The tasking phase provided participants with an opportunity to record thoughts and comments in a tasking pack format on some of the issues discussed in the regional workshops. The tasking pack asked questions around the issue of the future of energy use and energy research in the UK while providing internet links to a variety of sources, so that participants could consider the questions in more depth and in a more personal way than at the regional workshops. The tasking phase was designed as a way of encouraging engagement with the subject matter and potentially facilitating effective contribution and stimulating discussion for the Summit event.

2.4 The Summit

Overview of structure:

-**Presentation** of initial findings (plenary)

-**Refining and clustering** 'lay' criteria from regional workshops (plenary)

-Discussion of **relative importance** of criteria to 'real-life choices' (group)

-**Budget allocation** to research projects (group, with researchers advising)

-**News headlines** from the future (group)

-**Question and answer** session with energy researchers (plenary)

-Discussion of **future scenarios** (groups)

-Final **thoughts**/more **questions and answers** (plenary)

The summit workshop took place over a **full weekend**, and comprised some of the participants reconvened from the regional events. People were invited back on the basis of trying to get a broad spread by region, demographics and types of view. By carrying out the event over two days, the debates could be allowed to develop thoroughly, further aided by the encouragement of team 'bonding'. Throughout the regional workshops, the Ipsos MORI team monitored potential participants for the summit event. **30** (around 10 from each event) were recruited for the final event.

On the Saturday morning, participants were first reminded of the aims of the research, as well as its importance. After a warm-up exercise, where participants were invited to share their experiences and knowledge learnt so far with participants from other regional workshops, Ipsos MORI presented on the **initial findings** from the regional events. There followed a brief **plenary discussion** where participants were asked for their reactions to the presentation.

Still in a single plenary group, participants were then introduced to a complete **list of all the criteria** they came up with at the regional workshops, on large post-it notes on the wall. As a group, they were asked to **cluster** these into similar categories ("put like with like"), and suggest names for each cluster. Once clusters had formed, participants divided into breakout groups (a broad mix in each), where the aim was to further **refine and define** the criteria. Each group was given one or two clusters, discussing why each is important, its **importance** relative to others, and how it might be **applied to 'real-life' choices**.

Having fed back their findings to the wider group, participants, in their syndicate groups, participants were given an **energy research budget** of £70m. Using the criteria that they had discussed in the morning, the task was to apply these to making judgments on a number of hypothetically costed energy research project areas. Groups first made **initial allocations**, then

were asked to challenge and/or justify these where appropriate. Throughout this task, **energy researchers acted as 'research advisers'**, moving between the groups, answering participants' questions.

Participants were invited to illustrate the kind of future they envisage by suggesting '**news headlines from 2050'**. The aim of this session was to understand what the public would see as the likely **outcome** of their spending priorities.

Having fed back their findings in the final plenary session of the day, participants had a chance to devise a list of further **questions for energy researchers**.

The first session of Sunday morning was spent reflecting as a group, with energy researchers involved, on the findings from the previous day when discussing the **'what if?' situations** and criteria. There was also further opportunity to ask questions of the energy researchers.

Participants then returned to their four syndicate groups, where they were presented with one of four scenarios (different for each group). These scenarios were drawn from Ipsos MORI's 'Horizon Scanning' futures work:

- 'Big is beautiful';
- 'Making do';
- 'Small is suitable'; and
- 'Industrial revolution'.

For each, participants discussed the **advantages and drawbacks** of such a situation, which energy **criteria** have been applied successfully and which have not, which new criteria may be appropriate, what the **role of energy researcher** would be, and **how money would be allocated**. Their findings were then reported back to the group by a spokesperson. The summit was completed with a summing up session by Ipsos MORI, and a final **question and answer** session.

As at the regional workshops, participants were given a **questionnaire** to complete before leaving the summit; again, although are not explicitly reported on due to the small base sizes involved, they are used to feed into this report.

2.5 Analysis

Analysis began with a series of **meetings**, with both the core team, and with other Ipsos MORI researchers who had been present at the events. The aim of these meetings was to **brainstorm** ideas and **key themes** from the events. Initially this was conducted by following the discussion guide, before **consolidating the thoughts** from the process into consistent themes, by using thematic diagrams and notes. From this, an outline report structure was established.

The research team then returned to the outputs from the events to validate and/or challenge the assumptions and structure of the outline created in the

brainstorming session. The primary outputs used as the basis for analysis were the following:

- Detailed **notes** taken by Ipsos MORI observers at the events using laptops, including verbatim comments;

- **Materials** produced in the sessions including detailed flipchart notes and templates

- **Audio recordings** of all plenary and break-out discussion groups, used as back-up in case there were gaps in notes and materials.

Through an iterative process of reviewing notes and revising the initial hypotheses, the overall structure of the report evolved.

The report was reviewed internally by the core team of researchers before submitting to RCUK. The report was then submitted for review by the RCUK project steering group. A meeting was convened in which these comments were aired and they were subsequently incorporated in a revised draft of the report which was submitted on August 31st 2007.

2.6 Evaluating the Process

In due course, Shared Practice will outline their views on the events, but here we discuss our thoughts on those aspects that went well, those that could have been improved, and any lessons that may have been learnt throughout the process.

In general terms, the deliberative approach certainly appears to have been the correct research method to address the aims of RCUK. The reason this was chosen is due to the complex nature of the subject matter, which enabled participants to first debate energy issues and then energy research, while subsequently developing criteria for determining their energy research priorities. This can not hope to have been addressed by either quantitative research, or by employing qualitative methods which involved less depth (such as focus groups).

Although some of the exercises were fairly challenging for participants, they generally achieved their aims very effectively. For example, asking participants early on at the regional events to prioritise possible energy research areas using their own set of ground rules worked well as a way of producing a set of 'lay' criteria for clarification and debate at the summit. Other exercises that worked particularly well were those that involved the energy researchers; participants engaged strongly with these, and appeared to relish the opportunity of expert input into the debate.

One exception may be the allocation of the hypothetical research budget where previously established criteria for making decisions on the subject became secondary to the role of cost. There is also a possibility that participants could have been unduly influenced by the stimulus materials presented to them before taking part in such exercises – those outlining costs, in particular, could perhaps have been a little clearer.

Even for a deliberative process, this was a complex issue for members of the general public to deal with, and this is occasionally apparent in the outcomes of the research. For example, it is not clear that participants were always making the distinction between energy funding and energy *research* funding when sharing their views, particularly in the regional workshops.

Furthermore, the complexity of some of the terminology appeared to mean that the same word represented different things to different participants. For example, 'sustainability' can mean 'security' and 'consistent supply' to one person, but 'ecologically sound' to another. However, this is why careful and consistent probing is important in these events. Skilful moderators did ask participants what they meant by such terms, minimising the effects of such differences.

However, the events were largely very well received by participants; the feedback we received indicated that they enjoyed the group work, and particularly welcomed the opportunity to interact with the researchers.

In terms of recruitment, the aim was to get a reasonable spread of age, gender, and work status throughout and, at the summit, a spread of the regions. This was generally successful, although the relatively low proportion of women recruited for the summit was slightly disappointing (10, compared to 20 men). This may be because men are more interested in the subject matter than women, and we cannot be sure that this has not influenced some of the findings. (However, it may also be due to the fact that women more often have caring responsibilities for children and others). Although there does not appear to be any evidence of a gender split in terms of opinions offered or arguments used in the workshops, we know from previous Ipsos MORI research (among a representative national sample) that opinion on one of the key debates that informed the events, that of nuclear power, is split between men and women, the former being more likely to say they feel positive towards it than the latter (41% vs. 24%)[7].

The following table summarises our view on aspects of the process that worked well, and those that could be improved in similar future events.

[7] 'Overall, how do you feel about nuclear power?' A representative quota sample of 1,491 Adults aged15+ across Great Britain was interviewed, face-to-face, between 1st October – 6th November 2005. Conducted by Ipsos MORI for UEA's Centre for Environmental Risk.

Positive	Areas for Improvement
✓ Small group work exercises - in particular, the spontaneous top-of-mind sessions at the regional events.	✗ Not always clear what the aim of the exercises were. Would help participants to understand why they are doing what they are doing, and motivate them towards the goal.
✓ Emergence of criteria – Use of exercises meant that these generally fell out 'naturally'.	✗ A great deal of stimulus material, possibly too much for participants to take in.
✓ Role of experts, particularly the Q&A sessions. This served well as a means of building on knowledge.	✗ Occasionally, exercises felt hurried – Lots of material to get through in short space of time.
✓ Flexibility of process at the summit – Space for more questions	✗ Could have explained the narrative of events more to participants, in order to weave exercises together. May have occasionally become lost in the process.
✓ Positive feedback from participants – They enjoyed the events and were pleased to have their say.	

3. The Regional Workshops: Developing Priorities for Energy Research

3.1. The Goal of the Regional Workshops

The one-day regional workshops, beginning with the pilot in Birmingham on June 9th and running into the events in Oxford and Cardiff on June 16th, were intended, and designed, to move participants along from an initial spontaneous discussion of associations with 'energy' and 'energy research', to a stimulus-driven consideration of challenges and opportunities in this field for energy researchers, and ultimately the creation and testing of an initial set of public evaluation criteria for types of energy research.

This presented significant challenges, as described in Chapter 2, as it meant compressing many potential topics, debates and stimulus material into a short time. Trade-offs were inevitable in allocating time to each aspect of this discussion, but the ultimate goal of achieving a set of criteria which had been tested on actual categories of energy research was successfully accomplished at each workshop, in a way that enabled the criteria to emerge quite naturally.

An overview of the coverage of these first events is given below to provide an orientation to the subsequent discussion of the findings for this Chapter. The pilot in Birmingham taught us a few useful pointers that led us to make minor alterations to the activities and stimulus (See Process : Chapter 2) in the subsequent events, but the process was almost identical at all three:

Fig.1 Regional Workshop Outline

Timing	Activity
9.30-11.40am	1. Arrival, welcome and introductions 2. Syndicate groups (random): Spontaneous associations a) energy b) energy research
11.40-12.45pm	3. Stimulus presentation: current & future energy challenges 4. Syndicate groups (home/society/transport): Structured discussion of the most salient… a) Energy opportunities/needs b) Energy threats/challenges c) Ambitions/opportunities for energy researchers d) Voting to elicit and then describe evaluation criteria
12.45pm -4pm	5. Lunch 6. Syndicate groups: Using emergent evaluation criteria to rate the priority level of types of energy research (into categories – High/Medium/Low) 7. Plenary feedback Close

3.2 "Energy": Spontaneous Associations

The criteria, and the debates that spawned them, were arguably the most important outputs from the regional workshops. However, in order to interpret these successfully it was important to devote sufficient time up-front to elicit spontaneous views, both of 'energy' (to provide context), and going deeper, 'energy research'.

An indication of the everyday lens through which the public views energy and energy research issues was also necessary in part to control for the rather artificial and intense scrutiny under which they would place the topic in the course of the subsequent deliberative process.

In addition, it was important to bring people's natural assumptions and uncertainties to the surface with respect to these topics, the level of priority that they naturally attach to them in the context of everyday life, and the 'lay' language which they use to express themselves. Without this, it would be

impossible to control for the possible influence of the subsequent stimulus material on their opinions.

Therefore as an initial exercise, participants were assigned to small (8-10) syndicate groups to explore their spontaneous associations with 'energy'. This was initially done randomly, with minor adjustments then made to ensure a demographic mix.

There were some differences prompted by **local issues** (For example, some participants in Oxford mentioned the Rutherford laboratories, and some in Cardiff local slag heaps, and also nuclear power – which may have been prompted by the location of the workshop in Wales, although it could also have been something prompted by the views of particular respondents, irrespective of location). However, the most **immediate top-of-mind answers** were very similar across the three regional workshops, suggesting that geographical location does not have a significant impact on initial perceptions of energy.

Based on this relatively consistent pattern, the table overleaf (Fig.2) provides a tentative indication of the relative frequency and immediacy with which associations (as recorded on flip charts by facilitators) were cited by participants in these brainstorming sessions, and by implication their relative salience to participants. This is an aggregation of the information, presented in this form for the sake of simplicity, and it should be noted that there were exceptions to this pattern across the workshops:

Fig.2 Approximate Frequency and Immediacy of Associations

A. Many initial citations: High awareness/ salience?	B. Secondary citations: Medium awareness/ salience?	C. Tertiary citations: Low awareness/ salience?
• Nuclear • Power • Coal • Wind • Oil • Global warming • Solar • Gas • Electrical/Electricity • Carbon dioxide • Environment • Climate change	• Tidal • Hydroelectric/water • Bills/Cost (*NB is likely to be high salience in reality, and in Birmingham it was an initial citation) • Renewables/Non-Renewables • Heating • Kinetic • Biomass (Although low awareness of this name) • Sustainable • Biofuels	• Magnetic • Energy companies and energy 'players • Demand reduction • Conservation • Security of supply (which for some meant quantity/availability of, and for others meant safety eg against attack/terrorist attack) • Reliability • Emissions • Carbon footprint

As the table above shows, the **most typical initial citations** among the syndicate groups (Column A) when asked to free-associate on 'energy', - apart from the occasional suggestion of energy in other contexts (e.g. energy drinks or personal energy) – related to different forms of energy used to produce electricity. These were a blend of what might more formally be called **conventional (i.e. coal, gas, nuclear) and renewable energy (e.g. wind, solar) technologies**, their **outputs**, in the form of power and electricity, and it would seem, their **consequences** – in terms of the environment and specifically, carbon dioxide emissions.

While people seemed to be aware of the most common methods of generating power, they were less confident about estimating the proportion of the UK's energy needs being supplied by coal, gas, nuclear or renewables.

We should however sound a **slight note of caution in interpreting these findings**, and other 'spontaneous' associations as it is quite possible that a combination of factors may have influenced some participants towards giving this pattern of response. In chronological order, these are:

The recruitment questionnaire included three questions on energy, two of which related to electricity production, and one about non-renewables such as coal and oil. Also, one of the two questions on electricity production referred to a variety of energy sources (See showcard G at Q10 of the

recruitment questionnaire in the Appendices). This is because a certain number of questions need to be asked at recruitment stage in order to invite people to workshops and give them a sense of the issues, but the length of the recruitment interview needs to be kept quite short.

Participants may have engaged in preparation before the workshops.

The introductory comments at the workshops where RCUK was briefly introduced may have influenced participants' sense of what kinds of energy we were going to be exploring. However, this introduction was deliberately kept to a minimum at the regional workshops so as not to provide undue influence. Also, as no-one had heard of RCUK, we feel it is unlikely that this third factor had much influence, if any.

Finally, we must note that among those volunteering to come to a day-long workshop on energy at a weekend there are likely to be at least some who take a particular interest in the subject and therefore have higher levels of awareness and knowledge. Differences in socio-economic, professional and educational status may also account for variations in knowledge and awareness between individuals, syndicate groups and regional workshops.

Concerns about the environment, and the environmental impact of energy supply, were also among the most frequently mentioned spontaneous issues. Some emphasised the environmental impact of our energy use, and terms such as '**pollution'**, '**global warming'** and '**climate change'** were commonly associated with 'energy':

> *The way that we use our energy has an effect on the environment. That we drive and fly has a global impact.*
>
> Female, 55+, Oxford

However, while the association between energy, energy supply and environmental concerns was a common one, the emphasis given to aspects of the topic varied between individuals and groups.

Indeed, in a number of the syndicate groups, there was lively debate between sceptics and proponents of arguments about man-made climate change. Indeed confusion, claim and counter-claim about the climate change issue was a distinguishing feature of all three regional workshops.

Some emphasised **environmental damage** as being by far the most important challenge facing society, and hence the most important aim for energy research, as well as the most important association with 'energy':

> *Global warming won't affect me, but it will certainly affect my grandchildren*
>
> Female, 55+, Cardiff

Climate change does matter

Female, 35-54, Cardiff

Wind turbines are damaging wildlife. We don't want to make the environmental situation worse than it already is

Male, 35-54, Cardiff

Others, however, saw a tension between **maintaining a certain standard of living, and reducing our environmental impact**, and were more or less concerned with striking a balance between the two, depending on the degree to which they a) believed man-made climate change was a pressing issue and b) thought there was anything they could or should do about it:

Man-made activities could be responsible for any amount of damage

Male, 55+, Cardiff

I don't like people telling me that I shouldn't fly off on holiday, or that I should get on a bike. It's not appropriate for everybody. Companies should do more

Female, 55+, Oxford

We're all for reducing waste and energy use, but we need to use better and more realistic ways of doing it

Male, 55+, Oxford

I don't have any children, and so I'm not really bothered about the next generation. I'm worried about me

Female, 45-54, Cardiff

They used to have holocaust denial and now there's climate change denial

Female, Cardiff

The second column in Fig.2 summarises a number of **secondary energy associations** i.e. topics which, whilst not usually top-of-mind for most participants, were quite quick to emerge after the initial round of suggestions.

These would typically comprise less well-known forms of electricity production such as **tidal and biomass** (although significantly, few

participants actually knew it was called 'biomass', and would instead say something like 'you know, when you burn crops and compost for fuel'). These associations tended, but by no means exclusively, to be more commonly suggested by people who seemed (to facilitators) to be more confident in the group, and/or in their knowledge of the topic.

The speed and seeming ease with which participants gave both primary and secondary associations relating to energy technologies suggests that these aspects of energy are relatively mainstream in terms of public awareness. Indeed, there was some surprise among the facilitation team at the range and depth of awareness in this respect, especially in Oxford. Again, perhaps we should be cautious in inferring too much about this in light of the caveats we have previously highlighted.

In addition, as people began suggesting wider sets of associations beyond the energy technologies and their relationship to big 'macro' issues such as climate change, more mundane (and perhaps more natural) associations such as **cost, household bills, and domestic heating** started surfacing.[8] This may have been due to participants relaxing and therefore not feeling they had to 'perform' by naming energy technologies or anything else in particular.

Indeed, in response to further probing by facilitators, participants would often concede that the initial 'trigger' for thinking about energy in real life is most likely to be **financial** – i.e. the cost of energy bills – rather than matters relating to climate change or the relative merits of different methods of energy supply. This was particularly, understandably, the case for those on relatively low incomes.

More in-depth, perhaps more open, discussion of these energy technologies therefore tended to be focussed either on issues of **immediate personal impact**, in terms of 'NIMBYism', or on **cost.**

> *Every time I get an electricity bill, it seems to be going up quicker than the time before*
>
> Female, 55+, Birmingham

Also in response to challenging by facilitators, participants would typically say that whilst energy has probably risen in salience over the last decade or so, it is still not naturally something that is thought about in the context of daily life, and is therefore typically a low priority – unless its supply is somehow threatened for some reason (e.g. in a power cut, or if there is a dramatic increase in prices):

> *Ultimately, as long as the light turns on when I want, that's fine*
>
> Male, 18-34, Oxford

[8] In Birmingham, as mentioned above, they emerged among the first associations.

I most often think about it [energy] *when the cost goes up, like when buying petrol*

Male, Oxford

You think about energy more today than ten years ago, due to the media … Last year the bills went up by 30%, and so you can't avoid being aware of energy. When my bills go up, I become more aware

Female, Cardiff

Finally, with more time to discuss the issue and root around for further associations, participants – particularly those with a seemingly high level of knowledge on the topic – would tend to raise a **wider range of issues**, which were less likely to be spontaneously cited in the first round.

For example, attention was not exclusively focussed on reducing emissions from energy use. Concern was also expressed about the **security of supply** - which for some meant the continued availability of energy sources, and for others the safety implications of that supply. For example, some participants expressed concern over the risk of nuclear accidents and vulnerability to terrorist attacks using nuclear material, or attacks at nuclear or oil installations. Others mentioned war in the Middle East, or poor relations with Russia stifling supply:

Didn't someone say that the Third World War is going to be in the Middle East? If the oil comes from there then what will we do when we can't get it any more? And Russia are penalising everyone if you don't do what they want.

Male, Oxford

Reliability was another area of concern as the discussion deepened – particularly in relation to renewable sources of energy. Some were concerned that technologies such as solar and wind power are unlikely to fulfil all of our future energy needs sufficiently:

If the wind doesn't blow, then the wind doesn't blow. At the end of the day when you switch your light switch on then you expect the light to come on, and if it didn't then you'd be upset.

Male, 18-34, Cardiff

A number of different **'players'** were cited as being involved in debates and decisions about energy. These included: Tony Blair, George Bush, pressure groups such as Greenpeace and Friends of the Earth and energy companies such as Shell, EoN, or BP:

OPEC, British Gas, Exxon, Mobil. Those are the big players

Female, Oxford

Political parties – they're always talking about solar power and fulfilling energy needs, but politicians don't have the answers

Male, Cardiff

Some participants tended to view energy discussions within a UK context, particularly in terms of supply issues – while others considered energy in a global context – especially with regard to the environment. When asked about **responsibility** – ie who should take responsibility for reducing CO2 emissions – participants expressed a range of different opinions. While some stressed the importance of government, or of business doing so, others also emphasised the differences that can be achieved through individual action:

Your carbon footprint …. It's a personal thing, it's about individual behaviour

Male, 18-35, Birmingham

Ultimately, it's the people who elect the government. And it's up to the individuals as well as the government to tell you what you should do

Male, 18-34, Oxford

Companies can have an influence through encouraging people to cycle to work

Female, 18-34, Oxford

While this focus on the importance of individual action was something which appeared with greater prominence among participants towards the beginning of the deliberative process (and was a particular focus in Birmingham), its prevalence was somewhat diminished as the workshops continued.

Within the context of climate change and other discussions there were a number of mentions of terms such as **carbon footprint**, **sustainability, carbon tradeoffs**, and **reducing CO2 emissions**. These words were sometimes traded by participants on the assumption of a shared understanding of what they meant, but facilitators' subsequent probing revealed some uncertainty and variability in definitions. For example, in Birmingham there was a debate as to whether 'sustainability' meant an infinitely reusable energy source or merely one that depleted more slowly, or whether it merely meant an energy source that would not damage the environment.

Workshop Variations

As the discussion of these initial associations deepened, some slight differences emerged in emphasis between the workshops. This is more likely to have been caused by specific demographic and attitudinal characteristics of individuals at the workshops rather than more general regional differences.

For example, much of the spontaneous discussion in Birmingham focussed on containing consumption, largely to **reduce energy bills** (possibly reflecting the lower socio-economic status of some participants), but also because of **environmental concerns**. However, in Cardiff there was considerably more debate around **nuclear power**, which tended to polarise participants. Proponents tended to regard it as a way of tackling climate change, while opponents were generally concerned about the safety of plants. Among Oxford participants, there was an exceptionally high level of **awareness of different methods of generating power** – as well as some of the challenges surrounding **security of supply**.

'Energy' Associations: Lessons Learnt

- Top-of-mind associations relate to the **major energy technologies**, for which basic awareness is quite high (e.g. wind power, solar power), but there is some uncertainty about the mechanisms and processes involved.
- However this may not reflect the 'everyday' reality for some – that **cost** (e.g. domestic energy bills) is the most salient feature of energy issues.
- The debate revealed **major underlying tensions relating to energy, lifestyles and climate change**. There is significant confusion, disagreement and uncertainty on this important topic, with uncertainty as to whether the trade-off between modern lifestyles and environmental protection must necessarily be zero-sum.
- Other, less immediate associations relate to **reliability** and **security** of energy supply
- There was significant variation as to who primarily bears responsibility for reducing polluting emissions – **government**, **private companies** and the **individual**. At this stage in the deliberative process, **greater public responsibility** was cited as a major force for instigating change, but there was little agreement or conception as to how this could be achieved.

3.3 'Energy Research': Spontaneous Associations

After the initial 'Energy' discussions, facilitators began another free-association brainstorming session on 'Energy Research'.

Participants were generally able to name at least some of the major areas of focus for energy research spontaneously. In general however, they seemed to struggle rather more with generating associations for this than in the previous discussion.

There appeared to be a tendency initially to associate energy research with investigation of **supply-side technologies**. For example, hydrogen technology, fuel cells and biofuels were all mentioned.

The **efficiency, safety** (particularly in relation to nuclear) and **cost** of energy technologies were thought to be targets for energy research

initiatives, as was **climate change**, and the scope to **coordinate action** on this problem **globally**.

However research into the ***demand*** for energy, or into the way in which different groups in society consume energy, was mentioned far less frequently, (at least spontaneously) during these initial discussions. In Birmingham it received some mentions.

To overcome the low level of awareness, facilitators probed further, and employed projective techniques to elicit the public's *preconceptions* of energy researchers as people.

The typical response was to sketch out an impression of an **archetypal eccentric and cerebral scientist**:

> *They look like they're wearing a white coat, with a little row of biros in the pocket!* [laughter]
>
> Male, 35-54, Oxford

> *You could talk to them, but it'd be pretty intense*
>
> Male, 35-54, Oxford

Researchers were typically described as likely to be older, male, earnest if somewhat dull, and highly intelligent, if poor at communicating in layman's terms what their research was all about. This underlying stereotypical view is likely to explain why some aspects of the later expert involvement at the Summit event proved so effective, with the conduct and demeanour of those representing the researcher community challenging these preconceptions, perhaps to the surprise of the participants.

Probing into the motivations of researchers yielded a view among some participants that energy researchers have to be clever and committed, even passionate about their work. There was a high degree of uncertainty about how they were funded and where they worked, but they were typically thought to be employed by universities, although a few also suggested companies and charities.

A fairly strong view – particularly among participants from Oxford – was that the **UK lags behind other countries** in the field of energy research – though these perceptions to some extent seemed to be based more around a view that the UK is less engaged in environmentally conscious behaviour (such as recycling), rather than more specifically detailed knowledge of energy research:

> *In California they're very alive to this, especially with solar panels and lots of big experiments*
>
> Female, Birmingham

Other countries are way ahead of us. Germany and Holland have been using solar panels for 20 years

Female, 25-34, Oxford

One key issue in these initial discussions was that of **trust** – i.e. who people trust for information about energy research, and whether or not they trust the motivations of the people conducting the research.

Trust as a theme appeared in discussion of 'energy', but was particularly apparent in discussions of 'energy research'. Participants associated energy research with companies, universities and the government, and some were suspicious of the motivations of companies and government – a theme which is entirely consistent with much of Ipsos MORI's previous work[9].

Private sector companies were viewed, in particular, by some as being motivated purely by financial gain in the research that they pursue, rather than any broader social or environmental goals. Some felt that the profit motive was fundamentally incompatible with the kind of long-term thinking and uncertain rewards associated with scientific energy research. Others felt that government 'are there to govern' but that politicians are in it for themselves:

It's hard to know who to trust … People don't work together, and they've got different agendas

Male, Cardiff

Firms tend to be more short-term, always looking to cut costs … and make money

Female, Oxford

The Home Office are notorious for producing biased research to support their own propositions. I don't trust government research, They start with what they want to be proved, and then commission someone to prove it.

Male, 35-54, Oxford

Again, it is notable that these initial perceptions were in some cases superseded as the deliberative process continued. As participants became more familiar with the organisations responsible for energy research, and particularly their funding structures, so initial suspicion became less pronounced and the debate more open to the concept of private sector and non-academic public sector research.

There was also some debate around the extent to which people felt that *they, the public,* had influence over the way in which society will supply energy in future. While some emphasised the importance **of major energy companies** or the **influence of government policies** or academics, some

[9] For example: http://www.ipsos-mori.com/polls/2006/rcp.shtml

also stressed the role of the individual – both in terms of their power as 'consumer citizens' who have the right to pick and choose between energy suppliers, and in terms of their influence as voters, who have the right to choose between politicians. The relative emphasis on the importance of the individual should, of course, be seen in context here: these are views expressed in a workshop designed to elicit the views of the general public – and this may have heightened participants' emphasis on the public's role.

However, this focus on the **relative influence of the individual** also reflects earlier discussions in some of the break out groups about the responsibility that individuals, as well as companies, have to reduce their CO_2 emissions:

> *As citizens we do have control to some extent. Wind farms, we don't want them here, so that controls the choices that Government has to make. You do have an influence*
>
> Female, 18-35, Oxford

> *We vote for the government, we choose suppliers, we can buy solar panels*
>
> Male, 45-54, Birmingham

> *It comes in waves. So we're more concerned now than we were in the past, since it is getting more expensive.*
>
> Male, 18-34, Birmingham

"Energy Research": Lessons Learnt

- There appeared to be a tendency to associate energy research with **supply-side technologies**. Research into demand was mentioned much less frequently in these initial discussions, suggesting a need to highlight the value of this aspect of energy research.
- Impressions of **energy researchers** drew heavily on generic stereotypes of scientists. There is evidently scope to show the energy research community in a more personal, human light.
- In eliciting impressions of researchers, we also revealed a fundamental ambivalence about whether scientists a) primarily have their own or society's interests at heart (cf trust below) and b) whether they advance understanding and application in small steps or giant leaps
- Some participants felt that the **UK lies somewhere behind** other Western countries in the field of energy research.
- In the initial discussions over **which organisations were deemed to be trustworthy** to provide impartial information on energy research, some participants expressed distrust of private sector and non-academic publicly funded research. However, this issue receded as the discussions

continued, suggesting that companies can be considered legitimate partners in energy research but that the ground needs to be prepared first.

- There was some disagreement about the extent to which the general public has **influence** over how energy will be supplied in future. There seems to be an appetite for information and influence, and this is reportedly growing as energy issues rise up the agenda.

3.4 Energy Opportunities and Challenges: Implications for Future Research

As participants became more familiar with the concepts under discussion, so they were increasingly equipped to engage critically with the complex issues associated with energy research. After the initial, spontaneous discussions described above, participants were given a 25 minute PowerPoint **stimulus presentation** by the Ipsos MORI facilitators (see Appendices).

The presentation **defined 'energy research'** in more detail ('any form of research – from a range of possible disciplines – that helps us to tackle the energy challenges we face') and went on to suggest some of the potential opportunities and challenges involved in meeting the UK's future energy needs – both in a domestic context ('Energy for the home'), for transportation ('Transport'), and for the national infrastructure as a whole ('Society'). These headings were used mainly to break this large topic down into manageable chunks, rather than to force people to limit their discussion to only one topic.

The presentation also provided approximate figures (c. £70 million, give or take the annual variation) on the amount of money spent by the Research Councils on energy research in a typical year, and set this in the context of other expenditure on public service priorities.

After the presentation, an RCUK representative was on hand to explain more about the value of the research exercise and participants were invited to comment, ask questions and seek clarification on anything in the presentation.

In the ensuing Q&A sessions across the regional workshops, a few common patterns were observed:

- Surprise, verging on shock among some participants at the seemingly low level of state investment in energy research given the scale of the energy challenges facing the UK and the ambitions of Government.

> *£70m? That's less than one year of David Beckham's salary.*
>
> Male, 18-34, Oxford

- Debate about the underlying assumption of the need to respond to climate change by reduce CO2 emissions
- Questioning about the other sources of funding received by the RCUK, especially from private companies, and whether any conditions were attached to this funding

Participants were then divided up into three corresponding syndicate groups, which had been pre-arranged using coloured badges.

Each considered firstly the potential **opportunities** to achieve a better 'energy future'; then the possible **barriers or challenges** that might prevent this from happening; and finally, as a corollary, what the biggest opportunities could be for *energy research,* to overcome these barriers.

This was captured using structured flipchart grids. Once this framework had been developed, participants voted (using a prescribed number of adhesive dots) for the **energy research opportunities** that they considered most appealing for whatever reason that mattered to them. They were however asked to reflect on what these reasons, or 'criteria', were as they were voting, so that they could then try to describe and discuss them to the rest of the group in a subsequent syndicate group discussion.

In this way, the criteria emerged naturally from participants on the basis of an actual evaluation process, rather than as abstractions or ideas suggested by facilitators.

At the end of this section of the workshops, we had produced in each syndicate group a long list of emergent criteria with which the public might evaluate energy research opportunities, as well as a list of areas that the public felt would be valuable for further investigation by energy researchers.

Many of the same challenges and opportunities and ultimately, criteria, were similar across all three groups. The full tables describing the outputs from this process, (with duplicate themes removed), are provided in the Appendices.

A summary of the discussions in each class of syndicate group ("Home", "Society" or "Transport") is provided below, with special emphasis given to the variations between the groups where necessary.

3.4.1 "Energy in the Home"

Discussion on energy in the home tended to focus on the potential for research to deliver what were viewed as **modest, incremental changes** in household efficiency and energy use. Suggestions for research into relatively small innovations, such as televisions without standby buttons, improved insulation, or effective ways of encouraging recycling were commonly cited here.

Many of the issues mentioned by participants in relation to energy and the home related to **social research**. Suggestions for research into ways of encouraging people to turn off lights, for example, or to wash their clothes at

a lower temperature, tended to be more popular propositions. However this is also likely to be driven by the desire to save money.

As might be expected, research into **larger-scale, supply-side, solutions** tended to be less frequently mentioned in the context of energy and the home, with participants more likely to discuss supply-side technologies, such as research into the potential for **micro-generation,** better insulation, and the need for social research into behaviour change:

> *Making more energy efficient materials, like insulation*
>
> Female, 18-35, Birmingham

> *Educate the children to switch the lights off*
>
> Male, 35-54, Birmingham

This focus on social, demand-side solutions is in contrast to the initial discussions of energy and energy research. Issues such as the **aesthetics** of certain sorts of power generation (this was particularly mentioned in relation to wind power), as well as broader cost issues, were much more prevalent during these discussions.

3.4.2. "Energy for Transport"

In contrast to energy for the home, debate over energy for transport was more open to the opportunities that **technological research** might offer – for example, perhaps because of the growth in popularity of vehicles like the Toyota Prius, hybrid cars were mentioned as an area for further research. **Hydrogen powered** vehicles were also popular choices for further energy research – some local buses were powered by the fuel. Indeed, research into a drastic expansion in the number of hydrogen cars was perhaps the most commonly cited area of research among those discussing transport:

> *Hydrogen has got to be the way to go. It's clean and cheap.*
>
> Male, 35-54, Oxford

As with energy in the home, however, not all of the suggestions made here were technology-focussed. Many of the challenges mentioned by participants related to **altering people's behaviour**:

> *The problem is that people are lazy, and they'll always take the easiest option – and in most cases that's the car*
>
> Female, 55+, Oxford

> *We need to find out what people actually* want *from public transport*
>
> Female, 35-54, Oxford

Research into **simple improvements to public transport** – for example, ensuring that timetables for buses and trains match up, or working out ways of providing more information for people on **ways to reduce their carbon emissions** – were viewed by some as important **'quick wins'** which could have a significant impact on reducing transport emissions.

> *There is a role for research beyond the technological stuff – we need to look at how to change the way that people behave, too*
>
> Female, 35-54, Birmingham

This "quick win" theme was a recurring one through all the debates for those with deep-seated concerns about the **urgency** of the need to reduce carbon emissions – i.e. how to deliver the biggest reductions in the shortest time, and with the simplest means possible.

> *We're becoming elite in our transport choices…buses are so common!* [laughter]
>
> Male, 18-34, Oxford

> *New electric cars and things are all well and good, but we need to provide a viable and cost-effective alternative to the public so that they have a choice*
>
> Female, 18-34, Birmingham

As with those discussing energy in the home, **cost** was a prevalent factor throughout many of the discussions. The issue was whether the likelihood and scale of the benefits from a given research programme would justify the investment.

3.4.3. 'Energy for Society'

At each of the regional workshops, a third set of participants discussed some of the broader implications of providing energy for "society" in future. The way this was presented in the stimulus presentation was in terms of supplying the nation's homes, industries and industries (i.e. its infrastructure) with power and heating.

Responses here tended to be more balanced between the need for research to provide significant improvements in **electricity supply technologies** – for example improving the quality of renewables, developing more efficient wind and wave power, or (more controversially) investing in nuclear fusion or fission – while also stressing the importance of **demand-side improvements**, such as more efficient home insulation.

We need to balance the environment with human survival.

Male, Cardiff

Nuclear power was particularly controversial, and there were a number of disagreements about the balance between the ability to create power without significant carbon emissions, versus the dangers associated with it. Some felt that only a significant energy 'shock' would convince the general public that greater investment in nuclear is acceptable.

Another area of controversy here was the relative effectiveness of various different **renewable technologies** – and in particular the relative reliability of different types of renewable energy. **Wind power** was particularly favoured by some, often on the grounds that Britain is an island nation surrounded by windy coastline, although others objected that it lacked reliability. In contrast, advocates of **tidal power** suggested it could even offer a more reliable source in terms of short term supply and long-term sustainability.

The problem with wind power is that the wind might drop…maybe we could fine companies who don't manage to generate energy for a certain percentage of the time?

Female, Birmingham

I'll bet my house, my car, my girlfriend and my parents on the fact that the sea will still be there when I die!

Male, 18-34, Cardiff

Unlike in the "Home" or "Transport" groups, people discussing energy from the "Society" perspective seemed to display a greater appetite for **government intervention** to support local initiatives for generating electricity, such as microgeneration, and **reducing energy use**. For example, encouraging people to put wind turbines or solar panels on their houses, or to get more efficient insulation, were both mentioned.

Why aren't we building turbines or solar panels on new houses?

Male, Cardiff

We should have some sort of grants or subsidies from the government to care for the environment.

Male, 18-34, Oxford

Participants who discussed energy for society tended to favour projects viewed to be most likely to produce incremental rather than radical change – investing in research which provides the **maximum potential outputs** from any investment made. So, improving the **insulation and energy**

efficiency of buildings was a popular option, as was improving the **efficiency of transport systems**. **Self sufficiency** was another area that appeared to be valued highly, with energy research prioritised that could reduce our dependence on foreign imports of fuel.

Participants also prioritised research into some specific technologies. Improving the efficiency of **solar power** – thereby reducing the cost and boosting the output – was consistently rated highly. However the exercise revealed misconceptions about the technology, such as the belief that solar panels require direct sunlight to work – a belief which led some in the groups to argue reluctantly that the technology could never be widely adopted in the UK due to the overcast and generally poor weather conditions.

More broadly, some also approved of research which would **help developing countries to reduce their emissions** – for example, through developing carbon capture systems which could be used in coal fired power stations – reflecting the recognition that much of the future increases in CO_2 emissions will come from the industrialising, rather than the industrialised, world.

Unique to those considering energy for society, there was an emphasis on funding research which might have **potential positive financial benefits to the UK** – through developing technologies for export, for example. However this may have been a direct response to material in the stimulus presentation rather than a spontaneously generated idea.

The energy in society groups also suggested that tackling **fuel poverty** should be a potentially important area for energy research, although when it came to the crunch it didn't often attract many votes.

3.4.4 Common Themes Across All Groups

Overall, there was substantial agreement across all groups on a number of promising areas for new research. Common to all groups were the following ambitions and initiatives:

- Determine whether biofuels are, on balance harmful or beneficial depending on land use requirements, and deploy judiciously, particularly for transport

- Improving the efficiency and capacity of public transport while reducing emissions to attract users

- Developing UK wind power

- Desire to 'crack' the nuclear option – despite misgivings - with a combination of cleaner waste disposal and potential growth in overall nuclear supply to enable hydrogen economy and reduce emissions

- Home-grown energy production through various schemes
- Hydrogen and hybrid-based transportation
- Energy efficiency and insulation in buildings
- Encouraging energy efficient behaviour among consumers (e.g. raising awareness of carbon footprint

"Energy Research Opportunities/Challenges": Lessons Learnt

- Given the richness and quantity of outputs, a real interest and energy for getting involved in shaping priorities for energy
- Distinctions emerging between participants in terms of their desired types of interventions e.g. radical vs incremental change; quick win vs slow burn, based on their underlying assumptions about the urgency of the need for change and the beliefs about the extent to which change can be effected (Agency)
- A strong desire for investment in 'attractors' (e.g. clean, efficient public transport) to entice people into more energy efficient behaviour
- Common priorities in terms of certain technologies and approaches such as wind, solar and tidal power, cautious development of biofuels and nuclear; micro-generation, hydrogen and energy efficiency

3.5. Eliciting and Using Initial Energy Research Evaluation Criteria

Having completed the voting exercise as a way to help people prioritise their energy research choices, participants were able to articulate the criteria they were using to make judgements about the energy research opportunities they had come up with.

Across all the regional workshops, 64 evaluation criteria were identified, named and described in participants' own words. At this early stage of the deliberative research, these criteria were still relatively new and flexible. However, there was a degree of consensus that new energy research projects should fulfil a number of conditions.

While there was some variation in the criteria emerging from different groups, these differences were primarily in terms of emphasis rather than primary content. These variations are summarised in Fig. 3 overleaf, but the overall picture was one of remarkable consistency across the syndicate

groups and regional workshops, with a good deal of overlap between these criteria.

The full list of all the emergent criteria, along with a summary table outlining the slight variations in emphasis between sub-groups, is provided in the section discussing the findings from the summit (section 5), which describes how they were grouped into overarching themes through a clustering process.

Of the 64 criteria at this stage however, it was clear that a large number related to **efficiency** in some way, and this was perhaps the most consistently important criterion. This was interpreted as relating both to cost-efficiency in the running and delivery of energy research projects, but also that they should provide efficient ways of supplying energy. In addition they should make more efficient use – or 'make the most of' - what resources we are currently using inefficiently such as wind, tides, and solar.

This was closely related to criteria relating to **value for money** and **ultimate benefit**. These most commonly related to the reduction in carbon or other harmful emissions or the reduction in reliance on unsustainable fuel sources.

In general **new or novel** schemes were also rated highly – and again for some this point related back to efficiency, in that participants wanted to make sure that investment in research projects was not needlessly duplicating work being conducted elsewhere. Other criteria included the idea that research projects gain merit the more **practical or feasible** they are i.e. they have a likelihood of successful delivery.

Impact or legacy – chiefly environmental – was a common thread across the many criteria. Impact was measured not just in the present and in relation to human systems, but over the long term and in relation to other species and ecosystems.

Finally, **timing** was also mentioned as an issue. Some participants saw the need to reduce the UK's carbon emissions as an urgent and present threat, and that the length of time that potential research projects might need to come to fruition was considered to be a significant factor. However this was traded against value for money if the outcomes of the research might mean a much greater benefit in future.

In the afternoon of the regional workshops, each syndicate group used the criteria they had identified to try to rate the level of importance and priority they attached to various generic types of energy research (e.g. solar, wind, nuclear fusion, fuel poverty), all of which – unbeknownst to participants - had been drawn from the Research Councils' actual energy research portfolio.

Each type of energy research was written on a hexagonal 'post-it' note and participants were asked to evaluate it using their criteria - both individually, and in relation to 17 other items - and then rate it as either High, Medium or Low priority depending on how well it 'scored'.

Fig. 3 - Summary Table: Variations in Evaluation Criteria Emphasis Across Sub-Groups

Energy for the Home	Energy for Transport	Energy for Society
Evaluation criteria themes developed		
– Cost was important for this group – Can we guarantee that the research project in question will provide a strong level of return on the investment made? – Does the research improve the efficiency of existing technologies? This factor was considered particularly important because investment in workable technology – such as solar power – was viewed as offering a greater likelihood of success than more 'blue sky' research. – Does the research project in question offer the potential of positive financial benefits to the UK? Research that has the potential for economic gain, or spin-offs, was valued particularly highly. – Does the research project in question offer the potential to reduce our emissions of CO2? – Is the research project in question likely to be 'future-proof''?. Can we ensure that it will provide long-term solutions to energy problems in future? – Will the research take into account individual behaviour and how that can impact on energy consumption, the environment and on cost?	– Cost was a very important factor here –Will the likely output from a particular piece of research justify the relative outlay? – Research which focuses on changing behaviour was popular with this group. – Quick solutions were considered important here. Can we invest in research projects which we are confident will yield results in a short period of time? – Can research contribute to the efficiency of existing energy supply technologies? – The legacy issue: does the research offer the opportunity to provide future generations with power supplies which are safer and cleaner than those which exist at the moment? – Does the research project in question offer the potential to reduce carbon emissions significantly? – Does the research project in question contribute to the security of supply for the UK? Can we reduce our reliance on imported power supplies?	– Generation efficiency – Does the project offer us the potential of supplying energy more efficiently? – Is the proposed new scheme new or novel? It is researching into new technology, and not repeating work done in the past? – Does the research project offer value for money? Are we likely to be able to have a good level of return on the initial investment in the project? – Does the project in question offer the potential to significantly carbon emissions from energy supply, therefore producing environmental benefits? – Is the research project proposed practical or feasible? Is it likely that the project will produce demonstrable findings which can be practically applied? – Is the research project likely to produce results relatively quickly? The urgency of the need to reduce carbon emissions means that we will need do develop new technologies quickly, rather than concentrating on speculative research (which could be years from fruition). – Do the benefits of a particular piece of research have the potential to filter down through the whole of society?

Syndicate groups varied extensively in their ranking of these targets for future energy research. As such, we cannot attach firm weightings to any individual item. Some topics polarized the groups, leading them to rank them as "medium" priority, while others were more readily placed into one of the ranking categories with less controversy. However, the following table outlines some of the key research targets, an *approximate* ranking, and some of the arguments used by participants when speaking either for or against the option.

Fig. 4: Summary Table

Priority	Energy Research Targets	Arguments Used
High	Sustainable energy	Popular criteria of legacy and long-termism are applied by those arguing for research in this area.
	Public perceptions and attitudes	At this relatively early stage, the role of agency is seen as vital in dealing with the energy gap. Social research fulfils this, and is also viewed as 'value for money'.
	Wind/Solar/ Marine	Those who argue for research into renewable energy sources do so with an environmental and legacy agenda. However, for opponents, these sources are insufficient in scale to fulfil the energy gap.
	Fusion	Fusion caused a certain amount of polarisation among the groups. Those who argued against it used pragmatic arguments around the over-focussing of resources in one area. However, those who argued for it used similarly pragmatic lines of thought, but instead arguing that a large-scale problem requires a 'big-ticket' solution.
	Climate change	Climate change and other environmental concerns framed many of the debates throughout the events. However, participants saw this as an important aspect or criterion to take into account when evaluating research targets, rather than a target for research itself.
	Nuclear fission	This target is perhaps one of the most polarised in terms of proportions 'voting' either way, and one that evokes strong feelings among participants. However, interestingly, participants on either 'side of the fence' use common arguments of pragmatism and security.
	Fuel poverty	There was a high level of awareness of this, and a strong feeling that it should be combated. However, participants did not feel that this is within the remit of energy research.
	Interactive	Some did not fully understand what these were,

Low	software tools	while others felt that sufficient investment had already been placed in this area and any further would yield few results.
	Conventional energy generation	Participants generally viewed this as a non-pragmatic choice. The finite nature of the resources required, and the environmental implications were the principle arguments used against this.

The main areas of agreement/disagreement in these discussions proved revealing about the way participants seem to make decisions on the basis of their own evaluation criteria at this early stage in the dialogue process.

The importance of research into **sustainable energy sources** was largely undisputed, with participants arguing that in seeking a solution to energy supply, the outlook must be solving the problem in the long-term and looking to create a satisfactory legacy for future generations.

The importance of public perceptions and attitudes was also commonly cited; although education is seen as a key area, i.e. changing people's behaviour, participants asserted that research into this will be crucial before hoping to change it. This followed on from the theme in the earlier spontaneous discussions, in which some participants claimed it was time for the public to take more action to change their outlook and behaviours.

Likewise, participants were largely in agreement over some areas for energy research areas that were seen as low priorities. For example, it was commonly argued that **conventional energy generation** is not sufficiently long-term in its outlook, but rather is 'delaying the inevitable'.

Other potential areas of energy research caused **high levels of disagreement**. It is perhaps unsurprising, for example, that research into **nuclear power (fission)** polarised participants: those who see nuclear power as a viable energy solution argue that research to make it more efficient and safe would be welcome, while nuclear opponents are vociferous in their assertion that this is not an option.

Research into certain forms of renewable energy sources, in particular **solar and wind energy**, also prompted disagreement in the regional workshops. Those in favour of further exploiting these sources of energy argued that these means are already proven, and that research could make them more efficient. However, the view of other participants was that research would be of little value partly because we already know they work, and also because, it was argued, they will never be sufficiently large-scale to fill the energy gap.

After piloting the approach in Birmingham, subsequent syndicate groups, were asked, as a further task, to spread a notional budget of 100 'chips'

across the High, Medium and Low categories, to give us an idea of their approach to spreading investment and risk.

Across the syndicates a fairly consistent pattern emerged, in which approximately 50-60% was typically allocated to participants' 'High' priorities, 30-40% to 'Medium' priorities, and 10-20% on 'Low' priorities.

Eliciting and Applying Research Evaluation Criteria: Lessons Learnt

- Despite the number of criteria emerging in the exercises, there was a **striking degree of overlap** between them, and relatively little variation between workshops and sub-groups, suggesting that these would be relatively stable and robust criteria even if much larger samples were involved in similar exercises.
- Despite the common criteria being used, a **high degree of polarisation and disagreement** was observed with respect to many of the key targets of potential energy research. As a result, no strong and consistent pattern of ranking therefore emerged.
- **Sustainability and environmental impact** emerge as key value criteria at this early stage in the exercise
- Research to tackle **public attitudes and behaviour** are generally highly favoured, in line with initial spontaneous views that this aspect of the energy challenge has hitherto been overlooked.

3.6 Analysis of Regional Workshop findings: Emerging Hypotheses

From the pattern of responses at the regional workshops, we can tentatively put forward a number of hypotheses to help us make sense of what we observed.

It should be stressed that these are the interpretive perspectives of the research team, and do not necessarily reflect explicit comments by participants but seek to draw out what is *implicit* beneath these comments.

This is an important and necessary function of qualitative research, as it seeks to provide a more penetrating interpretive "lens" or insight through which to view the attitudes, opinions and beliefs articulated "on the surface" by participants.

Hypothesis 1: The salience and importance of energy research evaluation criteria are driven by the public's variable sense of a) Urgency and b) Agency with respect to the UK's future energy challenges, and by extension, the suitability of energy research programmes to address these challenges

Looking across the pattern of responses emerging from this first stage in the debate, a number of key issues seem to be influencing the public's outlook on energy issues.

- Belief or doubt about arguments put forward regarding the threat posed by man-made climate change, and fears about the outcomes of climate change

- The level of concern about security of supply, economic competition and political vulnerability – in terms of outcomes for the UK and themselves

- Anxiety about/sensitivity to cost (e.g. utility bills)

These issues seem to be among several issues which attract people's *attention* to the issue of energy supply and demand. They therefore act as drivers of the salience of the topic, and above all, their sense of **urgency** with respect to tackling major energy challenges.

We can define this driver as follows:

Urgency: the degree to which people believe that the challenges facing the UK with respect to energy require an energetic and urgent response.

Another set of issues, emerging from the regional discussions seem to be more influential in shaping people's *confidence* that these challenges can be overcome. These include the following:

- Confidence in science and technology: beliefs about the role of science and its ability to deliver beneficial change

- Trust in institutions: beliefs about the motives and abilities of politicians, private sector organisations, scientists and other decision-makers and confidence that they will take the steps necessary to effect change

- Confidence in the scope for public attitudinal/behavioural change: optimism or pessimism in the ability of societies, communities and

individuals to adapt their behaviours to respond to the level of threat posed

- Awareness of energy technologies and approaches that may offer a solution to the threats posed by major energy challenges (climate change,

We might define this characteristic of people's outlook as their sense of Agency, and can define this as follows:

Agency: the degree to which people have confidence that change can and will be achieved through whatever means (e.g. technologies, behaviour change) are being put forward as possible solutions.

These two factors may interact in a reciprocal relationship. The degree of perceived urgency points to the most suitable agent of change, and the agent of change (e.g. incremental solar power) acts as a sign or symptom of the implicit sense of urgency.

The underlying drivers of Urgency and Agency (e.g. beliefs about climate change threats, confidence in institutions) are likely to be a mix of **a priori assumptions, values and beliefs** (entrained patterns and associations) and more **immediate contextual factors** that are present in the context of the present where these issues are under consideration (e.g. stimulus materials, budgets, arguments or information presented by other citizens or experts).

Hypothesis 2: By mapping these two value drivers against each other, we can identify loose themes and typologies of thought with respect to participants as they try to grapple with the complexities of this issue.

The table below describes a loose classification of outlooks on energy challenges, and by extension, energy research. Each of the clusters describes a particular outlook that is characterized by a range of assumptions, beliefs, and possible demographic profiles.

We have given them titles to provide a summary of the 'world view' implicit in each cluster.

	High	• *'Hit and hope'* • High risk, major tech-first solutions • Fusion, Hydrogen etc • Sceptics re human agency and about social/softer sciences and interventions • But sympathy for	• *'Grand project'* • Climate alarm: existential fears • Low skepticism/precautionary principle • Strong social engineering possible and needed – mixed methods

		efficiency-based tech interventions • Tend towards security-based rationale for urgency (climate = low agency) • Male, engineering/tech background, higher education,	• Big ticket projects, large capital investment • Adventurous technologies • Younger, mixed gender, higher educational/socio-economic
URGENCY	***Low***	• *'The unconvinced'* • Powerless • Climate change skeptics • Gradual lifestyle change, but only if cost-effective • Government leads if at all • Lower socio-economic, female	• *'Steady as she goes'* • Circumspect and cautious approach • Some climate skepticism or at least greater uncertainty about level of threat • Incremental change acceptable (e.g. the "standby button" approach) • Mixed methods to achieve goals. • Social and tech fixes
		Low	***High***
		AGENCY	

The categories do not represent fixed and rigid typologies or segmentations of the population. They are presented as emerging hypotheses as to the archetypal arguments and stances adopted by participants with respect to the energy challenges and research responses discussed in the regional workshops.

They are presented as an initial framework on which the lessons from the Summit, and future research, can be built.

Hypothesis 3: Participants' sense of urgency and agency are influenced by the dialogue experience, by changing the underlying assumptions and immediate contextual factors that condition their response.

As a result of the deliberative experience and very likely the stimulus material, participants' **sense of urgency in relation to energy and investment in energy research seemed to increase**, relative to other priorities. This is likely to be partly a product of the deliberative events themselves - spending a day discussing a specific issue will inevitably cause people to consider it more important – and partly a response to the stimulus

presentations outlining the scale and scope of energy challenges and the role of research in this.

We should note however that not all underlying assumptions were influenced. For example, although some climate skeptics moderated their view, others remained largely unconvinced. However, among those who continued to doubt the evidence, other factors such as security of supply and self-sufficiency rose in importance and therefore conditioned their sense of urgency.

As people became more informed about the variety of approaches to tackling the energy challenges, their **sense of agency initially became more uncertain** or in some cases **more polarised**, as those who made up their mind quickly then sought to reinforce their preconceptions. Many people said they would like to know more in order to make a judgement, e.g. the probability of various types of energy research delivering results.

Again, the focus of discussion here shifted somewhat as participants became more familiar with the issues in hand, and considered them in more detail. Initially, discussion was often centred on social solutions to the issues – focussing on the importance of "quick win" and low cost individual actions (e.g. turning off the standby button) in responding to energy challenges:

> *It's about individual behaviour, reducing your carbon footprint. It's a personal thing.*
>
> Female, 18-34, Oxford

However, as the deliberation progressed and participants discussed energy research a **sense of agency or confidence grew with respect to technology-driven, supply-side responses at the expense of social/behavioral ones**, perhaps partly because the benefits seem easier to quantify and the likelihood of success easier to gauge than more complex social interventions.

4. The Tasking Phase

4.1 The Role of the Tasking Phase

The tasking phase provided participants with an opportunity to record thoughts and comments in a tasking pack format on some of the issues discussed in the regional workshops. Participants were given £10 as a thank you for on completion of the tasking pack.

The tasking phase provided a creative and participant-centred way of encouraging engagement with the subject matter and potentially facilitating effective contribution and stimulating discussion for the Summit event. Pre tasking also provided an opportunity for private reflection as a counter balance to possible group or researcher bias in the regional workshops.

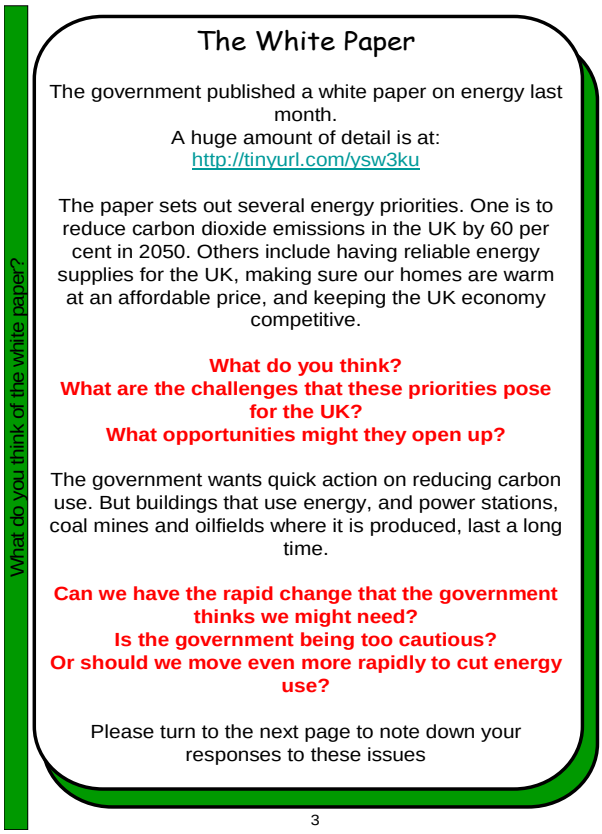
The tasking pack asked questions around the issue of the future of energy use and energy research in the UK while providing internet links to a variety of sources, so that participants could consider the questions in more depth and in a more personal way than they had done thus far.

Twenty-seven people returned their tasking packs to Ipsos MORI out of a possible 84 people. 11 of the 27 then attended the Summit event. It is uncertain whether those that attended the summit but had not returned their tasking packs had in any way been influenced by those that had.

The tasking pack comprised three sections:

The first section, 'Some background information' asked respondents to record thoughts and comments on the government white paper on energy; the speed of climate change; and who does energy research.

For example:



The second section, '4 energy issues to think about' asked participants to record thoughts and comments on wind power; energy in buildings; carbon capture; clean cars; and nuclear power.

The final section, 'Portraits of Energy Researchers' contained information on what energy researchers do, why they do it and some of their thoughts on the future of the topic.

4.2 Responses from Tasking Phase: Section 1

In the initial regional workshop phase participants' expressed a clear sense of urgency and agency with regard to the issues of the future of energy and energy research. The themes emerging from section 1 were closely related, and reflected the agency and urgency of the regional workshops. The main themes to emerge from Section 1 of the tasking pack were 'Climate Change', 'Sustainable Legacy', 'Responsibility' and 'Trust.'

Climate Change

The response to the Government White Paper stressed urgency in terms of ensuring reliable energy supplies and reducing CO2 emissions.

From the outset, considerations of energy research were framed by environmental considerations. Some participants mentioned CO2 emissions and 'global warming' as a danger to the future of the planet. Others referred to the need to research climate change as important and 'urgent:

> *I would like to think that in the last 10 years we are now very aware of carbon dioxide emissions…I would like to hope that progress is made and does not slow up.*
>
> Female, ABC1, 40-59

> *'We already know about climate change, and so I think more money needs to be put into what can be done to rectify the situation…We need to look at more sustainable energy sources and not just a quick fix…'*
>
> Female, C2DE, 40-59

Even those participants that said they did not feel particularly well informed about the issues felt that the speed of climate change was such that it required immediate attention.

> *We do know enough to know that urgent action is needed.*
>
> Male, ABC1, 40-59

Several respondents felt that the issue of climate change had not been paid enough attention:

> *My overarching thought is 'Why now?' Contemporary environmental concerns and issues have been known for over 30 years. Why has the government failed to listen to these concerns before...? Climate change is not a new idea. I am unsure even now how seriously research into climate change has been taken – and if the results have really influenced policy*
>
> Female, C2DE, 60-75

Yes, more money is needed as more research is needed, or it may be that lots is already being done but the public are not aware of this…but why so much so fast when we knew about climate change 10-20 years ago?

Female, ABC1, 18-39

Sustainable Legacy

A clear concern for many with regard to energy research was ensuring the possibility of a 'sustainable' environment for future generations. The idea of a legacy for future generations was also closely tied in to environmental concerns.

We need to look at more sustainable energy sources…fuels that are safe, economic and affordable. This is the future for our children

Female, C2DE, 40-59

Yes, more money for research on climate change, as we are all aware of what will happen if we do not change so that we can be sure of the future for our grandchildren

Female, ABC1, 40-59

Sustainability is the issue, as well as leaving a viable environment for future generations

Male, ABC1, 40-59

However, some mentioned energy security as an important element in achieving a sustainable future.

With gas at the moment coming from Russia, we have to pay whatever they ask

Female, ABC1, 40-59

…there is a need to reduce energy use and waste and to invest in new technologies to reduce our dependence as a country on oil and gas which is

controlled by non-democratic countries. How long before Putin shuts off the supply to European G8 countries?

Male, ABC1, 60-75

Responsibility

While there was a discernible sense of urgency amongst participants in terms of the need to address the issues of energy and environment, it was less clear where responsibility lay to address the relevant challenges. Many identified effective communication of research and education of the public as a solution. The government was widely felt to be the body with responsibility for communication of an effective message and setting a good example.

The challenge is to reduce the use of energy by sensible means (education, insulation etc)…We can have rapid change by the use of education and social funding coupled with government using best pratice and managing the way forward

Male, ABC1, 60-75

I would suggest that many people do not know enough. Existing research needs to be communicated to the population (and not dramatised by the media)

Female, C2DE, 60-75

Yes, we do need to spend more money on climate research. However, the findings need to be relayed to the public in plain convincing English (without spin). I know very little (scientifically speaking) about climate change.

Female, ABC1, 18-39

There was evidence of scepticism amongst respondents as to how far individual agents would be able to changes their behaviour to become more energy efficient and aware of issues relating to energy. Some suggested that social attitudes and notions of personal responsibility needed to change considerably if people were to become more energy efficient and environmentally friendly.

We need a change in the consumer / commercial l /advertising / celebrity-worhsipping / economy-driven thought processes…as long as this continues people will aspire to be wasteful…Until attitudes change so that it becomes socially desirable to be green rather than pretending to be…

Male, C2DE, 40-59

Social attitudes need to change from 'I'm alright Jack'.

Male, ABC1, 60-75

Trust

A common theme throughout the tasking responses was trust in academics and universities as impartial actors for taking forward an energy research agenda. There was also clear evidence of deference to 'expert' opinion. Some saw pressure groups such as Friends of the Earth or Greenpeace, and large companies such as BP as having their own agenda for research. The importance of trust in the experts was closely linked to the idea of a reliable message or reliable education about energy research.

I trust academics to provide the most objective research. Governments/companies are often driven by profit, and interest groups, by their nature, tend to exaggerate the problem…Research about implications on the environment are extremely important as we should aim for a balance between using energy and damaging the environment.

Male, ABC1, 18-39

We don't know they are acting in our interests and therefore need to question more deeply as the opportunities arise which includes public consultation not just a tick in the box.

Male, ABC1, 60-75

4.2 Responses from Tasking Phase: Section 2

In section 2, participants were asked to record their thoughts and comments on 5 'energy issues':

- Wind power;
- energy in buildings;
- carbon capture;
- clean cars; and
- nuclear power.

Common concerns when evaluating these potential energy sources are reliability and environmental impact. For some, nuclear is the only option proven to provide substantial energy needs and energy security while remaining environmentally friendly.

> *I believe strongly that we should build newer and better power stations. This solves the problem of carbon emissions.*
>
> Male, ABC1, 60-75

> *Nuclear is the best option for the UK by using the newer technology and safety experiences. We should however continue all other viable options so as not to be a 'one trick pony'. The risks are high intitial costs but developing technology can achieve payback by sales to other countries and drastically reducing our dependence on oil whilst still keeping coal in reserve.*
>
> Male, ABC1, 60-75

However, while nuclear was felt by some to be an important energy solution, some felt that the official message about the viability and relative safety of nuclear power as a source of energy was crucial. Others, however, were vehemently opposed to obtaining energy from nuclear power stations. When discussing the nuclear option, some participants placed a caveat on its use in terms of being able to safely store and/or dispose of the waste produced.

> *I feel that nuclear power is the answer but the waste which is the problem. If it can be made safe then the public will go along with it.*
>
> Male, ABC1, 40-59

I am concerned about nuclear waste. If this is the way to go we must be educated and encouraged about the positive effects, If there is an unlimited supply of this source of energy, and the waste is safe and able to be recycled and not dangerous then this should be the way forward.

Female, C2DE, 40-59

The other 'energy issues' discussed elicited a more diverse response. Wind power was favoured by some participants, but was not always considered to be reliable enough to provide for energy needs.

I believe that wind power is a very important source of energy and that it has a strong future despite objections. What matters most is the security of the nation's energy supply not what they look like. Provided they can be made efficient then I support wind power projects.

Female, ABC1,40-59

There was also some feeling that the appearance of turbines was something people would become accustomed to.

Many architectural monstrosities have been erected in the name of progress and diverse aesthetic pereferences. Whilst some people object inititally, our 'tolerant nation' usually eventually shuts up and tolerates them. The same thing would inevitably happen with wind turbines.

Female, ABC1, 18-39

A common response to a consideration of 'cleaner cars' was that they would only make a difference to energy use and climate change if popular values changed first. Some respondents felt that a change in values required a persuasive message from relevant parties. Improved 'Public transport' was often mentioned as a more appropriate way to increase energy efficiency and reduce carbon emissions than relying on 'cleaner cars.'

Better than congestion charging would be to reserve allroads within a three mile radius of a town or city for public transport or cycling. The media and car manufacturers should emphasise greener cars as 'cool' and present us with cars that are safer, greener and more reliable than before.

Female, ABC1, 40-59

'Energy in Buildings' was an area in which respondents felt the individual could make a difference. Respondents felt that small changes made on an individual basis could go a long way to improving energy efficiency.

> *There are so many changes that people can make at a personal level e.g. do not leave electrical appliances on stand-by; install better windows, insulation etc (grants given to poorer more vulnerable individuals)' lights in buildings turned off at night….*
>
> Female, ABC1, 18-39

At the same time there was a strand of opinion that suggested there should be a leadership role or some sort of incentive scheme from government in order to make changes.

> *We should all be made aware of affordable ways in which to make our homes energy efficient. We have already increased recycling. Loft insulation, energy efficient products, cavity wall insulation, solar power, energy-saving bulbs should be given grants. New builds should be energy efficient as standard.*
>
> Female, C2DE, 40-59

Carbon capture elicited the most negative response from participants. Some were sceptical that it could work, and in particular whether it was possible to effectively capture and store carbon in the long term.

> *In terms of pumping CO2 underground, again this is likely to consume much of the energy produced and would further limit dwindling resources.*
>
> Male, ABC1, 18-39

Tasking Phase: Lessons Learnt

Several key themes emerge in the tasking packs when considering energy. Reflecting the findings from the regional workshops, debates are framed by **environmental considerations**; particularly in terms of **climate change** and **sustainability**. Also in line with the regional findings, participants see responsibility as resting with **individuals**, with **behaviour** seen as an important part of the energy agenda.

When considering difference energy sources, it is **reliability** and **environmental impact** that emerge as key criteria for evaluating them. However, as we saw at the regional events, a consistent set of criteria for evaluating energy priorities does not necessarily lead to a consistent set of energy priorities.

4.3 Analysis of the Tasking Phase findings

Areas of Agreement:

There was a significant degree of agreement amongst tasking respondents about the challenges they faced and the future they wanted with regard to energy efficiency and energy use.

For all but one respondent (who completed the tasking pack), **climate change** was the most pressing issue related to energy research. (In contrast, it was **not** the most pressing issue related to energy research for all those who did not complete the tasking pack). Reducing CO2 emissions was a priority for many tasking respondents because it was felt it would help foster a world fit for future generations. Energy research was felt to play a key part in creating an environment suitable for the future. The key to energy research creating conditions for a viable future was that sources of energy were **reliable and secure**. 'Reliable' in the sense that they would not run out, and 'secure' in the sense that they would be free from interference by other nations. Attention to climate change alongside reliable and secure energy sources were seen as being the key elements in creating the conditions for a sustainable future.

Areas of Uncertainty:

The question of where responsibility lay to ensure the sustainable future which everyone agreed was a desirable outcome was less clear. Some respondents felt able to contribute to increasing energy efficiency by making changes on a **micro-level** e.g. insulating their houses and adopting greener, more energy efficient lifestyles. However, some respondents felt that there was a limited amount they could do and showed a preference for larger scale energy research projects to look into providing for energy needs on a national macro basis. A corollary of this was the belief that social values and notions of personal responsibility needed to change dramatically before the public became more energy efficient and environmentally friendly. As such, there was some agreement that a strong and persuasive message was needed from trustworthy opinion leaders such as academics.

There was a considerable degree of uncertainty in terms of choosing energy sources. The **most popular choice was nuclear energy** because it was reliable and environmentally friendly. **Renewable energy sources** such as

wind power were viewed favourably because they were environmentally friendly but their reliability as a large scale energy provider was questioned. 'Energy efficient buildings' and 'cleaner cars', both options, which to some extent relied on personal change were not as popular because they were felt to rely on a change in personal values.

We can see here perhaps the movement from the regionals away from confidence in social and behavioural solutions towards more technologically-driven ones.

Carbon Capture was an unpopular option because it was viewed as unreliable and not a long-term option.

Building on the Regional Workshops:

The tasking exercise built on the emerging criteria for judging energy research developed at the regional workshops. It acted as a safety check against the workshops by providing a 'private space' in which people could consider the issues, and their priorities away from the influence of group dynamics and time restrictions.

In commenting on 'background information' around energy research, respondents were clearly most motivated by **concerns for reliability of energy supply and environmental concerns**.

Both these factors were part of the larger issue of sustainability in terms of providing a legacy for the future. In commenting on 'energy issues' participants were clearly favourable towards energy sources that provided a reliable source of energy whilst also being environmentally friendly and reducing CO2 emissions. The tasking phase clearly suggests that what respondents valued most in energy research was **reliability and security followed closely by environmental considerations**.

5. The Summit Event: Developing and Applying Emerging Criteria for Energy Research

5.1. The Role of the Summit

The Summit was designed to achieve five core objectives

- Condense the many criteria emerging from the regional workshops into a more manageable number to allow their use in structured evaluation exercises
- Clarify the meaning and relative importance of these criteria
- Elicit the arguments and trade-offs that the public make when designing their own energy research portfolio using a budget, hypothetical projects and the core evaluation criteria
- 'Future-proof' their approach to investment by looking at how they stand up to a range of alternative future energy scenarios
- Understand what questions the public has of the energy research community once they get more involved in these debates

In order to achieve these goals, the Summit was structured as follows. The full facilitation plan with precise details of the exercises is provided in the Appendices.

Timing	**Activity**
Saturday 9.30-12pm	1. Arrival, welcome and introductions 2. Recap over what we learnt from regionals 3. Plenary group exercise to cluster the evaluation criteria 4. Syndicate groups to define and enrich the criteria clusters 5. Plenary presentations of clusters
12-4pm	6. Lunch 7. Syndicate groups: 'Real world' budget allocation exercise using hypothetical energy research projects 8. Plenary presentations: real world allocations and

	rationales
4pm-4.30pm	9. Q&A session with academics Close for day
Sunday 10-1030am	10. Recap on Saturday and further questions
1030-12.15pm	11. Scenarios stimulus presentation 12. Syndicate groups: Scenarios discussion 13. Plenary feedback and "ideal scenario"
1215-1pm	14. Final Q&A session with experts 15. Close of Summit

5.2 Clustering the Criteria

The 64 evaluation criteria that were developed at the Regional Workshops were re-presented at the Summit in preparation for their second phase of development. At the event participants undertook a plenary 'clustering' exercise which resulted in them being grouped into seven criteria that, it was agreed, successfully subsumed all the original 64 without compromising them.

Participants then worked in syndicate groups to define each of these criteria clusters in their own language and describe how each should be applied to energy research projects. The clusters or "meta-criteria" that emerged (in no particular order) were:

- 'Economics'
- 'Sustainability'
- 'Fairness'
- 'Environment'
- 'Legacy'
- 'Quick fix'
- 'Efficiency'

The tables overleaf describe each of these clusters in more detail, and list the items from the original long-list of criteria from the regional workshops that they encompass.

It is worth noting that some aspects of the criteria discussed in this chapter overlap, and that definitions used by participants may vary from those understood in the research literature.

Another key point is that these criteria were used to discuss both means (energy research) and ends (energy technologies) somewhat interchangeably, and it was not always clear to which participants were referring when they described them. For example, participants might highlight the importance of minimising environmental impact in considering the expansion of conventional nuclear power generation, but in the heat of the debate it was not always possible to decipher whether they were referring to the need for this consideration to be a part of any energy research submission, part of the overall deployment of nuclear energy or some combination of the two.

"Economics"

The cluster is defined as…

- **'Costs to individuals, countries and consumers';**
- **'Costs not to be passed onto consumers';**
- **'Building on what's already been spent'.**

Encompassing…

- 'Cost generally'
- 'Price to people'
- 'Cost-effective'
- 'Financial viability'
- 'Money'
- 'Cost of research project'
- 'Affordability of outcome'
- 'Affordable and accessible to all in society'
- 'Least amount of resources used'

The term 'economics' rather than 'costs' was used here because 'costs' implies wider criteria than simply financial concerns – such as environmental or social costs.

Participants identified a number of different elements to their economic concerns. When considering energy projects, economic arguments were often deployed against funding more ambitious or uncertain projects, such as research into fusion power. Of course, the relative economic cost of a particular research project was also weighed up by some against the potential benefits of a successful completion of a piece of research. In this context, economic arguments were not deployed solely to promote the cheapest projects per se, but to promote the projects which represented the best value. In such cases, for some, fusion might constitute a sound economic investment.

Economics was considered a criterion of major importance to the evaluation of energy research projects.

'Sustainability'

The cluster is defined as…

- **'Providing us with a continuous source of energy'**

Encompassing…

- 'Easy to use and get'
- 'Economical – Can we make the required changes?'
- 'Renewable sustainability'
- 'Improves on what we've got'
- 'Sustainable'

The notion of sustainability tended to be seen in a multi-dimensional way, perhaps reflecting the uncertainty and lack of consensus as to how the concept is best defined.

For some, the emphasis was on the degree to which the energy source was either infinitely renewable (e.g. solar) or at least less prone to depletion than conventional fossil fuels (e.g. biofuels).

For some, sustainability related to the difficulty in extracting or harnessing the energy source.

Another dimension was the extent to which the technology would be likely to be accepted and adopted by society. Would major changes to society or infrastructure be needed in order to employ the technology? If so this would be a major impediment to sustainability.

Finally, some interpreted sustainability as the degree to which new technology manages to build on existing resources and techniques, and thereby provides some guarantee of continuity and long-term effectiveness. This interpretation overlaps with similar aspects of the "Economics" and "Quick Fix".

'Ethics and Equality'

The cluster is defined as…

- **'The benefits of the {energy technology} being deliverable and accessible universally'**

Encompassing…

- 'Shared / worldwide action – no one should bear all the costs and others free-ride'
- 'Information needed (public involvement / education)'
- 'Accessibility – can everyone benefit from it?'
- 'What is good for Britain is good for the world'
- 'Fairness – who is excluded from the benefits'
- 'Equality – everyone on board'
- 'Peoples behaviour and attitudes (education & acceptability)'
- 'Fuel power – international, Africa etc'
- 'Religion – avoiding apocalyptic religious visions'
- 'Convince everyone first'
- 'Security of supply (avoiding reliance on regimes)'
- 'Space – planning permission'
- 'Ethics'

Fairness and ethical concerns centred on whether the energy source being researched can potentially offer benefits cutting across the whole of society.

As such, it was on occasion used as an argument against micro-generation initiatives such as domestic solar, which would favour those who can afford to adopt this. Conversely, large-scale solutions were viewed by some as being 'fairer', because they offer a potentially universal solution, to which all would have access.

Other aspects of the 'Fairness' cluster included fairness towards communities facing the construction of major new energy plants on their backyard. Sensitivity in applying for planning permission – especially for nuclear and wind – was therefore an integral part of this evaluative criterion.

Finally, there was an international dimension to this criterion. Energy technologies and, by extension, the projects that foster them, should be favoured if they reduce the UK's reliance on repressive regimes, and if they support international aid and development efforts in the Third World.

'Environment'

The cluster is defined as…

- **'Minimising the impact of global emissions, the effects on nature, in both the short and long-term {of the energy technology} and protecting the planet'**

Encompassing…

- 'Green'
- 'Environmental effects e.g. sea life'
- 'Environmental impact'
- 'Legacy – Safety'
- 'Aesthetic'
- 'Security (Technology)'
- 'Legacy – Health and safety issues'
- 'Environment'
- 'Visual impact'
- 'Effects on nature'
- 'Environmental awareness'
- 'Reduced carbon emissions'
- 'Risk'
- 'Carbon emissions'

Together with 'Economics', the 'Environment' criterion was one of the most important for participants.

Environmental concerns were related to the relative safety and impact of different energy technologies. For example, nuclear power was viewed by some as representing an unacceptably high environmental risk – the dangers posed by terrorism, waste, or by accidental meltdown, were seen as too great. Others, however, placed the balance of risk towards environmental concerns, and favoured nuclear research as providing a technology which produces far less greenhouse gas emissions than 'traditional' energy supply. Research into wind power provided another example of such conflict; while wind farms do not produce any carbon emissions, environmental reasoning is used against such projects by some on 'aesthetic' grounds.

'Legacy'
The cluster is defined as… ➢ **"Projects should have an obligation to consider future generations needs in terms of social awareness of the planet, and the individuals well-being"**
Encompassing… ➢ 'Future proofing (sustainable)' ➢ 'Beneficial to future generations' ➢ 'Legacy for children / future' ➢ 'Future / Children's future' The 'Legacy' cluster relates to the concept of the environment, but goes further than research into environmentally-friendly forms of energy production. The focus is on bequeathing a safe, responsible and sustainable approach to energy to future generations. It is therefore merely about planning for the future, but allowing ourselves to feel good about it. 'Legacy' was also described as relating to increasing information and awareness of environmental and energy supply issues among the next generation, so that their behaviours may be altered and subsequently passed down to future generations. In this context, the 'Legacy' cluster emerged as a prominent argument for those in favour of the role of social scientists in energy research. This is about behaviour change, it was argued, and in order to change behaviour we must understand behaviour.

'Quick Fix'
The cluster is defined as… ➢ **'Identifying those areas of energy consumption that are amenable to improvement in the next 3 to 5 years'** ➢ **'Building on existing technology to increase energy outputs and reduce materials input'**
Encompassing… ➢ 'Speed with which it can be put in place' ➢ 'Already works' ➢ 'Use of existing technology / improve on it' ➢ 'Reliability' ➢ 'Looking for new oil and gas fields etc' ➢ 'How realistic is it to do?' ➢ 'Acceptability – popular acceptance' ➢ 'Practical / realistic' ➢ 'Tried and tested' ➢ 'Pilot scheme possible – testing it out first' ➢ 'Promising technology that we already know a lot about' ➢ 'Simple to put into practice now' ➢ "Prior knowledge"

The 'Quick fix' criterion was discussed largely in the context of developing and building on existing technologies to avoid the need to invent something needlessly. However, there was disagreement about the extent to which particular energy research initiatives offer the kinds of 'Quick fixes' that this cluster requires.

Judgement of an energy type against this criterion seemed to be influenced by its prior rating against other criteria.

For example, participants who argued that wind farms represent an environmentally-friendly ('Environment') form of energy supply that could be made more efficient would see this as a 'Quick fix' and argue for more research in this area. Participants who dispute the environmental credentials of wind farms or see them as failing on the 'Economics' criterion therefore deny that there is a quick fix to be achieved.

Furthermore, there was not always agreement on what could be achieved 'quickly'; certain forms of societal change in energy reduction are cited by some as a quick fix - such as getting people to turn off their standby buttons. However, others asserted that effecting such change, or indeed anything more substantial is a much longer-term project.

'Efficiency'
The cluster is defined as… ➢ **'Producing as much energy, for as little cost, and harm to the environment, as possible'**
Encompassing… ➢ 'Obtainable' ➢ 'Efficiency of resources' ➢ 'Storage/efficiency' ➢ 'Efficiency of usage' ➢ 'Energy from waste' ➢ 'Supply of existing measures' ➢ 'Is it necessary?' The concept of 'Efficiency' was referred to in a number of different ways by participants. Partly, it was related to economic arguments – will a certain sort of method supply energy cheaply, in relation to the amount of capital invested? But efficiency was also partly defined in relation to environmental concerns – can a particular method of energy supply produce outputs for as little damage or cost to the environment as possible?

5.3. Applying the Criteria to Hypothetical Research Projects

Having defined the core evaluative criteria that they regard as important for future energy and energy research, participants undertook a facilitated exercise to apply these criteria in a simulation of a 'real-world' setting.

They engaged in a debate about funding decisions for a wide selection of hypothetical energy research projects that mirrored as closely as possible the reality for funding bodies such as the Research Councils UK.

The hypothetical projects that had been drafted by RCUK researchers were evaluated in syndicate groups, within a notional budget of £70 million[10]. Having debated the range of research options, the participants were asked, in their groups, to agree on their funding choices. The funding portfolios outlined by each of the groups are outlined in the Appendices.

This exercise was completed in four separate groups, each accompanied by an expert energy researcher from the Research Councils team acting as both an adviser, and where required, as an active participant in the debate.

Once this was done, participants were asked to characterise the sort of future for Britain they envisage arising from their investment approach if it was to be continued forward to 2050. This was done in the form of hypothetical "news headlines" from this future. This was done partly to enliven the session, partly as a projective exercise to gain another insight into the priorities they were working for, and partly to get them thinking about the longer term consequences of their actions, as a lead-in to the subsequent scenario work.

The entire budget allocation exercise encouraged participants to make decisions and trade-offs between different technologies and research. As in real life, there were not enough funds available to cover all of the projects competing for research funding, and so participants had to negotiate with one another, and to articulate arguments supporting their positions, in order to decide which projects they wanted to fund. The exercise was used to elicit debates and arguments among participants, rather than to attach importance to any final allocation of energy projects as 'the ideal' or "the public's choice".

These debates, issues and comments that emerged in relation to each of the specific energy research projects are summarized in the Appendices.

More details of this process and the stimulus projects used can be found in Chapter 2 (Process) and in the Appendices.

[10] The approximate current spend on energy research by RCUK (It is in fact £260m over three years).

As expected, despite using the same evaluative criteria to use to judge the relative merits of energy research projects, a range of different funding 'packages' were developed by the different groups. These packages, and the headlines they gave rise to, are summarized below for reference:

Group 1:

Funding Choices:	**Cost**
Nuclear fusion	£50m
Solar Energy: conventional photovoltaics	£14m
Understanding behavioural change in energy use	£5m
Total:	*£69m*

Headlines from 2050:

Fusion – We've cracked it!

Energy for All

Fusion Saves the World

Group 2

Funding Choices:	**Cost**
Nuclear fusion	£50m
Energy efficient buildings	£18m
Total:	*£68m*

Headlines from 2050:

First Fusion Powered Rocket takes new Colony to Mars

Confusion over Fusion - Is it working ok?

Group 3: NB this group was allowed to exceed the £70m limit, following a request by them.

Option	Cost
Energy efficient buildings	£18m
Large scale wind energy	£18m
Solar Energy: conventional photovoltaics	£14m
Hybrid electric vehicles	£8m
Understanding behavioural change in energy use	£5m
Measures to induce change in transport behaviour	£5m
Transforming national and international energy markets to reduce carbon emissions	£5m
Total:	*£73m*

Headlines from 2050:

Not another wind turbine!

Buy one get one free solar panels.

Roads dug up as people move less far in electric cars.

Too many pandas – Do we need to kill them?

Group 4: NB This group became polarised, and divided into two in order for everyone to express their views. Therefore, there are two tables for this group.

Option	Cost
Large scale wind energy	£18m
Energy efficient buildings	£18m
Understanding Behavioural Change in Energy Use	£5m
Tackling fuel poverty	£5m
Total:	*£46m*

Headlines from 2050

90 Year-old Woman Killed by Falling Solar Panel

Britain Setting Standards in Green Issues

Britain De-Fossilised

Energy Policy Means We Stay a Green and Pleasant Land

Britons Become Virtual Travellers

Option	Cost
Energy efficient buildings	£18m
Measures to introduce change in transport behaviour	£5m
Transforming national and international energy markets	£5m
Tackling fuel poverty	£5m
Large scale wind energy	£18m
Solar energy: Third generation PV	£12m
Total:	*£63m*

Headlines from 2050

Goodbye Sellafield, Hello Solar Field

We did it our way

5.3.1 Themes in the Allocation Debates: 'Archetypal' Response Patterns

As the tables above and in the Appendices illustrate, participants held a range of views and priorities about different potential energy projects, and deployed a range of arguments to make their case. The budgets and related headlines also indicate that groups and individuals did at least attempt to impose some coherence to their reasoning and overall prioritisation, albeit retrospectively in some cases.

Where there was relatively high consensus among syndicate group members it seemed that in some cases a relatively coherent approach to funding projects tentatively emerged gradually, with group members trying to weigh up each project on a like for like comparison with others and developing a shared allocation based on what seemed to be a shared set of priorities. In all cases however, there were individual 'pet projects' that one or two group members might personally advocate, but which were not taken forward by the group as a whole.

For other groups however, the degree of internal dissent was too great for a coherent or consensual approach to emerge easily, The result was that individuals and factions within the syndicate group pulled in different directions and lobbied to get their position accepted (as we might often expect in real life). In some cases this led to a somewhat messy compromise to hit the overall budget. In the case of one group however it led to a complete inability to reach a consensus, with the group dividing along factional lines (in this case split on the fusion issue). This variability in consensus/discord is a useful finding to illustrate the extent to which subjective differences still drive evaluation even if agreed and standardized criteria are theoretically applied.

Indeed it became apparent that when (largely) left to their own devices, the formal criteria were not applied in a rigorous and mechanistic way to the energy research projects. Participants would read the research synopses and start debating with each other on whichever aspect of the "brief" first grabbed them for some reason. A debate would then emerge in which the criteria would be used informally to make a case, but without any attempt to attach formal weighting to these, or using them systematically to trade-off between projects.

However we should bear in mind that longer, more thorough deliberation may have been a casualty of the large amount of stimulus material which participants needed to evaluate and the inevitable limits of time on the day – a learning, and always a major trade-off, for running such events in future.

A strong implicit, and sometimes explicit (e.g. in the stimulus materials) assumption that seemed to underpin these discussions was that the energy research projects were chiefly targeted at tackling the issue of **climate change through the reduction of emissions**.

It followed that many of the subsequent debates focused on selecting the most effective means to deliver reductions in emissions through energy research although security of supply, sustainability and cost also figured.

However in addition to these expected themes, some aspects of the evaluation criteria naturally seemed to come to the fore in these debates, where previously they had not been seen as very important.

One example of this was the issue of the **UK's economic position in the world** and the capacity for commercial spin-offs from new energy technologies. Another was the need to **maintain the UK's science base** by retaining and incentivising the most talented researchers to work here. Both of these were mentioned as important factors in the stimulus sheets so this may have influenced their salience.

In particular however the issue of **cost** radically altered the way in which participants viewed the energy research projects. Until now they had had no conception of the approximate 'price tags' for these projects, and with their limited budget in mind, **their mindset was strongly governed by the financial parameters they had been given to work within**.

Based on the responses we got, we can only hypothesise about the factors that influenced participants' thinking in the deliberation process, within these financial parameters. These would seem to include the following:

- the nature of the energy research project (i.e. whether social/behavioural or technological)
- the budget remaining after decisions had already been made;
- their attitude to the urgency of the underlying issue (NB chiefly assumed by participants to be about climate change), and therefore the level of ambition and/or speed required of energy research projects
- their sense of agency in relation to the energy technology and/or research project i.e. how likely they thought it was that the goal could be achieved
- their preconceptions of the benefits/downsides of energy technologies
- the evaluative criteria
- their attitude to risk,
- their approach to money and investment (linked to risk)

The combination of these factors, and very likely still many more, seemed to give rise to three broad 'archetypal' strands of argument that participants would deploy to varying degrees depending on their disposition both 'in the moment' and generally.

These reflect a mindset that seemed essentially investment-driven, and which brought to the surface assumptions about risk and future uncertainties. It would therefore seem appropriate to characterise these arguments 'positions' or 'stances' using a financial risk analogy from which we have derived the following names as a way to capture their essence.

- 'High Stakes, High Reward'
- 'Safe Solutions'
- 'Hedge Betting'

These archetypal positions, outlined below, tend to link together the different evaluative factors such as attitude to risk, and the relative emphasis placed upon technology vs. social solutions, supply-led vs. demand-led solutions, and long-term vs. short-term priorities.

High Stakes, High Reward

The '**High Stakes, High Reward**' 'position' advanced a logic in which a large percentage of the research budget should be used on a single, or a few, major solutions to the issue of climate change, and often focused around ambitious technological projects on the assumption that the scale of the threat justified the scale of the investment in a potentially radical, "silver bullet" technology. Analogies were drawn with the Manhattan Project and the Space Race challenges embarked upon by previous generations.

Fusion power, or a major investment in the Hydrogen Economy were often seen as solutions which, although risky, could be the most rewarding. There was also a view that these minimise the need for behavioural change, and some scepticism. Other, cheaper and more short-term projects were fitted in around these major programmes of investment to make up the numbers.

Reducing polluting emissions was viewed by those adopting this position as an important aim of energy supply technology for whom the 'Environmental' criteria was commonly top-of-mind. Here, the benefit participants believed would be received from large scale solutions meant that society can continue with its existing lifestyle and level of energy consumption.

> *Fusion won't affect the environment so much, and it doesn't have carbon emissions. So it passes the environment test.*
>
> Male, 55+, Warwick

Environmental issues were also often linked to debates over **security of supply** and **legacy concerns** by those advocating 'high stakes' solutions. Other potential research projects were often viewed as being in danger of not representing significant enough change.

We need to link what we do today to our legacy, to the long term health of the planet. That includes plants and animals as well as humans

Female, 35-54, Warwick

We have an obligation to think about our children's inheritance

Female, Warwick

Typically, those advocating this position were less likely to place faith in **demand-side solutions** to energy issues, arguing that the level of radical societal change will not be met by demand-reduction strategies. Indeed, judging by the tone of some comments about potential social/behavioural research it would seem that some in this camp regard the social and behavioural sciences with, at best scepticism, and at worst, scorn with respect to their ability to deliver substantial change in this field.

Indeed, some in this group tended to argue that a reliance on the level of behaviour change required to reduce our emissions by a significant amount is unlikely to prove successful, is somewhat naïve, and could not meet the 2050 target. Rather, the archetypal 'high stakes' arguments seemed to implicitly place great faith in **science and technology** to help to reduce emissions, and to fulfil the '**legacy**' criteria developed earlier – often arguing against other potential research projects which they regarded as insufficiently technologically-advanced.

This may have been in the context of a fear that the UK may fall behind in technological terms, and be put at a competitive disadvantage as a result. It is also driven by a perception that UK energy researchers should be working at the very **leading edge** of scientific endeavour worldwide, leaving less illustrious competitors to pick up the threads of incremental innovation in existing technologies.

Do they need to do research into energy-efficient buildings? It seems like it's looking for the obvious?

Male, 55+, Warwick

We need to think about technologies that are going to be available for the future

Male, 18-34, Warwick

In the context of the urgency some participants saw in tackling climate change and higher levels of faith in technological, supply-side solutions for energy research, some argued that the decision to fund fusion or hydrogen power did not so much represent an idealistic faith in the power of technology to solve our future energy needs, but rather a '**pragmatic'** response. That is to say that the pragmatic argument for those favouring 'high stakes, high reward' concerned **opportunity cost**; the issue is large-scale and long-term, therefore it requires a large-scale and long-term solution – if

funds are allocated on any other basis, then this opportunity to solve the problem is lost.

> *It takes up a lot of the budget, but it's the only possible way forward.*
>
> Female, 35-54, Warwick

This positioning of 'high stakes' arguments as pragmatic is related to the **perception of risk** articulated by adherents of this position. Some accepted that significant investment in fusion power was not without its potential risks – the technology is unproven, hugely expensive and years away from successful commercial deployment. However, these risks were viewed as being outweighed both by the potential upsides to developing the technology, and versus the greater risks associated with continued global warming, should fusion power not prove successful.

> *We've got to have fusion. It's expensive, but we can't afford not to.*
>
> Female, Warwick

'Safe Solutions'

The second archetypal pattern of response, we have termed '**Safe Solutions'** and was characterized by a strong bias towards the energetic development of renewable sources of energy such as wind or solar power.

Participants arguing from this stance tended to be more concerned about the environmental implications of energy supply, emphasizing renewables, as well as more 'pragmatic' projects with a relatively high chance of success by building on existing mainstream green technology.

As with those in favour of 'High Stakes, High Reward' solutions, however those in favour of renewables tended to favour research into supply-side technologies, but they tended to be more risk-averse, deliberately spreading their research funding over a range of less risky, more incremental projects.

Another strand of argument was in favour of much more sustained investment in renewable energy sources, such as wind or solar power. As with those in favour of investment in fusion power, those favouring renewables tended **to prioritise environmental concerns** as a major driving force behind the investment decisions they made. Those that adopted this 'approach' seemed more likely to have faith in cultural change, especially where enforced by governmental legislation, as having the capacity to solve environmental concerns.

The primacy of environmental concerns here led some participants to argue for a portfolio heavily focused on **renewables**. One of the major advantages of renewable energy supplies were that they represented a 'known known' – improvements on existing technologies and making use of pre-existing and local resources. In this way, some who argued for renewables argued that

these research projects seemed to fulfill the '**quick fix**' criteria, by adapting existing technologies.

> *Personally, I'm a huge fan of solar. It's cheap, it's clean, and the more of the sun we can capture, the better*
>
> Male, 35-54, Warwick

> *Hybrid vehicles have got to be the way to go. You already see the driving round, so we know that the technology works*
>
> Female, 18-34, Warwick

A difference here in the arguments relate again to the **perceptions of environmental risk**. Like those arguing for fusion or other 'High Stakes' research, participants' arguments in favour of renewables research asserted that climate change and environmental degradation represented a significant challenge. However, arguments articulated from the "Safe Solutions" perspective tended to focus more on the need to be careful in our research choices, **concentrating on incremental improvements** rather than placing what some saw as a risky 'bet' on a potentially revolutionary technology with no guarantee of success. In this way, many of the arguments in favour of renewables research were related back to the need for research projects to be **economically realistic** and providing a 'good return' on their investments.

> *The thing about fusion is that 40 years ago it was still 20 years away, and it still is*
>
> Female, Warwick

> *You're putting all your eggs in one basket* [with fusion]
>
> Male, Warwick

This underlying attitude of risk also related to other arguments within this group. In particular, some argued that a pragmatic approach to energy research (given the fact that no project has a guarantee of success), would be to **fund a broad range of different projects** in different disciplines (but heavily weighted towards newer sources of energy, renewables), thus increasing the chances of at least a proportion of projects successfully coming to completion. This is where this strategy starts to mesh with the arguments and stances adopted by that of 'Hedge Betting.

> *Solar could be great, especially on big buildings like the ones round here. Little steps can make all the difference*
>
> Male, Warwick

> *I don't know why fusion takes up so much money, if all the money that's been pumped into fusion had*

been put into renewables, we would have had much more efficient renewable power by now

Male, 35+, Warwick

I glanced through all of them looking at likelihood of success and you could argue if it's not likely to succeed why fund it?

Female, Warwick

Perceptions of risk also impacted funding choices here in terms of the dangers that some participants associated with certain technologies. As throughout the deliberative process, the issue of the safety of nuclear power was contentious, with some arguing that the dangers of a **catastrophic accident or terrorist attack** would outweigh the benefits, while others felt that the risk of not significantly reducing our carbon outputs outweigh this danger.

Whenever I hear 'nuclear', I think bombs and Chernobyl

Male, 18-34, Warwick

Arguments in favour of renewable energy projects also tended to promote investment in research projects dedicated to **behaviour change** – both in terms of altering the behaviour of individuals, and that of government and corporations. Many of the arguments articulated here were similar to those in favour of renewables in "Safe Solutions" – participants saw social research as likely to have a relatively high chance of success, for a relatively low level of financial outlay. They also represent another **'known-known'** – some participants claimed to have already altered their behaviour in response to environmental concerns, and so it is not difficult to conceive of others doing the same thing.

We've got to think about the social impact of these technologies

Male, Warwick

'Hedge Betting'

Another theme was to adopt a rather cautious **"Hedge Betting"** stance, which favoured a mixed approach to spread the risk in their portfolios, involving incremental improvement in existing technologies alongside behaviour change, rather than betting big either on renewables or radical technological 'leaps forward'.

This investment strategy seemed to be based on three broad strands of argument – that we need to see behaviour change on a **national (or potentially global) scale**; that this behaviour change needs to come not only from individuals, but from **business and government** and through economics as well; and that measures to encourage behaviour change

represent a **pragmatic response to the need to reduce carbon emissions** and combat global warming.

The argument that we need to see research encouraging shifts in behaviour at a global level typically started with an assumption that environmental issues, and in particular climate change, represent a global challenge, and so require some sort of global response.

> *We're talking about a global problem and we need a global solution…if we don't get the economics right, nobody's going to do the research into anything*
>
> Male, Warwick

> *You need to people 'this is a war; we're all in it together'. Like the Blitz spirit or something*
>
> Male, 55+, Warwick

Those proposing research projects looking at behaviour change tended to use '**legacy**'-based arguments as a way of forwarding their position, arguing that a shift in the way that we consume energy will provide a more stable consumption pattern for future generations.

Another strand of argument for those advocating behaviour change research is to emphasise that shifts in behaviour need not only be limited to changes at the individual level – **companies and governments** should also change. Typically, this argument was used in respond to critiques that behaviour change represented a 'soft' or unrealistic area for future energy research. Often, those suggesting this approach argued that the job of government should be to provide a framework with incentives for private companies and individuals to reduce their energy consumption.

> *We should be encouraging businesses to be more efficient.*
>
> Male, 35-54, Warwick

> *All of the planners need to get on board with energy efficient buildings. They're very important.*
>
> Female, Warwick

Such arguments sometimes proved unpopular with those in favour of more explicitly 'technological' research projects – since encouraging changes in the way people and markets behave through developing specific policy frameworks represented **a more abstract approach** than, for example, building more wind turbines.

As with those advocating research into other areas, those supporting social research also tended to present their position as a **rational response** to the issues under discussion. The definition of 'rationality' here tends to relate

partly to the extent to which participants **believed that people and societies have the capacity for significant shifts in behaviour**. For those who believe that this *is* the case, the argument for further research into encouraging individuals to make changes to their patterns of behaviour and consumption represents a realistic approach to reducing carbon emissions. For those, however, who believe that changes to lifestyles are unlikely (or indeed undesirable), too much of a focus on behaviour change represents an idealistic, and indeed unrealistic, choice of research. In addition, the time in which it takes people to change may be too slow for the need to reduce CO_2 emissions.

> *People are people at the end of the day, and I don't think that they're really likely to change without, you know, being forced to*
>
> Male, 35-54, Warwick

As with other the axes of disagreement mentioned above, it is important to emphasise here that participants were not usually solely in favour of a single approach at the expense of all others – and indeed some participants argued for the advantages and disadvantages of a broad range of research options.

In the case of social research, participants recognised that this sort of project might be most effectively deployed **in partnership** with other research approaches, and moreover that research into behaviour change is perhaps most effectively deployed alongside other research approaches.

> *We're getting confused between categories. There are hard categories, like technology and technological fixes, and then there are the softer ones. Maybe we can't use the same criteria to judge both?*
>
> Female, Warwick

This approach tended to put greater store in social, research projects than either of the others, based on a confidence in the flexibility of people and markets to alter the way in which they operate. Those arguing from this perspective also tended to be more aware of the potential for a research project to fail, and as such sought to take more of a 'portfolio approach' to the research that they fund, paying for smaller projects and accepting that if one did not come to fruition, others will offset the loss.

Archetypal Responses: Note on Interpretation

We must emphasise that this characterisation of responses is not an attempt to segment or compartmentalize participants into each of these typologies, nor to oversimplify the rich debates that were experienced on the day.

Some participants did adopt one or other of these positions more strongly than others but in most cases any person might combine a particular mix of all three.

These are interpretive overlays onto the raw content of the debates, intended to draw out patterns and themes in the responses to help make sense of the data, and are put forward as hypotheses for further investigation.

5.4 Scenarios to Test the Investment Strategies

Having developed energy research funding portfolios, participants were presented with a PowerPoint presentation of a number of **Scenarios to 2050** (See Appendix). The scenario presentation (based on the work of the Institute for Alternative Futures), presented a number of different ways in which the UK could reduce its CO2 emissions by 60% by 2050.

The scenarios were named as follows:

- 'Big is beautiful'
- 'Small is suitable'
- 'Making do'
- 'Industrial Revolution'

Participants were divided into four breakout groups, and discussed both their reaction to the scenarios, and how (if at all) they might affect the validity or robustness of the energy research investment strategy they had developed previously. The summary table in the Appendices outlines the discussions and disagreements that each of the scenarios provoked.

After debating the scenarios in breakout groups, participants briefly reconvened in a plenary discussion to present their responses to the scenarios and to attempt to identify from all the 'positive' strands of all the scenarios, their 'ideal scenario'.

It should be noted that while they reported enjoying it, participants found this exercise quite challenging conceptually :

Several broad themes emerged from these discussions:

- Major technological, supply-side change were most often associated with positive change.
- Again, climate change and CO2 emissions loomed large as the significant factor on which scenarios were evaluated.

- However, unless this came with environmental safeguards there were significant reservations about sustainability.

- While social and behavioural change was not seen as desirable, it was seen as necessary. However the scenario exercise revealed just how sceptical people are about the scope for a sea-change in lifestyles and environmentally responsible behaviours.

- Despite their earlier rhetoric and evangelism about public change, participants tended to be attracted to those scenarios which did not require them to significantly change the way that they live.

- They were also attracted to situations which assumed that the state would take the lead in promoting energy-saving measures, and research in this area.

- For some, the lack of *guilt* was a major plus point for an ideal scenario, and this was the benefit that would be the result of not having to adapt their lifestyles. In an ideal scenario, government, and technology would come to the rescue, alleviating their concerns about the impacts their lifestyles are having on the planet.

> *We'd get to enjoy our lifestyle.*
>
> Male, 35-54, Warwick

> *We don't have to change massively.*
>
> Female, 18-34, Warwick

It is important to emphasise here that this future does not necessarily represent the scenario which participants thought was the most likely, but the one they found the most attractive. In this context, it is perhaps not surprising that participants opted for an ideal world in which they had the opportunity to continue to live their lives in the manner to which they had become accustomed.

> We have some right to happiness and to enjoy life.
>
> Female, 50+, Warwick

5.5. Q&A Session with Experts

As a final session at the Summit, the energy researchers present were brought forward and public participants were invited to ask them any remaining questions they had about any aspect of the topic. These questions, and the responses they elicited from experts, were captured in order to

learn about where people's outlook on this issue is after extensive deliberation and stimulus.

By comparing these against the issues that participants said they wanted to address at the start of the Summit weekend, we can identify not only the strongest public priorities and demands from the energy research community going forward, but also how successfully the Summit managed to satisfy the public's appetite for information.

"What do you want to get out of the weekend?" Points raised at the start of the Summit	**Questions to experts at the end of the Summit** (minus answers)
1. A lively debate! 2. Greater understanding 3. To learn as much as I can about all the various energy methods – more knowledge 4. Biofuel for poorer countries – and nuclear 5. Clear information on the options for the immediate future 6. More knowledge about energy in the future 7. Better understanding 8. A better understanding of what we as a country are doing to help the environment and research renewable energy 9. Greater understanding of the politico-economic impact of the issues 10. Will future energy costs be more reasonable 11. Information on changes being made in regards to the environmental action being taken by the government 12. How to access independent information in order to make informed decisions 13. To be assured that our opinions actually have an effect on policy 14. To be given perhaps assurances that our opinions will be used 15. To gain more information on	1. How much time / deliberation do you spend deciding the balance between different projects 2. What do you personally feel is the best way to go? 3. How are our (public's) opinions treated? 4. Do you get any grants or subsidies from the EU? 5. What is the funding for the USA? 6. How much is spent by private sector companies and do you welcome it? 7. Is there any aspect of what we've said that is surprising? 8. Will this be a one-off project or will we do more of the same? 9. You mentioned the overlap issue regarding research – how do we avoid duplicating effort in international work? 10. Has the budget risen as we've become more aware of climate change - £70 million doesn't sound enough for crucial research. 11. Does carbon offsetting add anything or is it just a placebo to appease consciences? E.g. Tony Blair 12. Can someone explain the mechanism of global warming? 13. By 2050, in the future, what are your budgets likely to be? 14. Do these scenarios consider drastic environmental degradation?

energy and the future 16. Guarantee energies for the future 17. I have learnt allot about energy and hopefully have achieved something out of it 18. Find out about peoples priorities 19. Specific 'proven' scientific facts 20. Facts and ideas that I may be able to take back – especially to groups I represent in my community 21. Confidence that there is unanimous acceptance by the public of climate change and the need to act now! Dispel doubters. 22. What people understand of the energy crises 23. Information on new types of energy research – where this research is being carried out and its practical viability 24. A personal understanding of what I can actively do to conserve energy 25. Better understanding of public perception of energy priorities 26. Information! Any other reasons for consultation, research directions 27. Satisfactory dialogue 28. Direction 29. Interesting debate 30. Reassurance that nuclear energy is the way forward	15. What are the likely economic of environmental damage? 16. Do we go alone or do we go collaboratively on scientific research – to make up the shortfall in attitudes on climate change among our allies? 17. Is the concept of diminishing returns valid? E.g. complacency of US attitude re responding to change.

These pre- and post-questions reveal a number of issues which point the way towards successful public engagement on energy topics in future:

- A general thirst for satisfying information, debate and understanding about issues relating to energy, climate change, technology and society.
- The demand for more information about climate change in general, and energy choices from the scientific community.
- A desire for clarity and/or reassurance on certain controversial technologies and issues such as nuclear power and biofuels.

- A desire for greater candour and pragmatism about some of the wilder claims made for climate change – both in terms of panaceas (e.g. offsetting) and major threats (e.g. economic impacts).

- A strong demand to have the public's opinions sought and incorporated on a regular basis.

- Criticism and doubts about the level of funding awarded to energy research, although this could have been clearer in the way stimulus material was presented, and may also be to some extent an artifact of the exercises people undertook.

- An interest in scientists talking freely about the uncertainties and personal feelings they have with respect to some of the big energy debates.

- A desire to see greater involvement and investment from other Western countries, particularly the USA.

In addition to this successful, final Q&A session, we allowed time for spontaneous ideas and thoughts to emerge. One participant put it to the rest of the Summit group that they should hear one of the energy experts – Dr Jon Gibbins, Department of Mechanical Engineering, Imperial College, London – give his presentation on the uncertainties and implications of climate change, as a chance conversation between 'expert' and 'participant' on the previous night had led to a discussion of the subject and the participant in question felt that his perspective had altered significantly as a result, towards greater acceptance of the evidence for man-made climate change.

Jon Gibbins gave a truncated version of a fuller presentation and took questions. What was striking, and useful about this interaction was that it seemed to be the dispassionate and matter of fact way in which probabilities and likelihoods of certain climate change outcomes were presented, rather than strident prophesies and predictions, that softened those who had previously been cynics on the issue.

A circumspect, self-critical, but ultimately confident, charismatic and authoritative scientific perspective on the issue came across, which seemed to sit well with the public participants. In the formal evaluation process, participants said they liked the Q&A session and this final section, partly because the scientists involved were not patronising.

However a further learning from the scientists' perspective was not to assume public awareness of certain elements of scientific jargon (e.g. The laws of Thermodynamics), but equally not to let this restrain them from addressing the audience in a forthright, 'adult' way.

Throughout all the interactions with the experts in this and other stages of the event, another major learning was the importance of 'face-time' with real, rather than stereotypical scientists as an essential way to break down barriers and connect people into the issues and world views of the research community. Humour, personal perspectives on science and a friendly, informal, collaborative spirit characterised the researchers' approach to the Summit event. Judging by the mood in the room, this seemed, from an observer's perspective, to have made a powerful impression on the participants' initially somewhat one-dimensional perception of scientists, as being 'experts, but aloof' and the extent to which they felt they could communicate with and understand them.

5.6 Analysing the Summit findings: Axes of Agreement/ Disagreement

As the details of all discussions described above illustrate, debates among participants shifted as different arguments were put forward and discussed. In arguing for areas of energy research, participants negotiated partly through referring to the criteria for prioritising research funding developed earlier – suggesting that certain areas of funding fulfilled to varying extents the criteria for securing our legacy, or for economic efficiency, or helped alleviate environmental concerns.

However, as the sessions continued, it became clear that the criteria could be interpreted and applied flexibly to different types of research. The result was that the extent to which research projects were viewed to fulfill which criteria was not uniform among participants – and indeed often very different projects were seen to fit the same criteria.

For example, a project such as fusion research was considered by some to be a worthy economic investment because it has the potential to mitigate the potentially much higher costs associated with continued environmental damage. Alternatively, however, others argued that the funding required for such a project was in fact too high, and restricted the ability to pay for a broader spread of different research projects – with more likely immediate results. By this logic fusion did not fulfill the criteria for cost-effective research.

The flexibility of interpretation should not be interpreted as implying that the criteria have no substantive value in prioritising different research projects, however. Rather, the way that the criteria were used in debate among participants serves to illustrate a series of deeper underlying debates about how the value of energy research should be judged.

These underlying tensions could be termed the key **axes of agreement/disagreement or uncertainty** on these issues.

Our analysis suggests that there are **two key axes** along which people position themselves and stake out a position, depending on a variety of

immediate contextual factors (e.g. budget constraints, information about project options, other participants in the debate, availability of expert advice) and more **deep-seated factors and assumptions** (e.g. attitudes to risk, prior assumptions about energy technologies, energy research and the threat from climate change, energy insecurity, personality) which we have highlighted in our analysis of the regional workshops, and which was further enhanced by the insight gleaned from the Summit work.

Axes of Agreement/Disagreement

Axis 1: The necessary pace of change

Incremental: building on existing technologies, gradual improvements, quick fixes and achievable short term goals

Vs

Radical: rapid, widespread and/or dramatic transformations in technologies and/or attitudes and behaviours. Heavy weighting on invention and innovation.

Axis 2: The likely source of change

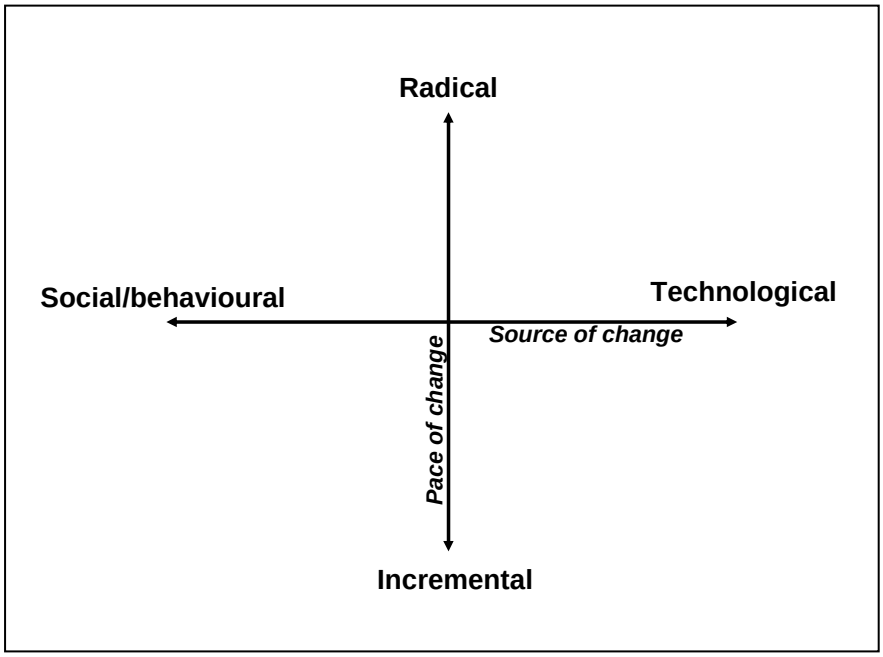
Technological: Arising from new science translating into effective new forms of energy technology

Vs

Social/behavioural: Arising from significant and effective shifts in public attitudes and behaviours.

Mapping these axes against each other allows us to describe a matrix or 'disputed territory' (Fig. XX) within which arguments are framed and people typically manoeuvre when trying to evaluate the merits of both the means (energy research) and the ends (energy technology outcomes) for change in energy.

Fig. XX Public evaluation of energy and energy research: the disputed territory



This disputed territory is likely to **closely mirror** that which is navigated by the energy research community itself as it tries to balance competing needs and demands in order to make investment decisions. Indeed, one of the energy research experts at the Summit commented in the Question and Answer session with participants that he was struck by how – with the exception of the popularity of fusion – the public's debates largely mimicked those of the research community.

We discovered in the Summit how important **budget parameters** were in shaping the public's investment mindset – influencing them towards adopting a richer risk-based approach to evaluation and investment. At the Summit they tended to draw on a combination of financial, economic and environmental arguments to argue their case, rather than the more simplistic and one-dimensional ranking process used at the regionals in which environmental factors were perhaps pre-eminent.

What continued to be the case at the Summit however, was – as one expert observer put it – the '**principled but pragmatic'** way in which the public approached their evaluation. Arguments were made on the basis of pragmatism, efficiency and realizable achievements, rather than purely idealistic or moral grounds.

So, for example, those arguing **for investment in research into solar power** would commonly present their position as a pragmatic one. Solar power is a proven, existing technology – but one which could be improved upon. A certain amount of investment could therefore yield greater efficiency – without requiring the expenditure of the majority of the budget, and

without great uncertainty surrounding the length of time the research project is likely to take, or the expected outcome.

Those arguing **against solar power research**, however, *also* couched their objections in pragmatic terms. Solar power was seen (perhaps misguidedly) as potentially unreliable – particularly in rainy Britain – and as not representing a great enough technical leap forward, when faced with the serious challenges that climate change present to us. In the context of this conception of pragmatism, solar research is more likely to be seen as impractical, or even idealistic, since the outcome of the research will not result in sufficient changes in the way that we supply our energy.

Even those arguing for more radical and uncertain options, such as fusion or a hydrogen economy, explained their views as a pragmatic response to the scale of the problem they perceived (i.e. high urgency) and the high expectations they had for the research community to rise to this challenge (i.e. high agency).

Another feature of this aspect of the debate was that participants gradually made much wider connections between the work of energy researchers and broader social or societal goals than might previously have been the case. For example, reducing fuel poverty to help poorer members of society, decreasing the UK's reliance on energy sources from abroad, contributing to national security, or helping the economy and the science base through developing new technologies which could be employed profitably.

It is the possible way in which both these **underlying assumptions** about the nature of the issue, and more **immediate contextual factors** in the evaluation process, **influences participants' positioning along the axes** described above which provides potentially fertile territory for future research and investigation.

6. Conclusions

This project represented an ambitious effort by Ipsos MORI, on behalf of the Research Councils UK, to understand the public's priorities for future investment in energy research.

While wide-ranging in its scope, and rich in terms of the insights generated, we must be cautious in deriving conclusions above and beyond the already interesting and valuable outputs generated by the public as they debated the various options that were put to them over the course of the three-stage project.

We have therefore divided our conclusions into three sections:

- Firstly, a review of the some of the key **lessons learnt** both in terms of a) the dialogue process itself and b) the outputs and comments generated by the participants in the debates.

- Secondly, a set of **emerging hypotheses** with which to interpret these findings on the basis of our analysis.

- Thirdly, a set of suggested **next steps** for the Research Councils to consider as a way to take this work forward on the basis of the learnings and emerging hypotheses that we have identified.

6.1. Lessons Learnt

In undertaking this task, a number of key lessons have been learnt not only about public attitudes but also about the process of conducting such exercises in a meaningful, thorough and fair way.

6.1.1. Process Lessons

- The value of building and maintaining the quality of engagement primarily through **sustained small-group** contact interspersed with plenary sessions that involve all.

- The **close involvement of experts** at all stages, whose role in the dialogue changes fundamentally depending on the nature of the exercises and the emerging, spontaneous demands of participants.

- The difficulty in balancing the public's high **demand for information** with the danger of overwhelming them with excessive stimulus information, thereby reducing the scope for open-ended deliberation.

- The importance of clearly signalling to participants, at all stages of the dialogue, the **purpose** of each individual step in the process and **how it fits into the whole.**

- The value of creating '**free time and space'** (e.g. graffiti boards, spontaneous/serendipitous encounters, home tasking, improvised presentations) within the dialogue to allow new ideas and dynamics to emerge naturally.

- The need to keep **budget allocation exercises** sufficiently simple, and to allow adequate time, to enable a rich debate to develop without undue pressure to 'complete' or reach consensus if none is emerging.

- The process highlighted the strength of influence exerted by **dominant participants** who had strong opinions on the topic and sometimes a higher degree of specialist knowledge. They would quite often seek to influence other participants in the debates as they frequently felt passionately about the subject. This gives us an insight into the role played by 'lay' influencers in society on this topic, and further research on this topic is recommended.

6.1.2. Dialogue Lessons – Major Themes

- The **climate change** issue is a clearly a central one in shaping public perceptions of energy and energy research. Attitudes to this underpin both the degree to which people perceive that there is 'a problem' with respect to the UK energy portfolio both now and in the future, how urgent it is, and what might be done to address it. The findings from the deliberation seem to mirror in some ways a recent study conducted by Ipsos MORI in which 18% of respondents *disagreed* with the statement 'Humans have a significant effect on the climate', and 56% agreed that 'Many leading experts question if human activity is contributing to climate change'[11]. This scepticism means that justifying expenditure on energy research should not be based on an initial assumption that all members of the public are entirely convinced about the reality of climate change.

- **Technologies arousing major controversy and ambivalence:** Participants are divided on the value of a number of key energy technologies which tended to polarise opinion. In particular people are simultaneously attracted to, but also deeply concerned about **biofuels, nuclear** (fusion and fission –for different reasons) **solar, wind** and measures to instigate **social/behavioural change**

[11] Ipsos MORI, 14th – 20th June 2007, 2031 UK adults 16+

- Technologies and research targets attracting a **high level of appeal and consensus**: include **energy efficient buildings, hydrogen fuel cells/economy, and tidal**

- Technologies arousing **little interest or outright rejection**: include **conventional energy sources, carbon capture** and **fuel poverty** (except as a hygiene measure)

- **Budget:** Questions and concerns were raised over the **seeming lack of state funding for energy research** as a proportion of national spending. Participants were concerned that the Government is not channelling sufficient investment into energy research. However, we must qualify this with the observation that it may be (at least to some extent) an artefact of the dialogue process and the way that stimulus material was presented.

- **Shift from social/behavioural fixes to technological:** a high degree of ambivalence to the notion of social/behavioural change through. In general, a skew towards technological fixes as the panacea. Need for evidence of effectiveness of social/behavioural research and interventions

- **Trust in science:** stereotypical impressions of science persist but confidence in the motives of scientists is high overall. Both these findings are entirely consistent with Ipsos MORI's previous work[12]. However, suspicion prevails with respect to the role and motives of private enterprise in funding science, which again has been seen in Ipsos MORI's work previously (Footnote 11).

- **7 key overarching evaluative criteria** emerge naturally through process. These are: **Ethics and Equality; Economics; Quick Fix; Sustainability; Legacy; Environment; Efficiency.**

- However, these are used implicitly rather than explicitly/mechanistically, and seem to vary in weight depending on their interaction with a wider set of underlying a priori assumptions and contexts (e.g. information, budget, new information, other actors) factors.

- **Environmental impact, legacy and sustainability** emerge from the tasking phase and allocations as being strong criteria, underpinned by sound **economics**. **Ethics and Equality**, whilst important, seem to be relatively secondary factors in comparison.

[12] See OST/IpsosMORI 2004/5 Science in Society; and http://www.ipsos-mori.com/polls/2006/rcp.shtml

- Budgeting exercises highlighted the '**principled but pragmatic'** and utilitarian way in which the public evaluates energy research options. Idealistic or open-ended 'blue skies' approaches are not commonly adopted, especially once budgetary considerations and trade-offs enter the fray. Pragmatism does not necessarily mean 'most likely to yield results', or 'cheapest' in this context, but whether the *cost and likelihood of success of a given project are commensurate with the potential risks involved, or possibility of failure.*

- **Economic, competitive and global factors** rise in salience as evaluative criteria as a result of the allocation exercise, as does the importance of **maintaining a strong science base**

- Three broad themes or archetypes emerge in the way participants evaluate energy research. '**High Risk, High Rewards', 'Safe Solutions' and 'Hedge Betting'** are approaches they adopt flexibly, following a broadly rational, risk-based approach to investment.

- Looking ahead to possible **scenario futures** highlights an underlying discrepancy – that while people pay lip-service to behavioural and social change at the start of the deliberative process, by the end of it they are **strongly attracted by technology-driven options** that do not require them to alter their behaviours significantly. There remains an acceptance however that some changes can be adopted relatively easily as 'quick fixes' (e.g. not using standby buttons).

6.2. Emerging Hypotheses

Over the course of this report we have put forward a number of hypotheses to provide some initial insight into the diverse findings. These are inferences made by the research team on the basis of the findings, and are suggested as the basis for critical challenge, sense-making and further investigation.

These are discussed in more detail in the relevant sections of the report, but are summarised as follows:

Hypothesis 1: The salience and importance of energy research evaluation criteria are driven by the public's variable sense of a) Urgency and b) Agency with respect to the UK's future energy challenges, and by extension, the suitability of energy research programmes to address these challenges. These variables influence the degree to which certain evaluative criteria, energy challenges, and energy research programmes are deemed important and relevant.

Hypothesis 2: By mapping these two value drivers against each other, we can identify loose themes and typologies of thought with respect to participants as they try to grapple with the complexities of this issue. The

model we have constructed provides the basis for future segmentation research.

Hypothesis 3: Participants' sense of Urgency and Agency are influenced by the dialogue experience, by changing the underlying assumptions and immediate contextual factors that condition their response. This has implications for future RCUK communications and science dialogue, as by focusing on key messages (e.g. climate change, the value of social/behavioural research, trust in science), we can anticipate a changing public response on energy priorities.

Hypothesis 4: When it came to a specific and 'real world' budget allocation debate, public agreement or disagreement on funding energy research hinged on two axes: a) The pace of change (incremental or radical) and b) the source of change (social or technological). Together, these axes describe a disputed territory within which participants negotiated, in a manner likely to be similar to that of energy researchers themselves.

Hypothesis 5: As the dialogue exercise altered people's assumptions and knowledge about the topic area, it seemed that both their sense of urgency and agency increased, and that this broadly encouraged a more radical and technology-driven approach to be adopted with respect to energy research priorities.

6.3. Next Steps

The following are suggested to the Research Councils as a set of potential ideas for interventions and actions to consider, on the basis of our findings, analysis and hypotheses|:

- While this research was qualitative and sample sizes too small to create robust segmentations of demographics and attitudes, the hypotheses and frameworks we have provided offer a basis to take this forward into further quantitative research (as for Ipsos MORI's work for the research councils on diet & health research; and on ageing research)[13].

- For now, RCUK can use these hypothetical frameworks to construct 'archetypal' response patterns to energy challenges from the public, and use these to test energy research proposals against likely public response and arguments.

- Going further, RCUK could construct 'rich pictures' of a range of hypothetical members of the public (i.e. based on narratives and

[13] See http://www.ipsos-mori.com/polls/2005/bbsrc.shtml and http://www.ipsos-mori.com/polls/2006/rcuk.shtml

character vignettes) describing a particular set of assumptions, values, priorities and approaches to energy and energy research. These would bring the findings to life and provide a challenge and critical-thinking function to RCUK funding debates. This would be a useful way to bring public voices into RCUK's thinking when it comes to spending reviews. This would also be a useful first step to create a further basis for quantitative segmentation.

- Quantitative research could be undertaken to assess the **relative weighting of the evaluative criteria** – both spontaneously and with alternative question wordings and prompted stimulus materials to assess the impact of a) a priori assumptions and b) contextual factors on urgency/agency and the relative weightings of criteria.

- In addition, or alternatively, quantitative metrics could be devised to map where different members of the public perceive **energy technologies and/or research projects sit within the 'disputed territory' matrix**. I.e. rating hydrogen economy against the dimensions of a) pace of change and b) source of change.

- **Public criteria could be adopted as part of the formal submissions, evaluation and validation process** for all new energy research projects under the auspices of the RCUK. This would provide a transparent and demonstrable link back to public priorities and ensure concerns are explicitly addressed in submissions. This does not imply that decisions must be made on the basis of any particular criteria but lays bare the assumptions and public value of any given project.

- In **order for RCUK to communicate energy research funding choices effectively to the wider public**, it is important not only to outline the potential results of the research, but also the framework underpinning that decision. For example, communicating a significant investment in fusion research should not only include details of the potential advantages or merits of the research (the potential for large amounts of energy with little waste produced), but also the underlying risk analysis or criteria used to justify the decision (for example, the investment in fusion is necessary because it offers the potential to significantly reduce our carbon emissions).

- One way to do this might be to borrow an approach from the financial world: i.e. to provide a published **'fund management portfolio'**, taking the public (as taxpayers) to be the investors. A regular metric could be used to gauge public attitudes across a range of risk, urgency/agency and criteria-based dimensions (as the Financial Services Authority require a risk profile from investors) and RCUK could publish a document for public consumption on a regular basis with explanation of the level of risk which the 'portfolio' has taken on

and the underlying analytical assumptions (e.g. climate change, resource scarcity) and contextual factors that have shaped these decisions. Annual energy 'shareholders' meetings to invite the public to talk to the RCUK and question them on their stewardship of the 'fund'.

- **RCUK to provide more rich 'human' interaction with energy research community.** Giving researchers a stronger public platform using events, website, personal testimonies (e.g. as in our tasking pack) to illustrate the uncertainties, enthusiasm and variation of opinion within the research community, and to help the public identify more strongly with the research community and scientists operating in the field, leading to increased trust.

- **Provide an overarching narrative about the way the Research Councils see science and technology working**. I.e. the degree to which, if at all, the axes of agreement between incremental vs radical and social vs technological are real or artificial tensions in the way the science moves forward. Articulate how a 'full-spectrum' approach would work to marry these divergent perspectives.

- Provide more **information/justification for social and behavioural energy research programmes** – to counter scepticism of behaviour change work.

- Use the findings provided as the **basis for submissions for increased state funding for energy research.**

- **Communicate the findings more widely** through the research community to enable them to incorporate these into their submissions for funding, thereby increasing the public accountability aspect of these submissions.