HM Government

BERR | Department for Business Enterprise & Regulatory Reform

MEETING THE ENERGY CHALLENGE

The Future of Nuclear Power: Analysis of consultation responses

JANUARY 2008

Contents

Introduction

The consultation on the Future of Nuclear Power sought views from a wide range of different people, groups and organisations.

The consultation responses, resulting from a number of different consultative processes, have been analysed separately by consultants contracted by the Department for Business, Enterprise and Regulatory Reform (BERR). This document brings together these reports and also explains the consultation process in more detail.

This report is therefore broken down into four parts:

Part One: An overview of the consultation process

Part Two: Report by Dialogue by Design: Analysis of the written responses to the public consultation

Part Three: Report by Opinion Leader: Analysis of the findings from the deliberative events with members of the public

Part Four: Report by Henley Centre HeadlightVision: Analysis of outputs from the Nuclear Consultation Stakeholder Meetings

This analysis document should be read alongside the formal Government response to the consultation which is the White Paper on Nuclear Power URN 08/525.

PART ONE

The Future of Nuclear Power – An overview of the consultation process

1.1 This chapter sets out the rationale for the public consultation undertaken by the Government on the future of nuclear power. It gives a detailed account of the design and the running of the consultation.

Background

1.2 The Government concluded in its 2003 Energy White Paper:

> *"Nuclear power is currently an important source of carbon-free electricity. However, its current economics make it an unattractive option for new, carbon-free generating capacity and there are also important issues of nuclear waste to be resolved. These issues include our legacy waste and continued waste arising from other sources. This white paper does not contain specific proposals for building new nuclear power stations. However, we do not rule out the possibility that at some point in the future new nuclear build might be necessary if we are to meet our carbon targets. Before any decision to proceed with the building of new nuclear power stations, there will need to be the fullest public consultation and the publication of a further white paper setting out our proposals."*

1.3 In January 2006 the Government undertook an energy review, which assessed progress against the goals set out in the 2003 White Paper and the options for further steps to achieve them. This led to the publication of the Energy Challenge Report in July 2006.

1.4 Following the publication of the Energy Challenge, Greenpeace brought a successful Judicial Review in respect of the conclusion Government reached on new nuclear build. In the Judicial Review Mr Justice Sullivan concluded that the legitimate expectations of Greenpeace of the fullest public consultation had not been met and that accordingly the conclusions that the Government had reached on nuclear power could not be validly drawn. In response to the ruling, the Government accepted that it should conduct a public consultation before reaching a final view on the future of nuclear power. It therefore launched a new consultation on 23 May 2007 setting out the Government's preliminary view on nuclear power.

1.5 This consultation explicitly took account of the High Court ruling and the Government's commitment in 2003 to the fullest public consultation.

Framing the consultation and setting objectives

1.6 In framing any consultation, best practice attaches importance to determining and to communicating precisely the nature of the consultation i.e. to clearly indicate which aspects of the policy the Government is seeking views on. To meet this requirement, the Government sought to make two matters clear.

1.7 First, it was a consultation about the possible role for nuclear power within the energy policy framework set out in the 2007 Energy White Paper, not a consultation on energy policy itself. The consultation document on the future of nuclear power was launched in parallel with the Government's 2007 Energy White Paper. The White Paper set out that tackling climate change and ensuring future energy security are the primary considerations in determining the shape of future energy policy, including the role of future nuclear power. Consequently, the nuclear consultation was framed in the context of evaluating the need for future nuclear build in the context of mitigating climate change and ensuring energy security.

1.8 Second, the consultation made it clear that the Government had reached a preliminary view. Over the previous two years the Government had reviewed the issue of nuclear new build extensively and as a result formed an initial view that it would be in the public interest to allow new nuclear build. As a result, this consultation was about the Government's initial view and was designed to test the view and its underlying reasoning with the public and stakeholders.

1.9 The Government framed the consultation as follows:

- The Government has a preliminary view on the future role of nuclear power within the UK energy mix but has not yet decided; this view is that in the context of climate change and ensuring energy security it would be in the public interest to give private sector energy companies the option of investing in new nuclear power stations.

Design of and objectives for the consultation process

1.10 The Government set itself the following overarching objectives for the consultation process on nuclear power:

- To enable and facilitate a consultation which meets the commitment of the 2003 Energy White Paper to the fullest public consultation;
- The Government wishes to consult citizens and interested parties for their views and concerns relating to the arguments it has presented;
- For each strand of activity, to listen to and consider the views of those participating, and to be transparent in the reporting back process.

1.11 The design of the consultation process was guided by the above objectives and informed by the requirements of the Cabinet Office Guidance and BERR's own internal guidance on consultation.

1.12 The Government reviewed other previous large-scale consultations to understand what worked well and to apply best practice.

1.13 The Government's primary concern was to allow for a full consultation that would enable stakeholders as well as the wider public to respond meaningfully. The Government was also determined to seek views not only from its "usual" stakeholders but from as wide a range of people as possible.

1.14 As a consequence the Government decided to utilise a range of consultative methods:

- The foundation of the consultation was the Government's consultation document, The Future of Nuclear Power, which it published on 23 May 2007. The document set out the evidence the Government had considered in forming its initial view and presented 18 questions that sought views on the evidence and arguments the Government had drawn on and the conclusions it had reached regarding the future of nuclear power. All consultative methods used drew primarily on the content of the consultation document and the evidence it presented.
- A dedicated website was designed to enable people to respond to the consultation document not only in writing but also online.
- The Government considered the most appropriate way of engaging the wider public, particularly those not normally engaged in such processes. The Government wanted to understand the views of the public after they had heard the key arguments in the consultation. Specifically, we wanted to ensure we understood the issues in relation to nuclear power that members of the public were concerned about. In the context of these objectives we considered other large scale consultations such as the 2003 GM Nation debate on genetically modified crops, the 2004 Department of Health consultation Your Health, Your Care, Your Say and the 2006 National Pensions Debate run by the DWP as part of the consultation on the Turner Commission proposals. All had deployed large-scale deliberative events to gain the views from representative samples of the UK population. We concluded that such deliberative events would be well suited for this consultation as they engage the wider public on a complex technical or scientific issue, enabling discussion about trade offs and conditionality and providing a detailed picture for policy makers on the issues that concern citizens most. In reaching our decision in response to the consultation we have considered those issues and we have also considered to what extent existing policy, or developments of that policy, could address those issues.
- In addition, the Government wanted to hear from a diverse range of regional and national stakeholder groups to ascertain views on the specific issues raised in the consultation document. It was decided the most appropriate way of engaging such stakeholder groups was through a series of stakeholder meetings.

- A key concern for the Government was also to engage with those who live near nuclear power stations. For this reason we decided to engage interested parties representing communities living near nuclear power stations through a series of site stakeholder meetings.
- The Government also put in place a range of advertising and awareness raising measures to ensure that anyone who wanted to participate was able to.

Timetable

1.15 In light of the above objectives and the consultative measures selected, the Government reflected on the most appropriate length for the consultation process. The Cabinet Office guidance on consultation states that departments should generally allow a minimum of three months. However, given the complex nature of the consultation subject, the extensive range of consultative measures adopted and the fact that the consultation would run over the summer holidays the Government felt it appropriate to allow for a 20-week consultation period. The Government believes that the allocated 20 weeks did allow for a substantive consultation and did ensure all the consultative measures identified were undertaken.

Budget

1.16 Once the objectives for the consultation were agreed and the most suitable consultation methods identified the department allocated a total budget of £2.4m for the implementation and running of the consultation and subsequent collation and analysis of consultation responses.

Management structures and strategic partners

1.17 The consultation was owned and conducted by BERR. A small team, led by a senior civil servant, was established. The remit of the team was to design the consultation process and to ensure the objectives of the consultation were met within the timetable and available resources. An important role of the team was to secure critical partners in implementing the consultation.

Central Office of Information (COI)

1.18 BERR appointed the Central Office of Information (COI) to work closely with the department throughout the consultation process, from the initial design work through to the procurement of specialist suppliers in order to ensure that the project was effectively managed. The COI acts as the centre of excellence for marketing in the public sector, providing advice and procurement solutions across all communications and media on behalf of government departments and agencies. COI provided strategic consultancy advice during the initial planning stages of the

project, and as the consultation progressed ensured that BERR was able to meet its objectives.

1.19 Specific areas of work for COI have included:

- Strategic advice and guidance for BERR on the design and structure of the deliberative events with the public;
- Guidance and operational support in facilitating the stakeholder events and summarising the outputs;
- Procurement and management of specialist suppliers and contractors;
- Strategic communications advice and guidance;
- Delivery of a marketing communications plan;
- Procurement and management of the independent evaluator;
- Advice and support with project planning and management.

1.20 The COI have utilised a core team of four experienced strategic marketing and research consultants to work on the project, and this was supplemented by other COI staff when specialist skills were required (e.g. events management, execution of marketing communications programmes, video filming, etc).

1.21 Project management support was provided by COI in the form of a full-time project manager.

Procurement of specialist suppliers

1.22 COI has a broad range of Framework Agreements with contractors who are able to provide a wide range of marketing and communications solutions. These are organised by area of expertise and enable government departments to access specialist services in a way that is cost effective and efficient. Suppliers compete openly for inclusion on one of COI's Framework Agreements and this pre-qualifies their services should the Government require them.

1.23 BERR made use of COI Framework Agreements to procure specialist contractors in the following areas:

- Market research – Opinion Leader and Dialogue by Design
- Event production and management – M (previously known as Mice)
- Video film production – RSA
- Analysis and reporting of stakeholder findings – Henley Centre HeadlightVision
- Independent evaluation – Shared Practice

1.24 As part of the tender process, a panel of BERR and COI officials reviewed written proposals and took part in face-to-face pitches where appropriate before appointing the successful contractor.

Strategic communications

1.25 Strategic advice and planning support was provided by COI for the marketing communications programme to raise awareness of and encourage participation in the consultation. The COI team developed, in conjunction with BERR, the marketing communications strategy, and

then delivered each element of the programme using COI specialist departments (for example Publications for design and artwork, Direct Response for the mailings and Media Advertising Services for the press campaign).

Implementing the consultation process

1.26 There were four main elements of the consultation:
- The written consultation process
- The website
- The stakeholder events
- The public events

1.27 In total 2,728 people or organisations submitted a response to the consultation. The majority of these were submitted online (2043) but people also sent responses by post or email (685).

1.28 The majority of those who responded were individuals (1,784). Full analysis of participant type is available in the Dialogue by Design report, (Part Two of this document).

A written consultation process

1.29 A consultation document, 'The Future of Nuclear Power' was published on 23 May 2007. The document was available electronically, as a hard copy, in Welsh, Braille, large print and audio. In total approximately 5,200 copies of the documents were distributed or mailed out during the consultation period. A further 29 were distributed in Welsh, 13 in large print, 8 in Braille and 3 in audio.

1.30 When people requested a hard copy of the document they also received a Response Form. The form was designed to enable handwritten responses.

1.31 A freepost address was set up to enable those who wanted to respond by post to do so free of charge. In addition a dedicated telephone number was established for people to direct their queries to. This telephone number was publicised in the consultation document and at all our stakeholder events.

Consultation website

1.32 A dedicated website was set up to enable people to respond to the consultation document online. The website went live on the same day the consultation document was published and was available throughout the consultation period. The web address is www.direct.gov.uk/nuclearpower2007. The site was designed and managed by Dialogue by Design.

During the consultation

1.33 The website was designed to make the consultation document more accessible. The material in the formal consultation document was broken down into sections that respondents could click through easily and each question had an accompanying dialogue box for the answer to be entered. All text shown on the website was identical to the published consultation document. The site met the AA+ standard of disability access. The website included an email address and telephone number where people could direct any queries to.

1.34 During the consultation the site had approximately 46,000 unique visitors of which approximately 5,200 were returning visitors.

1.35 To take part in the online consultation users registered and were then given a unique name and a password. Over the course of the consultation 3,800 people registered on the site. The site was designed to be flexible so, once registered, participants could input their response directly online and throughout the consultation they could print, edit and update their submission. Only once the consultation was closed were participants' submissions considered to be final. Before the consultation closed all those registered were sent an e-mail to remind them that they had a few weeks to complete their response.

1.36 The website also included a section where the summaries of the stakeholder events as well as materials used during the consultation were published.

After the consultation

1.37 The same website has been used to publish all written responses in a way that allows people to view the data by question and theme as well as by specific submission. This ensures that the data received can be considered in an organised and systematic way.

1.38 The responses can be viewed by anyone visiting the site. To make the consultation as open and transparent as possible respondents' names are published alongside the associated response. However, in line with standard Government practice, respondents were given the option of requesting confidentiality. In total 261 confidential responses were submitted which have not been published.

1.39 In addition the consultation site includes materials received from respondents during the consultation such as articles or other documents which were not submitted as formal responses but contained useful information in respect to the subject matter.

Collation of responses

1.40 All responses received (whether online, post, email or fax) were managed in the first instance by Dialogue by Design. Each response was read carefully to discern whether the respondent agreed or disagreed with the Government's proposition and what further arguments they presented. Full explanation of the methodology used is set out in the Dialogue by Design report of this document.

Deliberative events with the public

1.41 The objective of the deliberative events was to engage a demographically representative sample of UK citizens in an informed debate and to enable the Government to understand the views of such people on the Government's preliminary view on nuclear energy as outlined in the consultation document.

1.42 Opinion Leader on behalf of the Government led nine deliberative events with 949 participants across the UK on 8 September 2007. The events took place in Edinburgh, Newcastle, Liverpool, Leicester, Norwich, Cardiff, London, Exeter and Belfast. Citizens were recruited to be demographically representative of the UK population. (See the Opinion Leader report in Part Three of this document for further details).

1.43 The content for the deliberative research was developed by Opinion Leader with the main source of material being the formal consultation document prepared by BERR. Events management support for these events was provided by M, a specialist events management company. As part of the deliberative work, Opinion Leader convened a Citizens' Advisory Board to provide input in terms of the structure and agenda for the deliberative day, as well as to ensure clarity of any stimulus material prepared.

1.44 In addition, BERR commissioned Richard Harris of 3KQ to gather the views of a range of stakeholders on the materials that were presented at the deliberative events.

Developing the stimulus materials

1.45 The aim of the stimulus material was to inform participants of the Government's preliminary view and to allow them to respond in an informed way. Materials included information handouts, a 'pub quiz' and a number of short videos. To ensure all participants received the same information, table moderators read out selected pieces of information from handouts during the discussion sessions.

1.46 The main source of the stimulus material was the formal consultation document prepared by BERR. Opinion Leader provided initial drafts of all materials that were reviewed over a three-month period by COI and BERR officials. The materials were also reviewed twice by stakeholders and by the Citizens' Advisory Board. Draft stimulus materials were also tested at a development event to ensure they were accessible to the general public.

1.47 A number of key stakeholders were invited to comment on the materials at two points in the process. Firstly, a stakeholder workshop was convened on 13 July 2007. The workshop was designed and facilitated by an independent convener (Richard Harris of 3KQ). Stakeholders were identified by 3KQ in consultation with BERR and invited to attend by 3KQ. A copy of the draft materials was supplied to attendees in advance. The organisations represented at the workshop

were: Greenpeace, SERA, Friends of the Earth, Environment Agency, Nuclear Industry Association, British Energy plc, EDF Energy, GMB, Unite, Nuclear Decommissioning Authority, CBI, Renewable Energy Association, Cardiff University, UK Sustainable Development Commission, COI, BERR, Opinion Leader and Shared Practice (the independent evaluator; attending in observer capacity).

1.48 Comments made during the workshop were recorded by 3KQ and the transcript was sent to all attendees. Opinion Leader also sent a note outlining the key actions being taken as a result of the workshop. In addition, attendees were invited to submit detailed comments in writing on the draft materials.

1.49 The second opportunity for stakeholders to review the materials took place when all those who had attended the workshop were sent a revised draft for their comments.

1.50 In addition, a selected number of those stakeholders (Unite Union, CBI, Nuclear Industries Association, Greenpeace, and Renewable Energy Association) were also invited to present their views in the videos to be shown to participants at the events, in order to represent a range of views on the issues. However, the Greenpeace contribution had to be removed the day before the events when they, along with other environmental groups, announced in the media that they were withdrawing from the consultation process and requested their contribution not to be shown. Due to the short notice of this announcement, it was not possible to film another stakeholder from the green lobby to replace the Greenpeace contribution, so a voiceover was used instead to reflect the Greenpeace position.

CAB and Development event

1.51 The Citizen's Advisory Board (CAB) was made up of 12 members of the public whose primary role was to provide comments on stimulus materials to assess its accessibility. The CAB convened three times to fulfil this role.

1.52 In August, a development event took place with 30 members of the public who were recruited to ensure that they broadly reflected the demographics of the UK. The development event took place after the completion of the three CAB meetings to provide further opportunity to review materials and the structure of the day and thus make refinements based on real-life experience.

The running of events

1.53 During forum sessions, the facilitators took notes of the table discussions using a proforma on a laptop computer. The proforma contained a number of set prompts exactly following the discussion guide and space to enter notes under each discussion section. After the event, Opinion Leader took all of the notes taken by table facilitators and organised them into a grid. Each table's notes (collected within the proforma) were given a row in the grid, and each column

referred to a specific discussion session of the day. The approach allowed the totality of responses on a single area/question to be looked at. Following this, key themes were identified from each discussion session and these themes provided the basis and structure for writing core sections of the report on the deliberative events.

1.54 A number of note takers were present at each of the events to capture verbatim comments to reflect the range of discussion taking place at each event.

1.55 Quantitative data was collected at various points of the day to aid the understanding of any changes in the participants' views. The use of individual voting keypads for this purpose with the data collected electronically meant that individual responses could be linked directly to the demographic data of each participant. This also enabled quantitative data to be analysed against key sample variables and any significant differences highlighted.

Observers

1.56 Stakeholders who attended the stimulus workshop on July 13 were invited to observe one of the deliberative events. Additionally, invitations were extended to other parties known to have an interest in the events or who had pro-actively requested to attend. No request to observe an event was turned down.

1.57 In total, 28 observers attended the events. They were provided with guidelines before they attended which encouraged them to watch rather than contribute to the participant discussions.

1.58 At the end of each deliberative event, a copy of the consultation document was made available. A leaflet with a list of organisations where participants could gain more information, and advice on how they could respond to the consultation document was also handed out.

1.59 A summary of the key themes from the day were published on the BERR website and e-mailed or posted to participants within two weeks of the events taking place.

Stakeholder events

1.60 A series of events with interested parties were held across the UK during the consultation period.

1.61 These meetings fell into two categories:

- Meetings with representative organisations in the regions and devolved administrations.
- Meetings with community groups, near existing nuclear sites.

Meetings in the regions and devolved administrations

1.62 These events gave representatives of organisations and groups the opportunity to hear more about the consultation and to voice their views or use the meetings to help them draft their written response. In total thirteen of these meetings were held, one in each of the English regions and devolved administrations.

1.63 To enable a full and open discussion, comments made during the meetings were recorded but not attributed to individuals.

Invitations

1.64 Local authorities, businesses, non-governmental organisations, unions and other community-based organisations were invited to participate. The invitation list was principally sourced via the Regional Development Agencies, the Government Offices, and from the devolved administrations. Large umbrella organisations (for example the British Chambers of Commerce and Friends of the Earth) were approached to ask if they could disseminate the invitations through to their regional representatives. Additional desk based research was undertaken to identify faith based organisations and other community groups in each region. The policy was to enable as many representatives from a wide range of organisations to attend and where groups recommended additional participants, they were invited and encouraged to attend.

1.65 In total, only two people were turned away from the meetings throughout the consultation. This was at the Manchester event, which was already over subscribed. These people were invited to attend a subsequent event at a different location.

1.66 Approximately 3,350 invitations were sent out and over 400 attended the meetings. (A complete list of those organisations invited and those who attended can be found on the nuclear consultation website www.direct.gov.uk/nuclearpower2007). Invitations were followed up with a reminder email and also a phone call to encourage attendance. Once people registered to attend, they were sent a registration pack which included logistics for the event and a copy of the consultation document. Occasionally, by necessity (for example when an individual registered late or had been invited at the suggestion of another stakeholder) the registration pack and consultation document were sent out with short notice.

1.67 The meetings took place in the locations and dates below:

Region	City	Date
North East	Newcastle	23 July
Yorkshire	Leeds	24 July
North West	Manchester	25 July
West Midlands	Birmingham	26 July
East of England	Cambridge	27 July
South West	Bristol	30 July
East Midlands	Nottingham	12 September
London	London	13 September
South East	Reading	14 September
Northern Ireland	Belfast	17 September
Wales	Cardiff	19 September
Scotland	Glasgow	21 September

1.68 Following a specific request, an additional meeting was held for faith groups in Carlisle on 20th September.

Logistics and format

1.69 The events were managed by M who secured the meeting venues and were responsible for registration, staging, catering and recording of the plenary discussions.

1.70 The July events started at 10am and finished at 12:30pm, followed by lunch. Participants at the July events thought the meetings too short and as a result we extended the meeting times for our September events to 13:00, followed by lunch. At each meeting participants were given a pack which included an attendance list, copies of the presentations and an evaluation form (which they were asked to complete at the end of the meeting). Additional copies of the consultation document were also available.

1.71 All the events followed the same format and were designed to give the most time for participant discussion, enabling the Government to listen. The agenda for the meetings is included in the stakeholder analysis report from Henley HeadlightVision (Part Four of this document). A senior BERR official led the facilitation at each of the events.

1.72 Participants sat at round tables and each table had a facilitator equipped with a laptop computer. BERR officials gave three short presentations:

- Overview of the consultation process, followed by Q&A;
- Why the Government is considering new nuclear, followed by table and plenary discussion
- Waste, security and safety, followed by table and plenary discussion.

1.73 Points made during the table discussions were captured by the table facilitators on a laptop, using a proforma. Following the table discussions a plenary discussion was managed by the lead facilitator. All comments during the plenary discussion were recorded and a summary published on our nuclear consultation website.

Protests and withdrawal from some Green NGO's

1.74 Following the withdrawal of a number of environmental organisations from the consultation on 7 September the events at Nottingham and Glasgow had small protests which attracted local media interest. Also, participants from Greenpeace and Friends of the Earth who had registered did not attend any of the September meetings. Other stakeholders registered their disappointment that these groups were not present. Their absence from some of the meetings meant that a more vigorous opposing view was only present in a very limited form.

Meeting outputs

1.75 Following each of these meetings, a summary of each discussion was posted on the consultation website. Full analysis of the outputs from these meetings has been undertaken by Henley Centre HeadlightVision and their report is included in this document.

Site Stakeholder meetings

1.76 To help understand the views of those who live near nuclear facilities a series of meetings were held with existing community groups located near such sites.

Invitations

1.77 In inviting the community groups BERR worked closely with operators (both British Energy and the NDA). The operators liaise regularly with their local community through both the site stakeholder groups (SSGs) and the Community Liaison Councils (CLC) as well as wider networks, and therefore using these existing channels of communication was considered the most effective way of disseminating the invitations. On all occasions the operators ensured that all SSG / CLC members were invited and they also extended the invitation to wider interested parties, for example local schools and church representatives. In addition, for the meetings near Heysham, Torness and Wylfa, the meeting was advertised in the local press. This approach was consistent with what the sites would usually do before a community meeting.

1.78 528 invitations were sent out and in total approximately 200 attended the meetings. No one was turned away from any of these meetings.

1.79 Meetings were held at or near operational sites across the UK.

Site	Meeting venue	Date
Hinkley	On site	15 August
Heysham	In hotel	17 August
Dungeness	On site	20 August
Hartlepool	On site	30 August
Sizewell	On site	31 August
Hunterston B	On site	25 September
Torness	On site	26 September
Wylfa	On site	27 September
Bradwell	In hotel	3 October

1.80 The meetings were held in the same venues where the local SSG or CLC meetings would be typically held.

Logistics and format

1.81 For the meetings in August the consultation document was not mailed out in advance, but due to the feedback received, the document was distributed for the events in September. Where people were late in their registration for the meeting, they were sent an email suggesting they look at the document online.

1.82 The meetings adopted the same format and agenda as that of the meetings in the regions and devolved administrations. Table facilitators recorded the table discussions. The plenary discussions were not recorded and transcribed but were captured by the facilitators on laptops who completed a pre-designed proforma.

Meeting output

1.83 Following each of these meetings, a summary of the discussions was posted on the website. Full analysis of the outputs from these meetings has been undertaken again by Henley Centre HeadlightVision and their full report is included in this document.

Other meetings

1.84 BERR undertook a number of other meetings where officials either raised awareness of the consultation by presenting the Government's preliminary view or where views from participants were explicitly sought.

1.85 These meetings included: speaking at the Annual Sitting of the Youth Parliament; speaking at the stakeholder event organised by the Energy Institute; a presentation to the Prospect trade union; a lunch with representatives from banking and finance companies; and a meeting in Whitehaven, West Cumbria with local community representatives. In addition key stakeholders were invited to a ministerial roundtable meeting with the Secretary of State where they were invited to discuss the issues in the consultation document.

Awareness raising – Marketing Communications

1.86 There was also a programme of marketing communications activities to support raising awareness of the consultation and to encourage response from members of the public.

1.87 Previous consultations have used similar communications activity to encourage participation. For instance, 'National Pensions Debate' advertising was placed in the national press, and 'Your Health, Your Care, Your Say' promotional activity was undertaken in consumer magazines. Additionally, both The GM Debate and Your Health used media partnerships to drive awareness.

1.88 The over-arching aim of this activity was to raise awareness amongst people who do not normally get involved in a public consultation, and to encourage response to the consultation.

Activity and audiences

1.89 The target audience for marketing communications activity was defined as 'All UK Adults' given the need to drive broad awareness, as well as the consultation being of interest to everyone living in the UK.

1.90 Additionally, as approximately 35% of the UK population do not use the internet (MORI, 2004), the strategy included specific approaches to reach such audiences and encourage response.

1.91 In summary, the communications strategy had five key elements:

- National press advertising plan
- Google paid-for search marketing activity, supported by presence on BERR and Directgov websites
- Mailings to some 5,000 grassroots organisations
- Mailings to all UK Libraries on the DWP Publicity Register
- Media relations activity

National press advertising plan

1.92 The objective was to ensure the consultation reached a wide range of audiences and encouraged participation. Overview of activity undertaken:

- National Print was selected due to the medium's ability to effectively reach a broad UK audience, as well as including those who are not currently online;
- Announcement style adverts were placed in national newspapers between 30 July and 8 September (the end date coincided with the citizen deliberative events);
- The advert had a clear call to action of encouraging people to share their views via the consultation site or by ordering a paper version of the consultation document;
- Two bi-lingual (Welsh/English) ads were placed in the Western Morning News and Liverpool Daily Post (Welsh edition).

Results

1.93 The campaign achieved 72% coverage of the target audience over the period, at an average of 4.1 opportunities to see (OTS). This compares to the target of minimum 60% coverage, and breaks down regionally as follows:

- England: 73.3% coverage at 4.1 OTS
- Scotland: 81.4% coverage at 4.3 OTS
- Wales: 70.6% coverage at 3.6 OTS

1.94 In total, 60 inserts were placed with 93% appearing within the first half of the newspaper, helping to drive standout (An example of the advert is at Appendix 1).

Google paid for search marketing

1.95 The objective was to ensure the consultation site had a strong online presence and to drive Internet traffic to the consultation site. Overview of activity undertaken:

- Search terms relevant to the consultation were sponsored, meaning that when people place them into a search engine a link to the consultation appeared either on the right hand side or top of the search results.
- To help achieve cost effectiveness, the activity was restricted to Google, which accounts for approximately 60% of all UK search engine traffic.
- The campaign started on 13 June and ended on 10 October.

Results

1.96 The campaign drove a total of 15,170 clicks at an average cost per click of £0.98. This cost per click is slightly higher than that of similar COI campaigns, due to the highly competitive nature of generic search terms sponsored. These included:

- "Nuclear power", which generated 5931 clicks
- "Nuclear", 1162 clicks
- "Power stations", 556 clicks

1.97 The conversion rate of clicks to arrival at the consultation site was 69.7%, equating to 10572 arrivals.

Additional supporting activity

1.98 The Google search activity was also supported by presence on both the BERR and DirectGov sites:

- A link to the consultation site was placed on the BERR homepage throughout the consultation period
- The consultation was featured on the homepage of DirectGov between 23-31 May 2007, and on the DirectGov public consultations page for the duration of the consultation.

1.99 During the first week of the consultation, 1099 visitors clicked through from the DirectGov site to the consultation site. Of these, 90% came from the DirectGov homepage and 10% from the DirectGov consultation page. There were also 765 visits to the news page about the Energy White Paper.

Mailing to grassroots organisations

1.100 A mailing (either posted or via email) was sent in June 2007 to regional or local organisations who might have an interest in the consultation. The mailing was designed to notify the organisation of the consultation and encourage them and their members to share their views via the website or by ordering a copy of the consultation document.

1.101 Almost 4,500 mailings were sent to regional and local organisations, broken down as follows:

- 1,400 regional or local umbrella organisations, ranging from local authorities, community groups, NGOs, professional institutions
- 3,100 individual groups, ranging from faith and youth groups to environmental groups.

1.102 The database of contacts used for the mailing was held by Dialogue by Design, who had gathered the information from publicly accessible lists.

1.103 Additionally, information about the consultation was included in the June edition of the Nuclear Decommissioning Authority's (NDA) regular newsletter. This was sent to 229 NDA contacts via the NDA convenor.

Mailing to all UK libraries on the DWP Publicity Register

1.104 To drive awareness of the consultation and increase access to the consultation document we placed promotional material and a copy of the consultation document in all public libraries that have indicated they are willing to display Government communications. Overview of activity undertaken:

- The DWP Publicity Register contains details of a range of organisations or institutions that have agreed to receive and display government information. One of these groups is libraries, of which there are approximately 1,500 on the Register.
- The mailing was sent to all 1,500 libraries in June 2007, and consisted of: a consultation document for librarians to place in their libraries; 2–3 copies of a poster to display on library noticeboards, containing information about the consultation as well as how people could respond; (a copy of the artwork is contained at Appendix 2); a covering letter from BERR.
- This was followed up by a second mailing wave to Welsh libraries in August 2007 of a Welsh version of the consultation document (the English version of the consultation document had already been sent to Welsh libraries in June 2007).

Evaluation

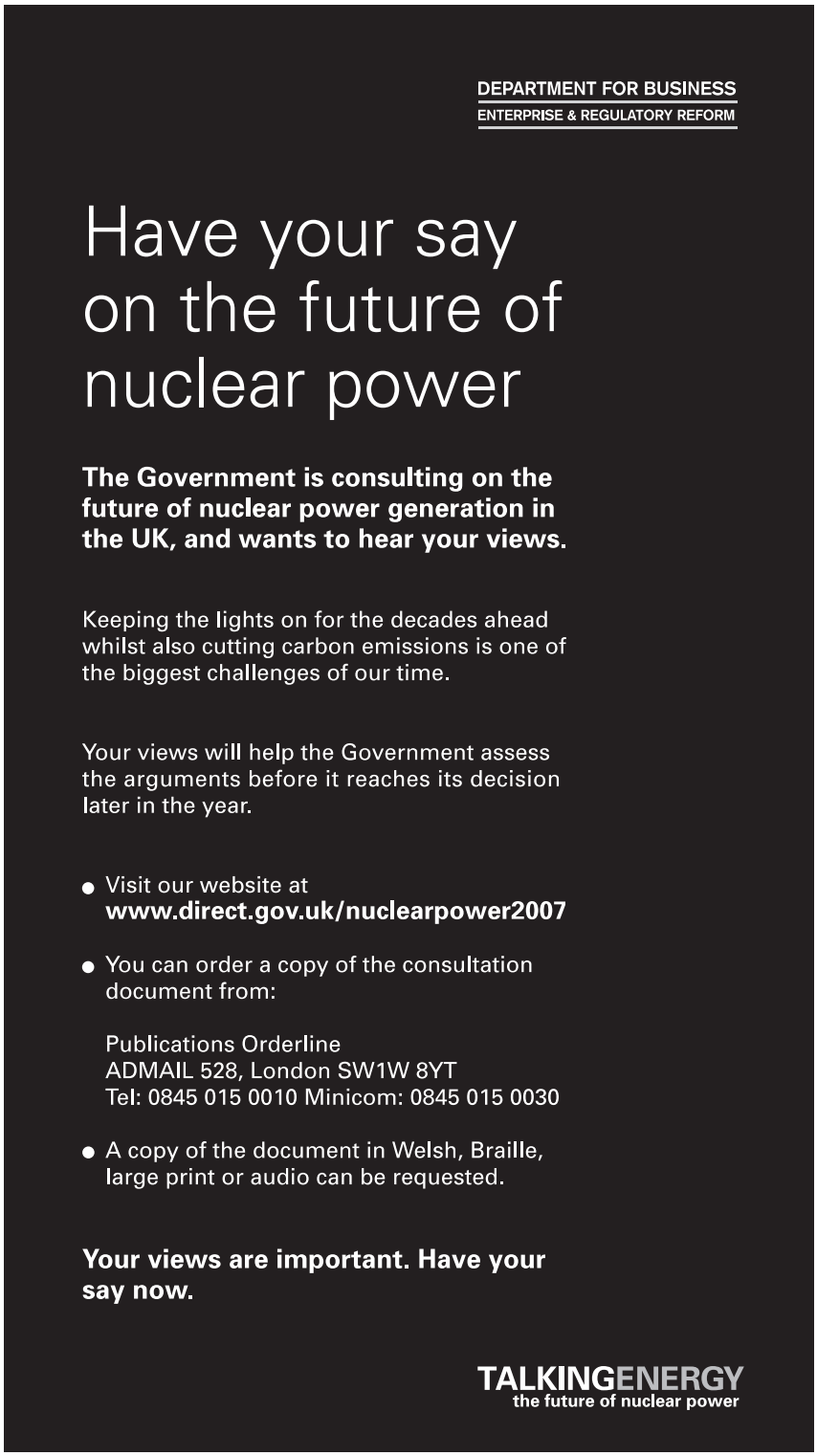
1.107 BERR through COI contracted Shared Practice to undertake a full and independent evaluation of the consultation process. The purpose of the evaluation is twofold:

- To assess whether the department has achieved its objectives
- To gain understanding and learning for the future.

1.108 A full evaluation report will be published once completed.

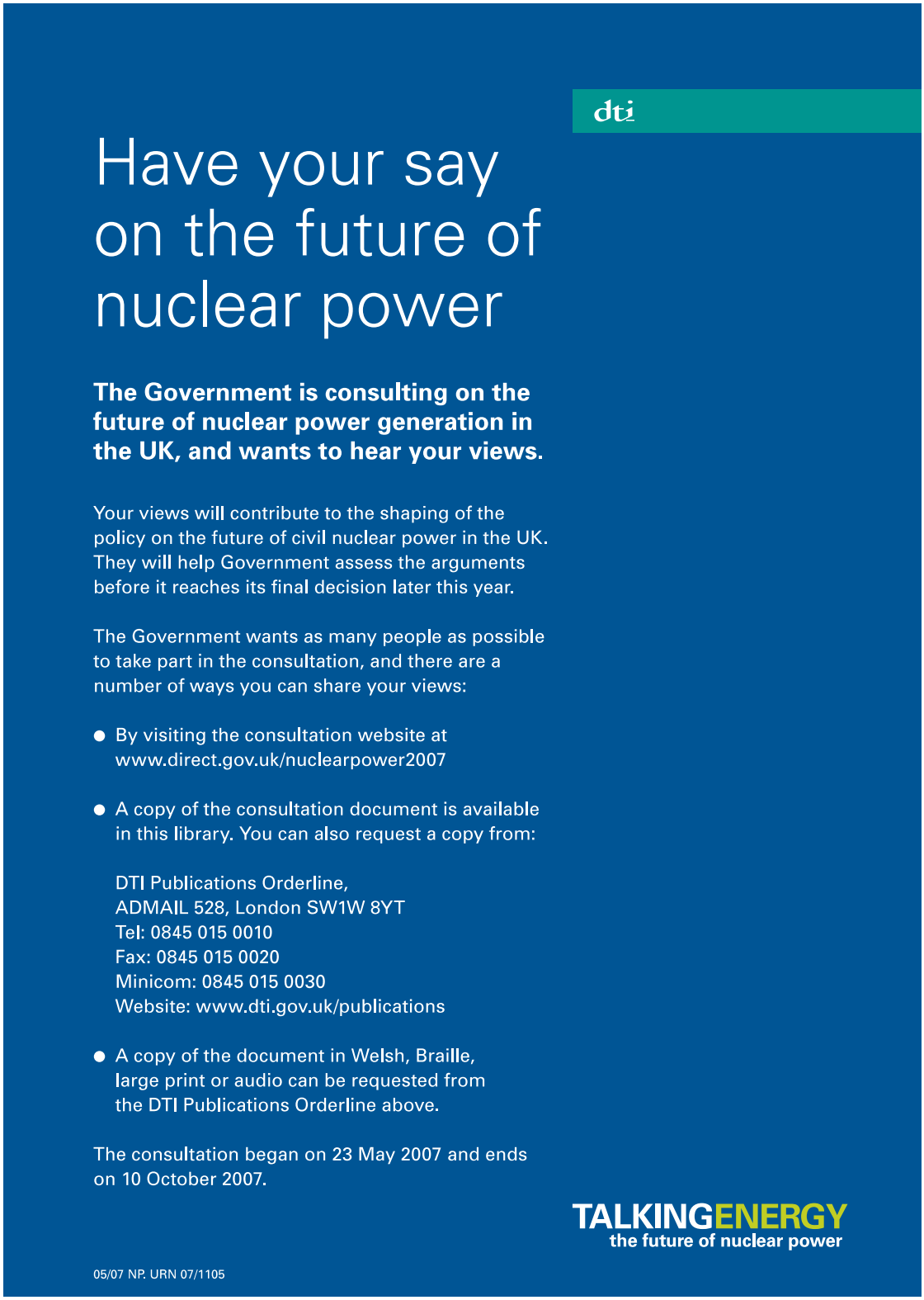
APPENDIX ONE

Print advertising creative



APPENDIX TWO

Library poster artwork



The Future of Nuclear Power

Analysis Report

Written responses to the public consultation
May to October 2007

Prepared for

The Department for Business Enterprise and Regulatory Reform

by

Dialogue by Design Ltd

December 2007

Table of contents

Executive summary

A total of 2,728 organisations and individuals responded to some or all of the 18 questions in the main consultation. A majority of this self-selected group is in favour of allowing energy companies to invest in new nuclear power stations.

The consultation was qualitative, providing insight into the concerns and priorities of those who support and oppose nuclear power. This Executive Summary sets out the key points in the responses to each question.

1. To what extent do you believe that tackling climate change and ensuring the security of energy supplies are critical challenges for the UK that require significant action in the near term and a sustained strategy between now and 2050?

About half of respondents felt that both climate change and security of energy supply are critical challenges, with smaller numbers of respondents seeing one or other as more of a priority. Only a few respondents disagree that these are critical challenges. Many include in their answer their main arguments for or against new investment in nuclear power as a response to these challenges. For supporters of nuclear power it offers a safe and reliable source of low carbon electricity based on fuel from secure supplies. For opponents, the risks to safety and health they perceive, the dangers from terrorism, and the finite supply of a fuel that must be shipped across the world, outweigh the fact that it is a low carbon source of energy; they would prefer climate change and security of supply to be tackled through demand reduction and investment in renewables.

2. Do you agree or disagree with the Government's views on carbon emissions from new nuclear power stations? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Half of respondents to this question explicitly agree with the Government's views. Many responses debate the accuracy of the figures cited, and cite their own sources and reasons for agreeing or disagreeing with the Government's views. Those in favour of nuclear power believe that its emissions may be lower than those quoted; those opposed tend to believe that the figures quoted do not take a full lifecycle approach to their calculations. Some respondents believe that other aspects of nuclear power, such as cost, security and waste management, override and potential benefits.

3. Do you agree or disagree with the Government's views on the security of supply impact of new nuclear power stations? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

The key issue here for many people is what constitutes 'security of supply'. For supporters of nuclear power it is primarily about securing a baseload supply using easily obtained and stockpiled fuel from stable sources that is relatively immune to fluctuations of supply and price; these are among their main reasons for wanting nuclear power. For opponents of nuclear power, 'security of supply' tends to mean locally generated electricity based on fuel sources that cannot be intercepted in transit or denied to the United Kingdom by a foreign power or terrorist action. These are among the main

reasons why they would prefer demand reduction and more investment in renewable forms of energy.

4. Do you agree or disagree with the Government's views on the economics of new nuclear power stations? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Many responses to this question are closely argued around the projections and uncertainties of future electricity supply and pricing regimes. There is some agreement, by both supporters and opponents of nuclear power, that a new generation of nuclear power stations is unlikely without some degree of public subsidy either for new build or waste management and decommissioning. Some respondents argue that responsibility for the country's energy supply should not be put into the hands of private companies which are primarily profit-driven and vulnerable to foreign takeover.

5. Do you agree or disagree with the Government's views on the value of having nuclear power as an option? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Supporters of nuclear power agree with the Government's views because they believe nuclear power is a safe, reliable and cheap source of low-carbon energy based on fuel that comes from secure sources, and that there is no truly viable alternative for producing the amount of electricity our society and economy requires to maintain our way of life. Opponents disagree on the grounds that nuclear power is an unsafe, unreliable and expensive way of generating electricity that is vulnerable to terrorism and creates waste that is dangerous for thousands of years, and that we should be investing in demand reduction and renewable sources of energy such as wind and tidal, that create no waste, do not require the import of a finite fuel, and pose less of a target for terrorists.

6. Do you agree or disagree with the Government's view on the safety, security, health and non-proliferation issues? What are your reasons? Are there any significant considerations that you believe are missing? If so what are they?

Responses to this question cite rival calculations of risk and hazard depending on their point of view. Supporters of nuclear power agree with the Government's views that nuclear power is safe, compare it favourably with other means of generating electricity, believe the Government is overly cautious in its approach and many would like to see the industry expand further and faster that is proposed. Opponents contest some of the figures cited and point out the problem of human error and the potential implications of large-scale problems. They also tend to believe that neither the nuclear industry nor the Government can be trusted to be transparent about the problems with nuclear power stations that do occur, they are concerned about terrorists gaining access to nuclear material, and they think that any new investment in nuclear power will lead inevitably to proliferation.

7. Do you agree or disagree with the Government's views on the transport of nuclear materials? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses to this question often link to the issue of re-processing. Supporters of nuclear power assert that the history of nuclear transport is unblemished by loss, leak or accident; they point out that, when it comes to transporting fuels, nuclear fuels are transported in much smaller quantities and with a much better safety record than other fuels. Opponents believe that transporting nuclear material is inherently vulnerable to attack by those who either seek to release radiation or to acquire the materials for a 'dirty bomb'.

8. Do you agree or disagree with the Government's views on waste and decommissioning? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

The question of what to do with nuclear waste both in the short and long terms is important to both supporters and opponents of nuclear power. Many respondents point out successive governments' failure to resolve waste issues and do not believe that more waste should be created until they are resolved. The issues are perceived to be both technical (how to guarantee the safe storage of dangerous material for very many years into the future) and moral (whether we have the right to impose this burden on future generations). Many supporters of nuclear power would like the Government to be more proactive about nuclear waste, particularly with regard to a geological repository, but do not see the challenges of managing current and future waste as a reason for preventing nuclear new build. Many opponents of nuclear power are particularly concerned both about the cost of decommissioning and waste management, which they argue has historically been a neglected aspect of the economics of nuclear power, and about the threat they believe that it will continue to pose for many generations after it has been created. It is for many the main reason for opposing new nuclear power stations.

9. What are the implications for the management of existing nuclear waste of taking a decision to allow energy companies to build new nuclear power stations?

While some respondents feel that new build waste will raise new issues, most do not believe there are any entirely new implications, though many would like to see some firm plans for dealing with existing waste before any new waste is generated. There is more discussion about who should be responsible for financing the cost of managing and storing legacy and new waste, with some respondents sceptical that the private sector will want to carry this burden.

10. What do you think are the ethical considerations related to a decision to allow new nuclear power stations to be built? And how should these be balanced against the need to address climate change?

For many supporters of nuclear power there are no ethical considerations, only practical concerns about future energy generation and security of supply; others perceive the need to combat climate change by generating electricity from low-carbon sources as a moral imperative. For opponents of nuclear power there are ethical considerations around the creation of a burden of waste for future generations, and around what they perceive to be risks to the health and safety of the population. For opponents the moral imperative is to invest in changes in behaviour and priorities that will address the challenges of climate change rather than to try to techno-fix our way out of them.

11. Do you agree or disagree with the Government's views on environmental issues? What are your reasons? Are there any significant considerations you believe are missing? If so what are they?

Respondents to this question tend to focus either on the impacts of nuclear power stations on the immediate environment, or on wider environmental issues and issues such as nuclear waste. Many supporters of nuclear power consider energy generation from renewable sources, such as wind farms, to be more environmentally damaging than nuclear power stations, citing, for example, their impact on the landscape, and are confident that the planning system will ensure that new nuclear build is done responsibly and will comply fully with all regulatory requirements. Opponents of nuclear power tend to take a wider and longer view and discuss issues from the environmental impacts of uranium mining, the threat they believe it poses to local communities and the environment around nuclear power stations, to the possible future impacts of nuclear waste many generations into the future.

12. Do you agree with the Government's views on the supply of nuclear fuel? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

The issue for many respondents here is whether the present is a reliable guide to the future. Supporters of nuclear power tend to agree with the Government's view that there will be sufficient supplies of nuclear fuel available from secure sources at stable prices for many years into the future. Opponents are more sceptical: they believe that if nuclear power expands the easily attainable supplies of nuclear fuel will be used up faster and supplies will have to come from less secure sources and probably at higher prices, and they are also concerned at supply lines' vulnerability to terrorist attack. Both supporters and opponents are aware that nuclear fuel, like fossil fuel, is also in finite supply, and some therefore see nuclear power as at best an interim solution to the country's energy supply needs.

13. Do you agree or disagree with the Government's views on the supply chain and skills capacity? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

The issue here is whether we have in the United Kingdom people and producers capable of staffing and resourcing a renascent nuclear industry. Opinion is divided: some say that we have neglected over many years to invest in the educational, scientific and engineering skills that nuclear new build will require; others say that this will be rapidly solved by a combination of market forces and government investment in new skills in the years between the commissioning of new power stations and when the building and management skills are actually required. Even if we cannot supply the people and capacity from domestic sources, some argue, then foreign companies will step in.

14. Do you agree or disagree with the Government's views on reprocessing? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Those who oppose nuclear power are generally opposed also to reprocessing. Supporters of nuclear power are divided in their response to the Government's views on reprocessing. Some support the Government's views on the grounds that reprocessing has a somewhat chequered history in the United Kingdom; others believe that it does not make sense to extract only a relatively small proportion of the energy available from nuclear fuel, and that reprocessing is effectively a form of re-use and recycling like any other. Supporters of reprocessing argue that it would be foolish to close off for good an option for electricity generation that we might need at some point in the future.

15. Are there any other issues or information that you believe need to be considered before taking a decision on giving energy companies the option of investing in nuclear power stations? And why?

Many respondents use their responses to this question to reiterate points already made, but there are also new points made around in particular the economics, ownership and management of new nuclear power stations. Supporters of nuclear power, for example, would like to see nuclear power benefit from the Climate Change Levy, and discuss other aspects of the current electricity regulatory and pricing regime and its effects on nuclear power. Opponents of nuclear power take the opportunity to argue that the alternatives have not been explored sufficiently thoroughly, nor have they benefited historically from the investment that has been available to nuclear power. They explain alternatives approaches to electricity generation such as decentralised power systems that would save some of the inefficiencies of transmission and methods of demand reduction that would also reduce the amount of energy we waste and therefore the need to generate so much.

16. In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?

Supporters of nuclear power summarise the main reasons for agreeing with the Government's view that it would be in the public interest to give energy companies the option of investing in new nuclear power stations as that nuclear power is the only option that will provide the United Kingdom with a secure and reliable baseload capacity that is low carbon, and a safe and proven technology that uses fuel from secure sources. Some supporters would like to see energy companies compelled to make such investments, and aim for a higher proportion of electricity generated from nuclear power than at present. Some supporters also stress the need for safeguards covering all aspects of safety and security, prefer the nuclear industry either to be nationalised or for there to be some degree of public ownership, and say either that there should be no subsidies from the taxpayer or that public resources should be used to ensure that issues such as waste management are properly resolved.

Opponents have concerns about the risks and hazards of nuclear power caused by safety lapses; action by terrorists; security of supply because we would be dependent on the transport of uranium, a finite resource, from overseas; the ownership and management by private companies and the perception that this increases the likelihood of accidents; the problem of creating new nuclear waste before there are settled plans to deal with the legacy of waste from the past and present; the threat to the environment posed by radiation leaks from power stations or waste; the high costs of nuclear power; and the consequent diversion of resources away from research and development into

what they see as renewable and sustainable forms of power supply. Opponents believe it would be preferable to invest in demand reduction coupled with energy from tidal, wind, wave, solar, hydro, biomass, geothermal and clean coal and other fossil fuels combined with Carbon Capture and Storage (CSS).

17. Are there other conditions that you believe should be put in place before giving energy companies the option of investing in new nuclear power stations? (For example, restricting build to the vicinity of existing sites, or restricting build to approximately replacing the existing capacity.)

There is support for the idea that new nuclear power stations should only be built on existing nuclear sites, though some respondents point out that some such sites may be vulnerable to flooding as a result of climate change; others say that any site that can pass successfully through the planning process should be used, and that there should be no unnecessary planning constraints. As regards the cap on capacity, many supporters of nuclear power argue that we should be aiming for a greater proportion of power to be generated by nuclear means than at present. Opponents of nuclear power do not believe energy companies should have this option and reiterate the reasons for their opposition in responses to this question.

18. Do you think these are the right facilitative actions to reduce the regulatory and planning risks associated with such investments? Are there any other measures that you think the Government should consider?

Supporters generally approve the facilitative actions proposed, though some would like to see further actions to address issues such as, for example, what they see as inconsistencies between the approach to nuclear power and the approach to renewables. Opponents are concerned that the facilitative actions will result in a weakening of the planning process and reduce the ability of local communities to influence matters that affect them. The role of the devolved administrations in relation the future of nuclear power, is also debated by some respondents: there is divided opinion over whether they or Parliament in Westminster should have the final say over whether nuclear power stations can be built in Wales or Scotland.

Executive summary of responses to questions on Justification and Strategic Siting Assessment

1a. Are Government plans to structure the proposed Justification process by making a time-limited "call for applications" helpful?

Supporters of nuclear power believe the proposed Justification process will help to focus applications and expedite the building of new nuclear power stations. Some think the timeline is too tight and some think it is too long.
Others think the proposed process is too cumbersome and constraining.

1b. Is the proposed application, assessment and decision-making process clear, appropriate and proportionate? If not, how can it be improved?

Those who support nuclear power generally approve the process, though some believe there is a danger of rushing some very complex decisions. Others are concerned to see

the public fully engaged in the process, and a similar process ready to use in relation to non-nuclear generation.

1c. Is the indicative list of information, described in Appendix A, appropriate for applicants to be able to make applications?

A number of respondents suggest other information that should be supplied, including about environmental receptors and waste and disposal routes.

1d. The Government is planning, where possible, to consider concurrent applications for Justification (relating to new nuclear power station technologies) through a single Justification assessment process. Is the Government's proposal appropriate?

While the majority of respondents accept this process there are some concerns where different technologies are involved and also that those who need to be involved in the consultation process have sufficient assistance to gather and present evidence.

1e. Are there any other ways in which the draft Justification process can be improved? If so, we welcome your suggestions.

There are some additional suggestions including monitoring the success of initial applications, publishing a list of nuclear technologies that will not be considered, and processing more rapidly Justifications accepted by governments with whom the UK is already collaborating.

2a. Is the proposed approach to the Strategic Siting Assessment a logical approach to identifying suitable sites? If not, how could it be improved?

The approach is generally accepted as logical, though some respondents believe there are other considerations of which account should be taken, such as the need to include consideration of ancillary developments, cumulative effects, decommissioning, waste disposal and transmission needs.

The role of the devolved administrations is also discussed in some responses to this question. Some respondents believe, for example, that the possibilities and implications of Scotland's inclusion (or not) in the process need to be set out clearly from the outset. It is also suggested that an agreement endorsed by the Scottish Parliament and the Welsh Assembly is needed before the start of the site selection process.

2b. Does the proposed incorporation of Strategic Environmental Assessment into the Strategic Siting Assessment represent a reasonable and robust approach to assessing environmental issues that would be raised by the construction and operation of new nuclear power stations? If not, how could such issues be taken into account?

There is general agreement that this approach makes sense, though some would like to see it streamlined and there are a number of comments about other factors that should be considered including local social and economic issues.

Introduction

Background

The purpose of this consultation on the future of nuclear power was to provide the Government with information which will help it to take the decision whether or not to allow energy companies to build new nuclear power stations in this country.

The Government wants to be able to make a decision on new nuclear power stations for three reasons:

1. Over the next two decades, a significant number of the power stations which currently generate our electricity – both nuclear and those that burn fossil fuels like coal and gas – are scheduled to close and need to be replaced.

2. Climate change, which is linked to man-made emissions of carbon dioxide from fossil fuel based energy sources, is accelerating.

3. Domestic supplies of fossil fuels, notably oil and gas from the North Sea, are running down and the United Kingdom is becoming increasingly dependent on imported fossil fuels.

The Government's overall response to these challenges is set out in the Energy White Paper, which was published at the same time as this consultation. So the consultation should be understood in the context of United Kingdom energy policy as a whole.

How the consultation process was managed

The consultation document was available as a printed document and available electronically on the BERR website.

A consultation website (hosted at www.direct.gov.uk/nuclearpower2007) was designed to enable people to read the document and respond to the 18 questions online for the main consultation document and a further 7 questions for the technical consultation on the Justification and Strategic Siting Assessment.

People who requested printed copies of the consultation document were also sent a paper response form to complete.

The consultation document was translated into Welsh and made available on the website and by post on request.

Online responses

The online consultation process was designed to be easy for people to use. Respondents could log on to the website and register their details. Once on the consultation pages of the website respondents could navigate through each section of

the consultation documents and respond to the questions. Responses were recorded in boxes limited to 3,000 characters (about 600 words). The online consultation system also enabled respondents to edit, print or amend their responses at any time while the consultation was open.

The consultation website served as an information hub for the consultation with background material and notes the consultation events posted as they were completed. The full consultation documents could also be downloaded from the consultation website.

At the end of the consultation period all responses to each question were read and common themes identified. The responses were then collated (or grouped) under these theme headings; where more than one point was made in a response it was grouped under more than one heading.

Paper, fax and e-mail submissions

Responses on the paper response forms were entered into the same collation database used to group the online responses. These responses were then treated in exactly the same way as the online responses.

Responses that broadly followed the question structure, but included additional information, such as graphs or images. These were entered into the collation database and where possible grouped in the same way as the online responses. Those sections of responses that did not fit the question structure were treated in the same way as responses that did not directly respond to the questions (see below).

Responses that did not directly respond to the questions in the consultation document. These were read and the points they made were allocated first to the issue areas raised under each question in the consultation document (for example waste, fuel supply and skills). The second step was to put each point under group headings in a similar way to the online responses.

Participation statistics

Table 1 shows the number of participants for the main consultation and the technical consultations. Overall, 2728 responses were received for the main consultation, and 129 responses for the technical consultations. The consultation website had 3,756 people registering until the close of the consultation on 10 October 2007 (this figure only refers to the online consultation and does not include people who responded by post, email or fax).

Table 1: Number of responses

Response channel	Participated in main consultation	Participated in technical consultations
Online response	2043 (of which 237 requested confidential treatment)	94 (of which 9 requested confidential treatment)
Response by post, email or fax	685 (of which 24 requested confidential treatment)	35 (of which 1 requested confidential treatment)
Total	2728 (of which 261 requested confidential treatment)	129 (of which 10 requested confidential treatment)

We are also publishing in full on the consultation website all of the consultation responses we received, with the exception of those where the respondent specifically requested that their response should be treated as confidential. For this reason some of the numbers on the website vary with the numbers in this report. This report analyses and contains figures for all responses including those that requested confidentiality.

Due to the national postal strike responses received until 18 October 2007 are included in this analysis report. A number of responses were received after this date. These are published on the website as 'late responses' and the Government has made every effort to take account of these.

A small number of communications by letter, fax or email were received which were not responses to the consultation. These include organisations or individuals notifying us that their response was going to arrive late, or where people made queries about participating.

Table 2: Participation by sector

Sector	Participated in main consultation	Participated in technical consultations
Academic or consultancy	173	14
Energy Industry	306	15
Government agency or sponsored body	27	7
Individual	1784	71
Local or regional government	112	8
Other	109	3
Other business	91	5
Trade Union	17	3
Voluntary or environmental organisation	109	3
Total	2728	129

Table 3: Participation of individuals/ organisations

Individual vs. organisational response	Participated in main consultation	Participated in technical consultations
Response as an individual	2413	90
Response on behalf of an organisation	315	39
Total	2728	129

There were also a small number of letters from groups who actively declared their intention not to participate in the consultation because they were critical of the process.

Reading this summary and interpreting the results

Readers of this summary should do so in the context of the consultation:

1. Purpose of the consultation

The purpose of this consultation was to provide the Government with information which will help it to take the decision whether or not to allow energy companies the option of investing in new nuclear power stations in this country.

The consultation document set out the Government's preliminary view that energy companies should have the option of investing in new nuclear power stations. It also set out the evidence and information that the Government had considered and the preliminary conclusions that it had reached following its assessment of that evidence. The consultation document asked respondents a series of questions designed to test those conclusions and the evidence on which they were based. The consultation document made clear that the Government would 'give greater consideration to the arguments and evidence – in particular any new arguments, information or evidence – than to simple expressions of support or opposition to new nuclear power stations when considering responses to this consultation'.

The majority of the 18 questions asked were phrased "Do you agree or disagree…." and went on to ask respondents to identify any considerations they believed to be missing. Respondents to the consultation answer the questions in a variety of ways. Some state explicitly their agreement or disagreement with the Government's views and provide a list of arguments and evidence in support of the positions they take. Others provide more general accounts of their views for or against nuclear power.

In this summary of the responses to each question the effort is made to capture the essence of the arguments that lead some to agree and some to disagree with the specific propositions as stated.

2. Interpreting the numbers

In reading this report care must be exercised in attributing significance to the numbers of reported responses arguing in one direction or another (or to the numbers of responses collated under theme headings). Readers should remember

that this was a qualitative consultation process, not an opinion poll; the responses on the website are not representative of the British population as a whole. Its primary purpose was to seek views on the information and arguments set out in the consultation document in relation to whether energy companies should be allowed the option of investing in new nuclear power stations.

The collation process involved reading each response and allocating it to one or more theme headings. A long and detailed response may have been allocated to six or seven theme headings while short comments to just one or two. Theme headings were based on the content of the responses received, not on the subject of the question asked. This means, for example, that theme headings for 'waste' were created for most of the questions and not just for the questions in the consultation document that deal with waste.

The actual numbers of responses are mentioned only in the opening paragraph of the summary of responses to each question, and only to provide an overview of how this group of self-selected respondents divided in terms of their broad agreement or disagreement with the question asked. In the subsequent paragraphs of each summary terms such as 'the majority of respondents', 'many respondents', 'some respondents' and 'a few respondents' are used to give some indication of the numbers of people raising particular points. These designations are deliberately inexact to emphasise that it is the substance of the arguments that is the focus here, not the numbers of people making them.

The collation process was undertaken with great care and a quality control process used to check its accuracy. Because this was a qualitative rather than a quantitative process, however, the collation process is designed not to illustrate any statistical data but to organise responses so that the reader can find particular themes or follow particular arguments.

Similarly, the numbers of responses under theme headings may give a misleading impression if they are looked at simply in numerical terms. For example, a theme heading such as 'Explore and utilize renewables' may not include the responses of all the people who support renewables, or indeed the responses only of people arguing against nuclear power. This is because the issue of renewables was not part of the question but was used as one of the arguments in response to the question.

Similarly, it is always difficult to summarise many thousands of often very complex responses in a few pages. There are some points mentioned by a very few people which, if reported in full, might become disproportionately prominent; likewise there are many broadly similar points with minor variations that, if reported in full, would take up too much space and make it difficult to get an overview of the main arguments.

The editors have done their best to balance the requirements for fairness, comprehensiveness and readability, but it must be emphasised that reading this summary is not a substitute for reading the actual responses as displayed on the consultation website.

The full collation statistics for responses to each question are available online at http://www.berr.gov.uk/energy/nuclear-whitepaper/page42765.html. (URN number 08/535)

Please note that there are variations between the numbers in the collation statistics and those displayed in the website tables. There are two reasons for this: first, on the website the comments where people requested confidential treatment have not been displayed and included in the numbers (although they have been collated and taken into consideration); secondly, the website tables do not include numbers for responses that did not fit the question structure.

Main consultation – Summary of responses by question

Question 1

To what extent do you believe that tackling climate change and ensuring the security of energy supplies are critical challenges for the UK that require significant action in the near term and a sustained strategy between now and 2050?

Responses

2395 people responded to this question. Of those who responded, 1222 felt that both challenges are critical. 232 say that security of supply is critical, with 150 saying that security of supply is more critical than tackling climate change and 3 saying that security of supply is not critical.

180 say that climate change is critical, with 61 saying that tackling climate change is more critical than ensuring security of supply; 41 say that tackling climate change is not critical.

108 offer qualified agreement to the question, and 219 agree with the thrust of the question but specifically state that they oppose nuclear power.

This first question is answered by more people than subsequent questions and is used to make a wide range of comments relating to the causes and implications of climate change, as well as the supply and use of all forms of energy. It is also used as an opportunity to address the central topic of the consultation, namely whether or not nuclear power is a valid option for the United Kingdom.

Responses have been collated under a number of 'agree' and 'disagree' headings relating to the two challenges. These reflect the fact that some responses only refer to one challenge, while others address both and of these, some prioritise one challenge, some agree with one and disagree with the other, and some agree to a certain extent but qualify their support with a number of conditions. Responses are grouped as 'agree' where they either state agreement explicitly, or where they make their own case for the issue being critical which largely mirrors the government's case, or where they demonstrate agreement implicitly by setting out how they believe the challenges posed by climate change or security of supply should be met. There is also a group for responses which agree with some aspects of the question but fundamentally oppose nuclear power as part of the solution.

The critical challenges

Of the responses which felt that climate change and security of energy supply are both critical challenges for the United Kingdom to act on, some stress that the two issues are inextricably linked e.g. secure energy supplies can help to manage potential climate change impacts such as temperature changes or food shortages. Others see them as separate issues, each requiring its own approach.

Those who see security of energy supply as a critical challenge highlight the vital role energy supplies play in individuals' and in the United Kingdom's wellbeing, as well as the likelihood and/or the risks of an impending energy shortfall (see below for more detail). Those who see climate change as a critical challenge point to climate change being one, if not the most critical, of global issues given the significance of potential impacts not just on other parts of the world but also on the United Kingdom (see below for more detail). A proportion of those who agree that climate change and/or security of energy supply are critical challenges oppose nuclear power as any part of the solution because they think the risks and costs they believe to be associated with it are unjustifiable (see below for more details).

Those who qualify their agreement do so with the condition, for example, that their agreement should not be taken to imply their agreement with either the Government's supporting arguments or its proposed solutions. Other conditions mentioned are different interpretations of some of the supporting arguments, for example the condition that security of supply be redefined as sustainable supply and use, giving priority to maximizing demand reduction, energy efficiency and the development of renewables, and aiming not for continued economic growth but for a sustainable quality of life.

Regardless of which of the two challenges respondents see as critical, there is strong support among both supporters and opponents of nuclear power for significant action in the near term and an ongoing strategy to address both these challenges. There is general agreement that this is a key moment, and the decisions taken now will have consequences for years to come. Some argue that the Government must be prepared to take unpopular action, whether this means going ahead with nuclear power, making energy far more expensive or introducing individual carbon limits.

Climate change

Many responses refer to international and strategic aspects of climate change. Those who see climate change as a critical issue point to the potential for resource wars, social, political and economic upheavals, food shortages and habitat destruction, and stress the need for urgent action to reduce carbon emissions (and other contributors such as methane), not just in energy supply but everywhere and at all levels, to minimise the damage for future generations. The term 'tackling' is unpacked as meaning not just attempting to prevent and reduce the scale of (further) climate change, although some observe that it may already be too late to avert it; some people define it as also preparing for impacts.

Many people question assumptions about the causes of climate change, and especially to what extent human activities do or can have a significant impact. Within this group some people are convinced that climate change is entirely due to natural causes or that changes will not be as predicted, while others would like to see more evidence to be persuaded. However, many within this group nevertheless argue for reducing emissions as a sensible precaution.

There are mixed views on the extent of impact the United Kingdom can have by its own direct actions, for instance compared to larger energy users such as the US, China, Russia and Brazil. Some responses point to the need for global action and there are concerns that the United Kingdom should not act alone to its own disadvantage. Some responses highlight the need for the United Kingdom to take a lead as a responsible

global citizen and in recognition of the carbon contribution involved in our own development. Others argue that action against climate change is in our own self interest: the United Kingdom is vulnerable to sea level rises and other predicted impacts, and there is also potential for the United Kingdom to be a leading provider of the skills and technologies that will be in increasing demand. This lead should be both through example in its domestic responses and in the international arena though a combination of persuasion and enabling support such as technology transfer to developing countries. World population growth is also highlighted by some as an issue which should be consciously addressed as part of the response to climate change.

Some comments point to the need for a cross-party, politically neutral approach to the challenges of climate change and energy security that cuts across all government policies in a consistent way. Others want a massive information campaign, individual carbon allowances or the adoption of something akin to a war mentality so that the public will support the necessary changes. There are also suggestions that an over-response is a better precaution than an under-response given the risks.

The climate change issue leads some people to support nuclear power as a key contributor to low carbon energy production, and one which involves comparatively fewer risks than unchecked climate change. Some of those who support nuclear power do so only as one part of a mix of energies. Other people reject nuclear power, arguing that there are more sustainable and effective ways to reduce carbon emissions and what they perceive as the already unacceptable risks of using nuclear power are likely to increase if nuclear power is expanded as a response to climate change.

Security of energy supply

Many responses refer to the strategic aspects of energy supply and use, with many of them asserting the need to reduce reliance on other countries. There is some debate about what constitutes security of supply, with different definitions reflecting people's different priorities and values. Some believe security of supply means that a mix of supplies from stable locations which can be guaranteed to remain stable in the future; others believe that energy security must mean our energy supplies are independent of the influence or intervention of other countries. Others again use definitions that talk about guaranteed supply to individuals to maintain their lifestyles and see this as meaning indigenous, small scale and decentralised supplies. For some security of supply is synonymous with a secure baseload. There are concerns that securing energy supplies should not mean invading oil rich countries.

Another strand of thought around security of supply, introduced by many respondents, revolves around reducing demand rather than increasing supply. There is some strong opposition merely to increasing energy supply to meet current and projected patterns of demand; these people argue instead for prioritising and maximising demand reduction and ways to support individual or local action, such as developing more decentralised and renewable sources, and using what we generate more efficiently. The people who take this approach tend to want energy security redefined as sustainable energy supply and use and link it explicitly to tackling climate change and achieving sustainable development. They often go on to put more emphasis on business responsibility than individual action, and argue, for example, for the Government to be consistent in its approach and resolve apparent contradictions such as expanding air and road travel, and also use the fullest possible range of targeted economic and regulatory measures.

Many respondents support this line of argument with a challenge to our current model of economic growth and resource consumption. The aim, for people who take this line, should be not to support unsustainable economic growth but rather to address consumption and lifestyle patterns to reduce demand and emphasise instead quality of life and social justice. Some note that energy use can be painlessly decoupled from economic growth, and others argue that early progress in demand reduction is relatively more effective, as well as creating a breathing space whilst medium to longer term energy solutions are developed. Linked with this approach is the need to limit the use of oil to air travel and agriculture, and use electricity for all other uses. For some the main argument in favour of nuclear power is that it can be used to make hydrogen in anticipation of a shift towards a hydrogen economy.

Some people see the proactive role of government as crucial in achieving such changes, and therefore have concerns about leaving action in this area to the private sector. They feel a sustainable energy policy is long overdue and if the Government does not take control and act urgently then the market may force energy companies to invest in short-term options such as more gas powered stations.

The role of fossil fuels

There are also a range of comments in responses about the role of fossil fuels. Some respondents argue that the United Kingdom has a vast, indigenous supply of energy in the form of coal, and that this should be exploited through clean coal technology allied with carbon capture and storage (CCS).

Others feel that we should not use these or that we are too reliant on fossil fuels in the form of natural gas imports, and that the general depletion of fossil fuels will have a potentially drastic effect on our economy and lifestyles regardless of climate change. There are concerns expressed about what may happen when oil begins to run out, with some predicting food shortages, the breakdown of civil order and wars caused by resource shortages. Some respondents quote sources arguing that 'peak oil' has probably already been reached. The imminent decommissioning of existing nuclear power stations is another factor contributing to perceptions that the United Kingdom may face a looming and serious energy shortage in the near future.

Cutting across these views is a sense that a more proactive role from government is vital and long overdue. Concerns about leaving action in this area to the private sector are expressed; for instance that the market may force energy companies to invest in short-term options such as more gas powered stations.

Nuclear power

As mentioned above, some respondents use this question to make general points for or against nuclear power. The following paragraphs summarise their arguments.

Pro nuclear power

Those expressing support for nuclear power give a number of reasons. These include that in their view nuclear power is the only feasible solution to provide baseload capacity; that it should be part of an ongoing mix including renewables; or they support

it in the short term as an interim solution while we develop renewable and new energy sources such as hydrogen or nuclear fusion. Some feel that nuclear power should supply a much larger proportion of our energy needs than it has to date. France is cited as an example to learn from.

Those in favour of nuclear power point to what they believe is its good safety record, its cheapness, its low carbon impact and its ability to improve security of energy supply by reducing reliance on imported fossil fuels from unreliable sources such as Russia. They argue that uranium comes from secure sources and can be stockpiled as small quantities provide a very long term supply. Additional spin-off benefits such as employment are also mentioned.

Some (but not all) supporters of nuclear power acknowledge that there are the issues relating to the safe disposal of waste, to the decommissioning of old nuclear power stations, and to the design and building of new power stations, but feel that these are manageable, especially in view of what they consider to be the major advances in the technology of nuclear power generation over the past half century. Some nevertheless call for progress on a national waste repository.

A number of other arguments are also used to support the proposition. Better to have nuclear power with its known and manageable risks, it is argued, than to have climate change and its potentially catastrophic and unmanageable impacts. For some, generating electricity for transport or hydrogen production is a priority, and nuclear power is the most sensible way to do it; for others the next generation of nuclear power will have overcome many of the drawbacks associated with earlier technologies. There are also suggestions that thorium should be used instead of uranium, and nuclear fuel should be reprocessed to create MOX fuel to reduce the volumes of radioactive waste.

Some advocates of new nuclear build believe the government needs to be more proactive in its support and set out actions such as a positive policy for reducing the risk for long term investors (including generation price stability) and improved science teaching in schools and universities to ensure a supply of suitably qualified personnel. Such actions should include more effort to educate the public, improve public trust and diminish what some see as irrational fears about nuclear power in order to combat objections from environmentalists. Some believe that the public should not be involved in issues and decisions they cannot understand, or that the media and Government are unduly influenced by unrepresentative anti-nuclear lobbyists.

There are comments on how to implement new nuclear build. Many feel that the design and building of new plants needs to be streamlined and pushed through the planning system in the name of national need and benefit whilst taking care to create local benefits. Some feel the best way to do this is to build the new plants alongside existing ones to take advantage of the existing infrastructure and skills base.

The advocates of nuclear power often support their arguments by pointing out what they believe to be the weaknesses of renewables: that they are unreliable; that the supply is intermittent; that there are difficulties with storing energy; that onshore wind turbines are despoiling our countryside and creating noise pollution for local residents. Off shore wind and tidal barrages tend to be viewed more favourably than onshore wind or solar options, but it is also argued that as the climate changes we cannot rely on such sources of energy.

Anti nuclear power

Those who oppose nuclear power cite as their concerns what they consider to be unacceptably high environmental, health, safety and security risks from accidents or terrorist attack and the financial cost of operation, decommissioning and legacy. They cite evidence they believe indicates that the lifecycle carbon emissions and the environmental impacts of mining are under-estimated, and that therefore nuclear power's contribution to addressing climate change is over-estimated. They mention also their belief that the continued need to import raw material, and what they say is its declining availability, reduces nuclear power's contribution to security of supply.

There are also concerns that the Government's focus on nuclear power will prevent or preclude progress on demand management and the development of renewables. Both of these, many opposed to nuclear power believe, could better meet the challenges of both carbon reduction and security of supply if they receive the same level of funding as nuclear power and if the United Kingdom learns from experience in other countries.

The call for better demand management and increased energy efficiency is supported by a range of arguments and evidence from, for example, an experiment in Woking where, according to one respondent, there was a carbon reduction of 77%. Other arguments used include that if the capital costs attributed to new nuclear plant are spent on energy efficiency measures this would actually reduce demand by a greater amount than the new nuclear capacity would generate. Energy conservation is regarded by some as the first step towards dealing with climate change as it offers the cheapest and most rapidly-adopted cuts in greenhouse gases.

Others are concerned that the lead time for commissioning and building new nuclear power plants is such that they cannot anyway be functioning by the time we will need them or that the Government is unduly influenced by industry lobbyists or the lure of large scale solutions.

Those who argue against nuclear power and in favour of renewables would like to see the full potential of wind, waves, tide and sun fully exploited in order to give us what they consider to be real security of supply. They argue that we have these sources of energy in abundance; that they will never run out; that they are less vulnerable to attack, less polluting, and can be spread across country reducing inefficiencies of transmission. They can also be established much faster than a nuclear power plant and that it would be quite feasible to have a wide array of renewables in production within 5-6 years given, people argue, the political will and strong management.

The consultation process

Finally, a few respondents comment on this consultation process or question the Government's credibility. Some feel that the Government is using climate change as an excuse to do what they want to do anyway, be it nuclear power or higher taxes, citing as evidence, for example, that concerns about climate change are not a priority when it comes to issues such as airport expansion; others believe that the Government has already made its mind up regardless of the results of consultation; others again feel that the consultation questions are framed in a way that will procure the desired answers.

Question 2

Do you agree or disagree with the Government's views on carbon emissions from new nuclear power stations? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1684 people responded to this question. Of these, 854 express agreement with the Government's views on carbon emissions from new nuclear power stations. 135 qualify their agreement, and 43 express explicit opposition to nuclear power despite accepting the figures as correct. 235 people express direct disagreement with the Government's views on carbon emissions from new nuclear power stations.

Some people strengthen their agreement by confirming that they believe nuclear power will help to tackle climate change or reduce United Kingdom emissions and some respondents clearly want the Government to be more proactive in progressing nuclear power through financial, political and land use planning support. Of those who qualify their agreement, some point out aspects of nuclear power that need to be addressed or which need more consideration, primarily the availability of uranium and the issue of waste.

Those who accept the figures but express disagreement with nuclear power centre their reasons on overriding concerns about the nuclear option, such as waste, cost, risk of terrorist attack, health, safety and environmental aspects.

Disagreement about emissions

The complexities of comparing the emissions of different energy options are illustrated by the range and depth of responses to this question. Many responses contain arguments about the accuracy of the Government's figures for carbon emissions from new nuclear power stations, for example the figures for the comparison between nuclear power and wind power. In addition to the sources quoted in the consultation document a number of other sources are quoted in support of the argument that building new nuclear power stations would lead to lower carbon emissions, including a study by the Parliamentary Office of Science and Technology (2006), Fritsche and Lim (1997), WISE/NIRS (2005) and Proops, Gay, Speck and Schroder (1994).

The most frequently quoted sources arguing against the proposition are Caldicott (2006) and Heinberg (2005), the Oxford Research Group and van Leeuwen and Smith.

The debate over the figures is perhaps best summarised by one respondent who says "There are clearly some disagreements on this issue, some of them statistical and methodological, a situation which led the House of Commons Environmental Audit Committee to suggest a review by the Royal Commission on Environmental Pollution ('Keeping the Lights on', Environmental Audit Committee, Sixth report 2005–6 session, House of Commons, London)." A number of respondents echo this, pointing out, for example, that all the calculations made depend on a number of starting assumptions,

such as the stated generating capacity of the power station or the actual power delivered taking into account downtime due to scheduled and unscheduled maintenance. There is support for the use of independent studies and calculations, such as those conducted at the University of Groningen in the Netherlands, and also for new independent study of the figures using the most up to date research.

Lifecycle approaches

Part of the problem with taking any set of figures, some assert, is the time frame within which they are considered and how much nuclear power is expanded, because competition for diminishing supplies of easy attainable uranium will lead to a growing carbon imbalance. Among those who oppose nuclear power there is particular concern that the full lifecycle carbon costs of nuclear power, including the mining and transport of uranium, the long-term storage of waste and the decommissioning of power stations, and the use of chlorofluorocarbons (CFCs) in the uranium enrichment process have not been fully included. These arguments are countered by some who support nuclear power: for example, it is argued that much uranium is produced as a by-product of mining for other minerals that would be mined anyway; others argue that the full lifecycle carbon costs of wind farms do not take into account the need for back-up generation and/or new grid reinforcement, or driving to remote areas to do maintenance work, for example.

The challenge to the figures quoted in the consultation document does not just come from those who oppose nuclear power. Some respondents simply express surprise at the figures, querying the exact numbers or calculations, voicing concerns about the source of the figures, and asking for further information or suggesting further information that could be provided to back up the case.

Wider comparison of energy options

There are also respondents who feel that while emissions maybe an important aspect of the decision whether or not to build new nuclear power stations, they need to be looked at in parallel with the wider pros and cons of different energy options. Some people feel that security of supply is a key issue and that the nuclear option would be the best route to ensure this; others cite nuclear power as the most clean and reliable option. On the converse side, there are many comments that, regardless of emissions, issues such as waste, cost and safety override any potential benefits.

Finally, there are comments about climate change as a strategic global issue, the Government's overall approach to energy supply, and in particular on the need to learn lessons from other countries in terms of emissions reduction, energy strategy or the use of renewables. These are coupled with observations that a lack of progress on reducing emissions from aviation, marine, and road transport will mean that deeper cuts are needed in other sectors to meet the United Kingdom's targets.

Question 3

Do you agree or disagree with the Government's views on the security of supply impact of new nuclear power stations? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1579 people responded to this question, with 654 agreeing with the Government's proposition and a further 101 agreeing with qualifications. 246 disagree.

No respondent to this question argues that security of supply is not important; indeed, it seems to be so taken for granted that many respondents do not mention it at all. Some respondents are concerned that the situation is very urgent, arguing for example that 'peak oil' is being reached around now according to some estimates; others feel that the Government has over-emphasised the threat, for instance arguing that most of our gas supply comes from Norway not Russia, and that new nuclear power stations would probably only replace a small amount of gas anyway.

Meanings of 'security of supply'

Before analysing responses on this issue, though, it is important to appreciate that the term 'security of supply' has different meanings for different people. Responses showed that for people involved in the electricity industry, 'security of supply' means achieving a secure baseload supply: the minimum amount of electricity required at any given moment. Others use the term more loosely, embracing also, for example, how fuel supplies could be affected by geopolitical circumstances or more localised security problems. These differences of meaning need to be borne in mind when reading responses to this question.

A large number of respondents argue that diversity of supply equals security of supply. As several say, putting all one's energy eggs into a single basket would be unwise. Many of these people support nuclear power as one part of a mix of technologies.

Not everyone agrees, however, that diversity of supply equals security of supply. The value of diversity, it is argued, for example, depends on the value of what is diverse. Adding a technology of little value (such as wind power, according to some) adds nothing to energy security and may in fact reduce it by, for example, causing failures in the distribution system.

Another point argued by some is that if extending diversity means investing in nuclear power, then this may squeeze out renewables and the net effect will actually be a loss of diversity and more dependence on fewer sources. It is also pointed out that the security purchased by diversity depends on the amount of spare capacity in the system: too little and the reliability of the overall grid is only equal to the reliability of the least reliable part of it.

Why nuclear power offers security of supply

The supporters of nuclear power argue that nuclear power's ability to provide baseload generation from relatively small amounts of fuel, imported from what they perceive as stable and friendly countries such as Canada and Australia, which can be stockpiled well in advance of use is, they believe, the answer. Many point to France and Finland as models, and regret the fact that the United Kingdom has not followed their examples. Some supporters of nuclear power argue that it meets in particular the needs of major industrial consumers for a secure supply and stable prices, both of which improve their ability to do business. While some also acknowledge the potential threat from terrorism, the need to deal with the problem of waste, and the scale of investment required, they see the potential loss of our electricity supply through inadequate capacity as much more of a threat.

Nuclear power offers security of supply for several other reasons. It is, its supporters argue, an established, efficient and reliable technology being used by over 400 power stations around the world, with fuel a small element of the operating costs and largely immune to the sort of price fluctuations that affect oil and gas supplies. Many respondents supporting nuclear power believe that the Government's nuclear ambitions are overly timid, and that the United Kingdom should use nuclear power stations to generate 30 per cent, 50 per cent or even more of its electricity requirements.

While some supporters of nuclear power are sceptical about the value of renewables, mentioning what they see as their damaging effect on the countryside and arguing that it would be unwise to rely on an intermittent generating technology for baseload supply, many support nuclear power as one part of the energy mix (with some seeing it as an interim solution while renewables are developed to the point that we no longer need nuclear) and acknowledge that renewables can also contribute as a source of low carbon electricity.

Why nuclear power does not offer security of supply

The opponents of nuclear power are adamant that by its very nature it cannot offer security, and it is these considerations they perceive to be most significantly missing from the Government's analysis.

First, while they may accept that uranium currently comes from secure sources, they do not accept that this will always be the case, and they also see the need to transport it as presenting a security problem. Many question the amount of uranium available from secure sources, and the effect that new investment in nuclear power, by other countries as well as the United Kingdom, may have on the price and availability of uranium of sufficient quality. Should those sources become unavailable, they argue, we will then be reliant for uranium from other much less politically stable countries with poor human rights records. This, they argue, will not be conducive to security of supply.

The second widely cited argument is that geopolitical instability and the increase of terrorism means that nuclear power stations and shipments of uranium and of spent fuel are likely to be attractive targets for terrorists. Some argue that security of supply needs to be approached from this more holistic basis, and that investment in nuclear power will not provide it.

A third area of reservation is around relying on the private sector to invest in nuclear power and to provide security of supply. This point is also made by some supporters of nuclear power and by many of those who qualify their agreement with the Government's views on the security of supply impact of new nuclear power stations. These people argue that security of supply is too important to be left to the vagaries of the market place, or the self-interested calculations of commercially motivated energy companies, or in the hands of private companies that can be bought and moved into foreign ownership.

There are also a range of other arguments deployed against nuclear power as a source of secure energy supply, from the reliability of nuclear power stations to the historical link with the production of nuclear weapons.

Alternative forms of security of supply

The main arguments of many of those opposed to nuclear power to provide a secure energy supply, however, are based on the idea that the alternatives may be more secure and reliable. The power of wind, sun and sea, they point out, is not subject to the whims of distant dictators, and nor do such renewable sources of energy present the problems associated with nuclear waste and nor are they such tempting targets for terrorists.

Some also feel that investing in nuclear power will preclude investing in other options, such as clean coal, reducing demand through more efficient use and decentralised energy generation such as Combined Heat and Power and micro-generation. These people feel, therefore, that this chapter in the Government's consultation excludes discussion of ways of achieving secure energy supplies that have few or none of the disadvantages of nuclear power, and some voice concerns that the current lack of progress on decentralising is prejudicial to renewables and creates an effective bias towards nuclear power.

Other aspects of security of supply

There are a number of responses relating security of supply to affordability. Some advocates of the zero energy approach argue, for example, that houses which are comfortable without space heating as well as reducing energy costs should be useful in an economy without the infrastructure functioning, as may be the case with the coming of climate change.

Finally, broader security implications are identified by those concerned that a global increase in the use of nuclear power could create more international tensions and instability, making agreement on tackling climate change more difficult.

Question 4

Do you agree or disagree with the Government's views on the economics of new nuclear power stations? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

There are 1524 responses to this question of whom 405 agree with the Government's views on the economics of new nuclear power stations, 166 agree with qualifications and 244 disagree. 58 feel unable or unqualified to address the economics of nuclear power.

Overview of economic issues

Many of the responses to this question are complex and too closely argued to be summarised in simple terms. Some explore the many uncertainties around the pricing of future energy options, taking in to account possible geopolitical changes, the vagaries of markets, the impacts of new technology and of economic development, or lack of it, in different parts of the world. Others focus more closely on calculations around the costs of building, running and decommissioning various types of nuclear power station and the effects of different approaches to capital expenditure and operating regimes on the totals costs. Others again focus on more specific aspects of nuclear new build, such as the impact of different carbon pricing schemes or the costs involved in different regimes for dealing with waste.

Financing nuclear power

There is one issue on which many (but not all) supporters and opponents of nuclear power appear to agree: that the economics of nuclear power cannot work without the industry being subsidised by the taxpayer as it has been in the past. Some believe that it should not be expected to, given that energy supply is an issue of such national strategic importance. It is argued that nowhere in the world is there a nuclear power station which does not rely on subsidy of one kind or another. Some argue that there is nothing stopping private sector companies building new nuclear power stations now if they want to – except for not knowing how much the Government is prepared to subsidise the industry.

Against this point of view some responses suggest that major utility companies can raise sufficient finance and meet the full lifecycle costs of new build as long as the right enabling framework is in place – one key economic element of which are guaranteed high prices of fossil fuels and carbon over the long term. Others point to examples of public/private partnerships, including the option of large industrial consumers investing in a share of the output (examples given are the Olkiluto power station in Finland and the Exceltium Consortium in France).

There is some concern, shared by both supporters and opponents of nuclear power, about nuclear power being completely controlled by private sector companies. These concerns centre on a number of points, the principal ones being that private companies

could go out of business before dealing with the waste, or without decommissioning power stations, in which case the taxpayer would be left with the bill.

The relatively high proportion of respondents offering qualified agreement with the Government's views on the economics of new nuclear power stations may reflect the complexity of calculations and range of uncertainty acknowledged in the consultation document. Some respondents' qualification is around the figure used for carbon pricing, which in turn casts doubts on the subsequent calculations; some have done their own calculations and arrived at the same conclusions, while others agree with the views expressed in the consultation document providing the costs of waste management are clearly considered up front; and some agree with the economic case as long as the Government provides long-term assurances that any later burden will not fall on the taxpayer.

Incentives and barriers to investment

Many responses supporting new nuclear power stations do so on the grounds that nuclear power will improve the security of supply and reduce the reliance on imported fossil fuels, and on both counts will be of economic benefit. If nuclear power is to be an option, many supporters believe, the Government must be more proactive in removing barriers for private investment by, for example, improving the regulatory and planning frameworks and incentivising investment in the large up front costs of nuclear power stations.

The long-term costs of decommissioning and waste management are two of the primary concerns expressed by respondents who disagree with the Government's views on the economics of new nuclear power stations, not least because of the uncertainties around how great these costs may ultimately be. This issue of insurance and liability is also raised by some, with mixed views as to whether it is feasible, to what extent liability should apply, and whether the Government should be prepared to play a 'last resort' role.

A number of responses also express disbelief that the building of new nuclear power stations would adhere to estimates or budget, quoting examples of other large building projects which have overrun on costs and timetable.

The figures and calculations used in this chapter of the consultation document are treated with some scepticism by many respondents. There seems particularly to be confusion about what is included and what is not included in the comparisons between nuclear power and wind power. Some responses suggest that the projections and uncertainty discussed in the consultation document regarding electricity needs are huge and some respondents feel that the models and assumptions used are deliberately biased in favour of nuclear power.

Making comparisons

Some respondents would like to see more thorough comparative costings. These include alternative approaches, such as the more immediate payback of demand reduction, mechanisms to incentivise domestic micro generation (as for example in Germany, where, it is stated, householders receive five times the normal rate for electricity sold to the grid), as well as a full analysis of the relative subsidies given to

nuclear and renewables to date, projections of their relative future costings and an exploration of the impacts on competition for finance capital in taking both forward.

Many responses suggest that energy efficiency or reducing the demand for electricity needs more work by the government. In some cases the argument then runs that if we could be more effective in these areas then there would no longer be a need for new nuclear power stations.

Question 5

Do you agree or disagree with the Government's views on the value of having nuclear power as an option? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

There are 1481 responses to this question of which 715 agree with the Government's views on the value of having nuclear power as an option, and 159 agree with qualifications. 352 people disagree with the Government's views.

Reasons for agreeing

The mains reasons given for agreement with the Government's views on the value of having nuclear power as an option are: that nuclear power contributes to reducing our CO_2 emissions and therefore to tackling climate change, and is generally a 'clean' source of energy with a low environmental impact; that it will increase our security of supply by reducing our reliance on imported fossil fuels; that nuclear technology is reliable and no back-up generation method will be required; that it is cheap and affordable; and that it is the only feasible option, especially for ensuring baseload supply. Some supporters, taking a broader, international perspective, argue that the security of affordable supply that new nuclear power stations will provide will stop manufacturing relocating to countries which have cheaper and more polluting energy generation.

Many of those who support nuclear power set out what they believe is necessary if nuclear power is to prosper. There are many calls for the Government to be more proactive in removing barriers to private investment, and to streamline the regulatory and planning frameworks and incentivise investment in the large up front costs of nuclear power stations.

Many supporters of nuclear power also explain why they think renewables, while they could play a part in our future energy supply, are not a viable alternative to nuclear power when it comes to securing baseload supply. These arguments focus largely on the intermittency and inefficiency of supply from renewables. Other concerns expressed about renewables include what are stated to be the unproven nature of emerging technologies in the renewables, carbon capture and storage sectors (see below). Others are concerned that an increased conversion of agricultural land to biofuels both in the UK and worldwide, for example, will reduce food supplies and lead to the release of greater amounts of the greenhouse gas nitrous oxide as fertiliser decomposes.

Reasons for disagreeing

The responses that disagree with the Government's views, and a number of other responses expressing arguments against nuclear power without actually agreeing or disagreeing, cite as their main reasons for disagreeing safety, costs, concerns about

nuclear waste, and concerns about the risks of terrorist attack either on power stations, on waste repositories, or on nuclear fuel supplies in transit.

Those who disagree with the Government's views, however, are as likely to do so because they believe there are better alternatives as because they are concerned about what they perceive to be the disadvantages of nuclear power. A large proportion of those who disagree, for example, would like to see much more effort put into energy efficiency, demand management, and developing and improving the full spectrum of renewable energy technologies. There is also considerable support for decentralised approaches to energy, such as Combined Heat and Power (CHP) and micro-generation schemes.

Supporters of renewables also argue that more money, time and effort should be invested in further developing renewables. Some responses say that this should be alongside further development of nuclear energy, some that it should be instead of this and that the money being invested in nuclear energy could have a larger impact if spent on other technologies. Some say that a commitment to nuclear power by Government will actively prevent investment in renewables, and that the long timescales for construction means the claimed benefits will be in any case 'too little, too late'.

The subject of Carbon Capture and Storage (CCS) receives quite a lot of attention in responses to this question, with roughly equal numbers of supporters and opponents. Its supporters argue that CCS opens up the possibility of using our indigenous coal reserves, using 'clean coal' technology, and that CCS could be widely exported to countries such as China that are heavily dependent on coal. Opponents take the view that the technology is unproven, likely to be expensive and in the long-term may not be effective.

Strategic issues

Apart from the arguments for and against nuclear power and renewables there are many responses that consider energy supply from the more strategic point of view. Many of these call for the Government to introduce joined up policies or to think more creatively about reducing energy consumption by increasing support for energy efficiency and public transport; others call for as many as possible of our energy needs to be switched to electricity in order to preserve fossil fuels for other uses. There are also responses examining the alternatives in the light of the Government's commitment to cutting carbon emissions by 60 per cent; some of these conclude that this will not be possible without nuclear power.

A number of the responses comment on the figures and calculations used in this chapter of the consultation document, particularly the uncertainty about future electricity needs, and some suggest that, in the light of this uncertainty, the building of nuclear power stations is too inflexible a process to respond to any changes in our energy needs. The assumptions which have been used as part of the modelling exercises are also questioned in some responses.

Question 6

Do you agree or disagree with the Government's view on the safety, security, health and non-proliferation issues? What are your reasons? Are there any significant considerations that you believe are missing? If so what are they?

Responses

1438 people responded to this question. Of these, 657 express agreement with the Government's views on the safety, security, health and non-proliferation issues associated with nuclear energy production; 66 agree with qualifications and 373 disagree.

Calculations of risk

Responses to this question turn largely on the issue of whose calculations and assessments are to be trusted, and whose perceptions of relative risk and hazard are most realistic. Supporters of nuclear power cite the nuclear industry's safety record to date and some point out the statistically much greater dangers of fossil fuel (for example, deaths and injuries in the coal industry) and the risks involved in non-nuclear energy generation (such as the physical dangers involved in the construction of dams for hydroelectric schemes). Many supporters of nuclear power believe a valuable and highly responsible industry is undermined by emotive and irrational arguments exaggerating its dangers.

These respondents tend to believe the Government is overly cautious when it comes to nuclear power and want it to be more proactive in its support. They assert that a new generation of nuclear plants will be safer still than older and current designs. They point out that our regulatory regime is rigorous in pursuit of safety and events such as Chernobyl could never happen in the United Kingdom as permission would never be given for that sort of power plant to be built here. Some point to the nuclear industry's extensive operating experience (several respondents calculate it as 12,000 reactor years) and what they perceive to be huge improvements in safety and operational standards throughout the world.

Security standards

Supporters of nuclear power are also generally satisfied with security standards. It is pointed out that the low enriched uranium used in civil nuclear reactors is not suitable for making nuclear weapons and that any attempt to use the plutonium in spent fuel would require easily detected facilities. There are some concerns about low-yield nuclear devices using mixed uranium and plutonium oxides. One option, according to some respondents, is to reduce the stockpile of such material by using it in modern nuclear power stations as MOX fuel.

Those who qualify their agreement mostly add points about safety and security (particularly from terrorist action and accidents due to human error) and non-proliferation. Many call for strong and independent regulation to alleviate these fears, suggesting what they believe to be aspects of building design that would increase

security, including no-fly zones, building power stations underground and military guards. Some respondents express concern about staffing, suggesting greater vigilance to prevent terrorists infiltrating nuclear installations, while others would like to ensure we have sufficient skilled staff to be able to run the new generation of nuclear power plants safely.

Concerns about nuclear power

Those who disagree with the Government's views focus their reasons on concerns about health, safety, the threat posed by terrorist attack, and links to the production of nuclear weapons.

Concerns about the health impacts of nuclear power are long-standing and, some observe, no amount of epidemiological study has dispelled, for example, what are believed to be links to leukemia clusters and other cancers. Some respondents are concerned, for example, about levels of radioactivity in waterways near nuclear power plants. Several studies are quoted in support of these beliefs, such as Gardner (1990) and CERRIE (2004).

Similarly, no assurances about safety mechanisms can remove from some respondents the fear of human error causing catastrophe; there are a number of respondents who challenge the figures and safety calculations presented in the consultation document. One figure in particular challenged by a number of people is that concerning the probability of a major accident (melt down of the reactor's core and failure of the containment structure) – cited as one in 2.4 billion per reactor year. It is pointed out that 1 in 2.4 billion per nuclear plant year equals 1 in 4 million in the next 100 years if we run six reactors. Setting aside the odds of something going wrong, people point out that the other half of the calculation has to be the potential scale of the impact if it does, and this means that no level of risk is acceptable.

Health and safety issues are not limited to the possibility of accidents. There are also concerns that health and safety regulations may be flouted by bored or irresponsible staff; examples are quoted by respondents who have worked in the nuclear industry. Some respondents do not believe the figures in the consultation document; others point out that all human activities are error-prone and cite the three major nuclear accidents (at Windscale, Three Mile Island and Chernobyl) as evidence. Others cite more recent incidents such as, for example, near meltdowns at the Greifswald plant in Germany in 1989 and at Sweden's Forsmark plant in July 2006, and others which are not mentioned in the consultation document. Some respondents believe that neither the Government nor the nuclear industry can be trusted to be sufficiently open and honest about the real safety record of nuclear power stations.

The possibility of terrorist attack is mentioned in responses to many questions throughout the consultation. Those who raise the issue tend to feel that the Government is overly complacent about the possibility, and some cite evidence that the possibility of such attacks is growing rather than diminishing. There are also concerns expressed that while nuclear industry planners have anticipated many possible terrorist attack scenarios, they had not, before 9/11, envisaged terrorists being prepared to die in their attacks; there are questions raised about whether nuclear power stations could withstand the impact of large passenger jets fully laden and fuelled. Some also use the

example of the 9/11 attacks to point out the risks of such extreme action in a turbulent world.

Link to proliferation

The link to weapons production is mentioned by many people, among them people who are otherwise supporters of nuclear power. Their concern is not just about the link to the 'official' production of nuclear weapons, but the increased possibility of plutonium finding its way to terrorists which they feel would be an inevitable result of more nuclear power. The occasional reporting of quantities of plutonium being 'unaccounted for' in inventories is not, they believe, reassuring.

Some respondents make a wider point about non-proliferation, namely that the more nuclear power stations there are, the harder and less reasonable it is to prevent other countries initiating their own civil and then military nuclear programmes. Some believe that other countries may be less able to institute regulatory regimes of sufficient rigour to control their possession of fissile material.

Concerns are also voiced, by both supporters and opponents of nuclear power, about private ownership and profit orientation leading to corner cutting and increased risk. Some respondents would prefer Government ownership to allay the safety fears associated with private ownership. The challenges of waste disposal are also mentioned by many of those who otherwise support the Government's views.

Question 7

Do you agree or disagree with the Government's views on the transport of nuclear materials? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1332 people responded to this question. Of these 702 agree with the Government's views on the transport of nuclear materials and 124 agree with qualifications. 269 disagree.

Transport and safety

Respondents who agree with the Government's views mainly base their agreement on the nuclear industry's safety record for transporting materials. Many people point out that there has not been, in the past half century or so since such activities began, any serious accident and certainly none in which there has been a release of radioactivity into the environment. Respondents put this down to a combination of factors: a strict regulatory regime, careful management of operations and extremely robust flasks in which to transport nuclear materials.

Some people use these arguments to reinforce their case that the Government should be more proactive in progressing nuclear power through legislative support and believe the current approach is too cautious despite strong evidence in favour of nuclear power as a safe option. They point out that, when it comes to transporting fuels, nuclear fuels are transported in much smaller quantities and with a much better safety record than other fuels.

Transport and security

Those who qualify their agreement do so for a number of reasons. The possibility of nuclear terrorism ranks high among them: the idea of a train or convoy being stopped and hijacked. Some add that the more nuclear power stations we have, and the more need there is to transport materials, so the greater the opportunities for such interceptions. Others point out aspects of transporting nuclear materials that need to be addressed or which need more consideration.

Another reason for respondents qualifying their agreement is because of the consultation document's linking of the record of safe transport with the assumption that nuclear fuel will not be reprocessed (*see below*).

Those who disagree with the Government's views on the transport of nuclear materials do so mainly because of safety concerns and the risk of terrorist action while nuclear material is in transit. Many people accept the Government's figures on the low level of risk and good safety record to date, however they think the grave consequences of a single incident involving nuclear materials precludes even a low level of risk being

acceptable. Others believe any risk to be unacceptable as it is unnecessary given the availability of alternative sustainable energy sources.

Safety standards and limits

Current safety standards are questioned by some who point out that they were formulated before the events of 11 September 2001 and believe that determined terrorists could breach the set safety limits. A 'dirty bomb', some point out, is easily created by exploding a conventional bomb beside nuclear material, and some express surprise that this has not already happened. The only safeguard, they believe, would be to place armed guards on every nuclear transport and along the route to be traveled; the ease with which a newspaper reporter managed to place a fake bomb on a flask of nuclear waste in a rail siding is, they argue, evidence of such dangers.

There are a number of comments regarding the design of the transport system, and nuclear plant design, with some respondents favouring the reprocessing of fuel, the storage of materials and energy generation being all on one site to minimise the transportation of nuclear materials. Safety and security of the plant and transport system are of paramount concern to many respondents, with some expressing a preference for avoiding road transportation of nuclear materials due to the risk of a road traffic accident.

Linking transport and reprocessing

The assumption that reprocessing of spent fuel will not take place - the standpoint taken in the Government's views on transport of nuclear materials - is questioned by many respondents. Some people express concern that this assumption is unnecessary to justify further nuclear generation and that it is better to reprocess fuels and use the total potential of the fuel – citing concerns over future shortages of uranium as one of the justifications. While some respondents believe that reprocessing would increase the amount of transport required, others do not see this as a problem and point out that *not* reprocessing spent fuel will substantially reduce the nuclear industry's claim to a low carbon footprint. Conversely, some people are completely opposed to reprocessing and express concern that the assumption put forward by the Government will not be maintained in the future. Some respondents do not see why the subject of reprocessing is associated with transport at all, while others believe that the Government's opposition to reprocessing is intended to create a barrier to a revitalised nuclear industry.

Some people believe the full cost implications of transportation and, importantly, long-term storage of nuclear materials, has not been accurately accounted for in the Government's assessment. Some respondents are concerned by what they see as cost cutting by private companies managing nuclear generation is a concern for some respondents, many of whom favour either total Government control or at least close inspection and regulation by Government bodies.

In relation to the issue of lifecycle carbon impact, there are several comments highlighting the need to take the full process into consideration, including the emissions resulting from the transportation of nuclear materials, the building of the plants, and long-term storage. Although many respondents favour nuclear energy generation as a carbon friendly alternative to fossil fuels, others express concern that it is not as carbon friendly as the Government assessment states.

Transport and health

Finally, health concerns relating to the dangers of radiation from nuclear materials are a very important consideration for some respondents. The risks posed by high level radiation in the case of an accident during transport, and the fear of cancer associated with low level radiation exposure as a result, are overriding concerns for them. Some respondents in disagreement with the Government's views on the transport of nuclear materials relate their concern to the whole issue of waste, which for them overrides all other considerations. They express concern over creating more nuclear waste when no repository has been identified yet as this may create a problematic legacy for many generations to come.

Question 8

Do you agree or disagree with the Government's views on waste and decommissioning? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1396 people responded to this question. Of those who responded, 434 agree with the Government's views on waste and decommissioning, 88 agree with qualifications, and 210 disagree. Many respondents do not precisely state that they either agree or disagree, though their views often give a clear indication of whether they are for or against the Government's views.

The challenge of nuclear waste

The big issue for many respondents, both supporters and opponents of nuclear power, is what should be done with nuclear waste both in the short-term and more particularly in the long-term. Many respondents point out the failure of successive governments over half a century to make any real progress on resolving waste issues, and some find it extraordinary that we should be contemplating creating more waste before we have decided exactly what we are going to do with what we have already.

For many supporters of nuclear power the answer is interim storage until a long-term geological repository is built. For opponents, the issue is part-technical, part moral. From the technical point of view, they wonder if human beings can ever really guarantee the storage of material, some of which will remain dangerous for thousands of years, safe from the ravages of earthquakes, leaks from corroded containers, and man-made menaces. From the moral point of view, they wonder whether we have the right to impose such a burden on future generations. On the other hand, supporters of nuclear power point out, imposing man-made climate change on future generations is also morally dubious if there is a means to prevent it.

Those who agree with the Government's views on waste and decommissioning also encourage the Government to be more proactive with regard to addressing these matters, with some wanting the geological repository to be progressed immediately. They reason that the technology exists, the safety issues can be managed, the existing volume of waste is perfectly manageable and there would in all likelihood be less created from a new generation of reactors. Many are emphatic that the need to manage existing waste and the challenges of creating a suitable repository are not reasons for preventing the building of new nuclear power stations.

Some respondents argue the need for a clear, timetabled plan for progressing such a repository and/or contingency planning to include addressing the process of encapsulation which enables spent fuel rods to be moved from interim to geological storage. Clarification is also requested on whether the government intends new waste to be stored in the same facilities as legacy waste. There are mixed views on this point: some suggest that CoRWM should also consider new build waste, so that there is a coordinated approach to issues such as siting criteria.

Addressing local concerns

There are a number of other issues raised in relation to waste and decommissioning. Some respondents are concerned about the effect on any local community of siting a nuclear waste facility near to it. Some respondents say they would not want one in their own backyard, while others say it would be hard to find any community that would accept one. A few respondents comment on the proposed voluntary approach. Other aspects of siting are raised, including the need to select a location, suggestions as to where it could be, the local politics of choosing a location, and comments about the geological suitability of sites. A number of respondents draw on lessons from past experience in the United Kingdom, both positive and negative, of existing facilities. A number of respondents point out that the challenges of creating a long-term repository are essentially political rather than technical.

Some respondents talk about the lack of knowledge and understanding of the risks involved in nuclear waste management, particularly among the general public, and would like to see more public education so that people would be less fearful about what is involved. Other respondents request more information about various aspects of waste management and for further research to be conducted.

The cost of waste

Another issue addressed by some respondents is that of cost. Both supporters and opponents of the Government's views on waste and decommissioning point out that it will be difficult for private companies to anticipate fully the costs of building, running and eventually decommissioning nuclear power stations unless they have a clear idea of what the costs of dealing with wastes will be. The wider economic effects of creating a waste store and/or repository are also mentioned; for example, the effect on tourism if these facilities are in areas attractive to tourists. There is also some concern expressed about the possibility of private companies being less inclined to shoulder the costs of waste storage and decommissioning once a nuclear power station has reached the end of its profitable life.

Some respondents give detailed consideration to arrangements for the proposed decommissioning and waste fund. Their points include the need for legislative obligations to be placed on operators, and mechanisms to protect operators from creditors in the event of bankruptcy. Some respondents would also welcome more clarity over what would happen if the fund is insufficient or in surplus, and over who will hold the fund (for example, industry, government or an independent trust).

The issue of reprocessing is also raised here. While many people are in favour of a long-term repository, a proportion of them would prefer the sort of repository from which what is now currently deemed to be 'waste' can be retrieved at some point in the future and reprocessed to extract more energy. The need for this is disputed: while some supporters of nuclear power agree with the Government's views on reprocessing, often because the United Kingdom already has considerable stockpiles of the relevant material, others believe that reprocessing should be regarded like any other form of recycling and would encourage it.

A number of respondents discuss the details of the interim management of waste, mentioning, for example, concerns about transportation, temporary storage being used for longer than it is designed, and concerns about safety and security.

New options and possible solutions

A wide range of other issues is raised in relation to waste, from the need to explore further options such as renewable energy and energy efficiency so no more waste will be created, to the role of bodies such as CoRWM and the NDA and the MRWS process. Some respondents mention possible new technologies and future scientific advances that which will offer new solutions both to energy generation and to dealing with its by-product. Among those mentioned are transmutation, fusion technology, pebble bed reactor design and the use of thorium fuel. Many stress the importance of continuing research into every aspect of nuclear power, including into how methods of decommissioning and waste management can become part of the initial design process.

Question 9

What are the implications for the management of existing nuclear waste of taking a decision to allow energy companies to build new nuclear power stations?

Responses

1119 people responded to this question. Many repeat the points they made in response to the previous question. The biggest group of respondents, 132, sees few implications beyond those raised in the previous question; while the second biggest group, 129, focuses on the argument that there should be no new nuclear build until existing waste issues have been resolved. 120 people actively state they cannot or do not wish to comment, or make references to their responses to other questions.

Implications and impacts

A number of similar points are made in response to this question as were made in response to the previous one. For example, some respondents explicitly state that taking a decision to allow energy companies to build new nuclear power stations will merely add to the existing problems of managing nuclear waste. Others raise specific concerns about the impact on future generations, concerns for the health and safety of those living in the vicinity of nuclear waste storage sites, and the possibility of terrorist attacks. A large number of respondents say either that no new power stations should be allowed, or that the legacy waste should be dealt with first. Many say that there is no long term, proven disposal method or repository for waste.

Many of those who support the building of new nuclear power stations say that the increased volumes of waste would be relatively limited and that the overall volumes would still be manageable. Many also mention the advantages of new build, such as economies of scale, cost benefits, and the cross flow of knowledge and expertise. Some respondents say that the decision to build new stations would give new impetus to the need to build a repository and a few say new build would not produce any waste for many years, which would allow more time for a solution to be found.

Some respondents see the need for additional disposal capacity as one implication of new build. Other implications mentioned include the need for more repositories in different locations and catering for different types of waste, and also there are implications for the time they would need to remain open. Other respondents mention interim management issues, such as the need for further storage.

Legacy waste and new waste

Many respondents would like to see new and legacy waste addressed together. A smaller number, however, would prefer to see new and legacy waste treated separately because they will have different characteristics having arisen through different processes.

Many respondents raise concerns about the involvement of private companies in the building of new nuclear power stations and the implications for waste management;

some raise this as an overriding concern and say that private companies should not be involved; others fear that private companies' focus on profits and shareholders may prevent them taking a long enough view, and are concerned about what might happen if they went into liquidation or were taken over by foreign concerns.

Many respondents review who should be responsible for nuclear waste management. Some respondents say explicitly that they want the Government to have this responsibility. One suggestion, for example, is that the Government ring-fence funds; in the US, according to one respondent, in electricity bills a small surcharge per unit used is devoted to eventual waste management and reactor decommissioning. Others would like to see greater clarity about what private companies should be responsible for, and the potential for responsibilities to be shared with the Government, and whether a separate organisation is required. The requirement for a regulatory regime that involves monitoring, inspection and controls is also mentioned.

Financial implications

Many respondents also mention various financial implications that need to be considered, for example how costs should be allocated; whether companies should contribute to legacy costs; whether there would be satisfactory returns for companies; whether costs should be borne by the consumer; and the need for funds to be set aside and managed to pay for future storage needs. Some respondents argue that before any new build is approved, operators of nuclear power stations will have to guarantee to meet their full share of the decommissioning and waste management costs. Others argue that developers should identify on- and off-site waste and decommissioning needs, and the implications for legacy facilities on or near the site, in close consultation with local authorities and other relevant agencies.

Some respondents feel costs are an overriding concern, referring both to their likely scale now and to the uncertainties about their scale in the longer term; others are concerned that costs might fall on the taxpayer if companies get into financial difficulties.

Question 10

What do you think are the ethical considerations related to a decision to allow new nuclear power stations to be built? And how should these be balanced against the need to address climate change?

Responses

1201 people responded to this question in a variety of ways.

It is *generally* true that opponents of nuclear power identify more ethical issues than supporters, though both supporters and opponents identify the need to tackle climate change as one of the overriding ethical issues of our time. Some supporters of nuclear power suggest the Government should educate the general public on the implications of climate change and the relative safety and significant contribution of nuclear power. Some of those opposed to nuclear power express anger that the Government is posing a false dilemma so as to steer the results of the consultation towards the decision it has already made.

Types of ethical consideration

The ethical considerations most frequently mentioned can be divided into a number of types. For many respondents, the ethics involved in creating and then disposing of nuclear waste feature largely in their thinking: whether it is acceptable to create new waste before a definitive means has been established to deal with that which already exists, and whether it is acceptable to manage it in a way that could leave the burden for future generations – which have not benefited from its creation – to resolve. It may be ethical for us to take risks, some argue, but it cannot be ethical to impose those risks on others, or for us to benefit from the labour of those who have to work in the difficult and dangerous conditions of uranium mines.

An additional dimension to this for some is the nature of the waste created: that it can potentially contaminate groundwater and seawater, for example, and therefore the potential effects on human and environmental health must also be weighed into ethical considerations.

Set against these arguments are those of many respondents, both supporters and opponents of nuclear power, as mentioned above, who believe that the need to respond to the challenge of climate change is an overriding ethical priority, and that in fact it would be unethical *not* to do something that could help to prevent catastrophic climate change. On the other hand, some argue, if climate change is a natural rather than man-made process then this argument does not hold water, and nor does it if the full lifecycle carbon costs of nuclear power are higher than suggested – because this would then change the relative costs and benefits of nuclear power in the balance between, for example, the moral costs of extra waste versus the moral costs of unnecessarily increased carbon emissions.

Others feel that while climate change is a priority, nuclear power is not the answer, and that other options such as reducing demand, increasing the use of renewables or

decentralised energy would be preferable. There is also a line of argument (proposed by some respondents) that says if the investment in nuclear power distracts attention away from the need to reduce our consumption of energy to a point where our society is sustainable, and to invest in renewables and other sources of power that will be sustainable in the long-term, then it would be unethical.

Other ethical dimensions

There is another ethical dimension, according particularly to some supporters of nuclear power, relating to the effect on local communities and local economies of closing down existing nuclear power stations or missing the opportunity to create or safeguard more employment by building new ones. This ethical 'opportunity cost' could also be applied, some argue, if the failure to build new nuclear power stations results in society forfeiting the benefits of a secure electricity supply; or in the unnecessary escalation of electricity prices leading to fuel poverty and social deprivation (we also need to consider, for example, the ethics involved in reduced or too expensive energy supplies leading old people to die of hypothermia); or in the waging of wars to ensure the supply of fossil fuels. On the other hand, according to some opponents of nuclear power, it is also unethical to invest in what they see as a dangerous activity in order to fuel what they see as the fripperies of a consumer society.

There are two other ethical dimensions to a decision whether to allow new nuclear power stations to be built. The first of these is the possibility of encouraging nuclear proliferation because it becomes more difficult for us to persuade other countries to abandon their nuclear ambitions, whether civil or military, if we ourselves are unwilling to.

The other stems from the nature of the decision-making process itself. Given the importance of this decision and its implications for many years in to the future, say some, all the possible electricity generating and supply options should be given equal consideration and examined in parallel, and preferably the public should be widely involved the decision. In other words, how the decision is taken has to be one of the ethical considerations.

Ethics and survival

Almost as many people say there are no ethical decisions involved as say there are. The point has already been made that many supporters of nuclear power identify the need to tackle climate change as an ethical issue. Many also say that nuclear power is like any other power-generating technology: it has advantages and disadvantages in the same way as fossil fuels or hydro-electricity, and balancing the risks against the rewards is also the same as with any other technology, though others point out that balancing potential risks against potential rewards does not constitute an *ethical* debate.

There are a number of other points made about the ethical dimensions of nuclear debate. At the heart of it, for some respondents, both supporters and opponents, is the link between nuclear power and nuclear weapons: for some supporters a link that is largely irrelevant to the present decision; for some opponents, a link that is ever-present.

For many supporters of nuclear power, however, the crucial considerations are not ethical but considerations of security (an electricity supply free from foreign influence); safety (a proven technology with a good safety record); environment (a low-carbon generating capacity); and economics (a cheap source of electricity). Some supporters say that this decision is a question of survival and that ethical considerations should not come into it.

Question 11

Do you agree or disagree with the Government's views on environmental issues? What are your reasons? Are there any significant considerations you believe are missing? If so what are they?

Responses

1245 people responded to this question. 487 people agreed with the Government's views on environmental issues; 62 agreed with qualifications; and 196 disagreed.

The consultation document sets out, at the beginning of Chapter 9, to which this question relates, a number of relationships between nuclear power and the environment. Two of these, reducing the United Kingdom's carbon emissions and the managing of radioactive waste, are addressed in other chapters. In Chapter 9 the consultation document describes 'other environmental impacts that arise at different stages in the nuclear life cycle', in particular 'landscape and construction issues; water use and thermal discharge; mining and milling of uranium ore; and preparation of fuel for nuclear power'.

The immediate environment

Many of those who state they agree with the Government's views tend to be focusing on the construction of nuclear power stations and the landscape issues immediately associated with them. Some agree with qualifications, such as ensuring the waste issue is resolved satisfactorily, or providing approval is granted on the basis of existing planning laws, or assuming that full state-of-the-art security technology will be in place.

Of those who agree with the Government's views, the majority refer to the impact of nuclear power stations rather than the impact of nuclear power. The most frequently cited reason is that they have a lower environmental impact than alternative modes of generation, and contribute to reducing carbon emissions. More specific reasons include the low volume of fuel required and waste produced, reducing the impacts of transport; the area of land-take is low; the visual impact is acceptable given the need to generate electricity; and it is a mature technology that is well regulated, reliable and well understood. Faith in existing planning and regulatory procedures to mitigate any detrimental impacts is also frequently given as a reason for confidence.

In addition there are some who feel that nuclear power is unreservedly the best option and that environmental issues should not cause endless inquiries and delays.

Many of those who support the building of new nuclear power stations compare their immediate environmental and landscape impacts with those of renewable technologies, particularly wind farms. Other renewable technologies barely feature in responses except for a few respondents who mention land-take for biofuels and the unknown impacts of tidal barrages.

The wider environment

Those who disagree with the Government's views on the environmental issues tend to interpret 'environmental' more broadly to include one or more impacts falling within wider lifecycle considerations, such as the environmental impacts of uranium mining, waste management, radioactive leakage, accidents, decommissioning, as well as security aspects and weapons proliferation. These respondents tend to disagree with the Government's views on the grounds that the environmental issues around nuclear power spread wider, reach deeper and last longer than the mere construction of nuclear power stations.

There is a strong feeling among this group of respondents that a direct comparison between nuclear power and other forms of energy generation is impossible because the impacts and risks are of a significantly different nature and degree. This group concludes that it is impossible to assess the impacts of nuclear power generation without a comprehensive evaluation of all energy options, including the full spectrum of costs (financial, social and environmental) over the full life-cycle of operations (which for nuclear power would run from the extraction of uranium through the building, running and decommissioning of power stations to the eventual decay of radioactive waste).

Comparing impacts

There is a suspicion expressed by some that by not addressing the full range of impacts the Government is concealing the full costs of nuclear power and preventing like-for-like comparison with options such as carbon-capture technologies; the whole spectrum of renewables; small-scale decentralized generation; and demand-side management.

This is reflected in the large number of responses pointing out that the comparison in land-take between nuclear, coal and wind generation described in paragraph 103 is flawed because wind generation could be sited off-shore, while on-shore generation does not preclude other use of the land, and wind turbines are easy to decommission with minimal lasting impact. There is also suspicion among a few respondents that uncertainty and incomplete knowledge is neither being acknowledged nor properly addressed.

As regards siting, there is considerable support for building on existing sites. Reasons given are: the presence of an existing infrastructure and work force; preference for using a brownfield site; local populations would be more likely to accept new-build; and the predominantly coastal locations ensure a water supply for cooling.

Several respondents point out, however, that while building on existing sites has advantages, these coastal sites are vulnerable to sea-level rise and the increased incidence of storm surges expected to result from future climate change. Some flag up the problems of building power nuclear power stations on alternative brownfield sites, such as the sites of fossil fuel stations, because these tend to be close to population centres, far from a water source, and would require ugly cooling towers. A few observe that if nuclear power stations are as safe as the experts say, then brownfield sites in London could be used; and if the technology is not safe enough to put in London, it is not safe enough to put anywhere.

The planning system

A significant number of respondents express faith in existing Environmental Impact Assessment (EIA) procedures, regulatory bodies such as the Environment Agency, and welcome the proposals for the Strategic Environmental Assessment (SEA); almost as many are concerned, however, that the siting issue has not been thought through and want more input from government and environmental advisory bodies. A few explicitly advocate the use of the planning system to promote more decentralized approaches to power generation, preferably within a broader-based national energy strategy.

A recurring issue is the sense that the purpose of the Planning White Paper is to reduce local control in order to accelerate the consent procedure for major infrastructure projects such as nuclear power stations. A particular concern is the replacement of the right of local people to participate fully in the inquiry process by the right to be merely consulted by the developer. This is regarded as a regressive step in terms of democratic and participatory governance.

Other environmental issues

Some express the view that new nuclear build should not proceed until issues surrounding waste disposal have been resolved, while the chief concern surrounding accidents and radioactive pollution is the difficulty in excluding operator error and plant failure. Other issues cited by a significant proportion of respondents are the impacts of uranium mining, the risk surrounding terrorist attack, and the link to weapons production.

There is also a significant proportion of people who are concerned about the involvement of private energy companies in such a high risk industry. While not all of these completely rule out the involvement of private companies, the majority of concerns surround the incompatibility of profit orientation with stringent operational and safety procedures. Other issues are the suspicion that it would be only the profitable areas of power generation that would be privatised, leaving the taxpayer to foot the bill for unprofitable areas and any clean-up arising from accidents, as there is nothing to stop private companies from investing now. A few respondents actively advocate the involvement of private energy companies.

Question 12

Do you agree with the Government's views on the supply of nuclear fuel? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1231 people responded to this question. Of these, 521 agree with the Government's views on the supply of nuclear fuel and 128 qualify their agreement; 255 disagree.

Those who agree with the Government's views on the supply of nuclear fuel do so mostly by echoing the points made in the consultation paper. The fact that the United Kingdom's nuclear fuel comes largely from secure and stable sources such as Canada and Australia, and can be stockpiled in advance of use, is widely regarded by respondents as one of the key advantages of nuclear power.

Future supplies of nuclear fuel

Respondents also feel that the Government's figures allow for the possible increases in demand and consequently price of uranium, though some feel the figure of enough supplies to last 85 years, mentioned in the consultation paper, may be over-optimistic unless reprocessing and fast breeder reactors are used. Some argue that it would be wise to buy and stockpile enough fuel to ensure a new generation of nuclear power stations can be assured of enough fuel to last throughout their lifetimes.

Of those who qualify their agreement, some point out aspects of the supply of nuclear fuel that need to be addressed or which need more consideration. Their concerns are primarily about the continuing availability of uranium, the security of the sources, and the assumption that fuel will not be reprocessed. Many respondents are in favour of reprocessing being kept open as an option should the need arise in the future. In addition, many people assert the view that other nuclear technologies need to be developed in parallel with uranium-based technology, for example thorium, fast reactors, breeders, and MOX. Some also point to sources of uranium that have yet to be exploited, including the sea and ash from coal-fired power stations.

Some people strengthen their agreement by confirming that they believe that the supply of uranium is from secure sources and that they do not see the supply of uranium being a problem in the future. Furthermore, some respondents view stockpiling uranium to guarantee future supply as a valid course of action.

A great many of the respondents who disagree question the Government's assessment that there will be an 85 year supply of uranium. Many respondents assert that if and when the United Kingdom decides to build more nuclear power plants to meet its future energy needs, many other countries will follow our lead. Some respondents go on to say that the resulting increase in demand, and the likelihood that this will lead to lower quality ore having to be extracted, will lead to a decrease in supply and an increase in the cost of uranium. Many assert that the uranium supply in this situation will be much shorter than 85 years and may not last the lifetime of any new nuclear build, thereby

reducing the validity of arguments based on cost, carbon impact and energy production. Some respondents supply detailed calculations to support their arguments or refer readers to various published sources of information.

Benefits of self-sufficiency

The finite nature of the supply of uranium, similar to that of fossil fuels, is of concern to some, and others would prefer the United Kingdom to be self sufficient in its energy generation and fuel supply to mitigate any future security of supply problems. Some respondents assert that security of supply of uranium is not certain for the long term future as relationships between countries can change over time, or supply routes across the world may become vulnerable to interdiction by hostile powers or terrorist groups.

Many of the respondents who disagree with the Government's views would prefer to see the focus of solving the problem of future energy needs on lowering demand for energy by promoting energy efficiency in the home and in current methods of power generation. Others express concern that nuclear energy will have more carbon impact than has been taken into account when mining, transporting uranium from Australia, new build, decommissioning, and the carbon impacts of waste disposal are all factored in.

Other concerns expressed by respondents are of a more general nature, with health, safety, risk of terrorism, environmental impact, human rights aspects and fears over reprocessing being important considerations.

Finally, a large proportion of those in disagreement with the Government's views on the supply of nuclear fuel are in favour of renewable energy production, with many expressing a desire for more money to be invested in the development of these technologies instead of in nuclear energy generation.

Question 13

Do you agree or disagree with the Government's views on the supply chain and skills capacity? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1176 people responded to this question. 378 agree with the Government's views on the supply chain and skills capacity; 122 agree with qualifications. 112 disagree.

Many respondents who agree with the Government's views are enthusiastic about the possibilities of new nuclear build, not least because, some say, it could signal the renaissance of the British engineering industry. Many respondents believe the United Kingdom has a wealth of nuclear engineering talent available, and there should be no difficulty in assembling the necessary human resources to implement new nuclear build if required. While some respondents believe the long lead-time for nuclear build will help ensure the skills are available, others add that the sooner a positive decision is made, the sooner the necessary resources can be put into place.

Investing in skills

Even so, some respondents feel that there may be skills shortages and that the combination of market forces plus public and private investment in training and education may or may not be sufficient to remedy them. Many respondents refer directly to the need to invest in and develop education, training and skills. This investment should range from establishing apprenticeships to encouraging more young people to take science and engineering courses in secondary and higher education. There are many comments about the lack of science based education, and concern that the current lack of a viable career structure, options and opportunities for those wanting to enter the nuclear field diverts many into other courses and industries.

Some responses note, however, that recently more courses, academies and centres have been developed and have good numbers of students. Many responses argue a pressing need to move faster on investing in the necessary skills base if the supply of skills for new nuclear build is to be met from domestic sources.

A recurrent feature of many responses is the need to take strategic decisions quickly in order to provide some certainty in a field that some feel has dwindled and also to deal with the magnitude of the potential skills gap if left undecided for longer. A number of responses say that the current climate of uncertainty in decision making about nuclear policy has lead to a lack of investment in skills, education and training over the years and has resulted in the United Kingdom being behind the field and with a largely ageing workforce. There is a need to make a significant investment to catch up - some say that this just may not be feasible.

A high proportion of responses refer to the fact that if the skills cannot be found in the United Kingdom then there is expertise that can be drawn upon from elsewhere in the world. Some skills, including some which may be needed in the very early stages of a

new build programme, are felt to be in short supply and therefore the lead times to develop skills may not be as long as anticipated. A few responses refer to the fact that current nuclear skills are geared more towards decommissioning and there will continue to be a large demand for these skills over the coming years.

Using skills from overseas

One comment made repeatedly in responses is that the skills base that has existed in the past with respect to the industry is diminishing and ageing. Some respondents argue that the necessary skills have, however, been retained and developed in other countries such as France, Japan and Iran and they believe that in the short term this could mean that we have to rely on this overseas skills base. For some respondents this is an acceptable approach; for others it points to the need to ensure that in the future the opportunity is taken to develop the skills of the British nuclear industry, including those of the supply chain industries. A number of responses specifically mention issues related to the security of using foreign workers and our vulnerability if we have to draw on a skills base from outside the United Kingdom.

Supply chain capacity

Those who agree with the Government's views make similar points about the supply chain capacity: the United Kingdom can supply most of what will be required and by the time the need arises we will be able to fill the gaps either through increased capacity at home or by buying abroad. Even so, some say, some supply/demand imbalances will occur and will have to be managed. In this respect nuclear new build does not appear to be radically more challenging than developing other technologies.

The lack of current United Kingdom capacity to deliver on major component parts and the need for early decisions and orders if deadlines are to be met (providing a go-ahead is given) is a focus of some responses. A number draw on experiences elsewhere and advocate ways to simplify the supply chain issues, for example through keeping to one reactor design.

Creating new employment

A number of respondents refer explicitly to the job creation potential of new nuclear build and the need to create an industry that will add to the United Kingdom's economy, including its export potential, and regain what some feel is the loss of manufacturing capability. Other responses point to benefits beyond engineering, such as the continued economic development of communities around existing sites which are often in remote parts of the country where employment opportunities are limited.

In this context some responses note the potential for the North West, which hosts more than half of the United Kingdom's 40,000 nuclear sector employees, to become a focus for training and skills development. In addition there are responses about the need to create more certainty over the future of the industry in order to provide the framework for careers to develop and investment in skills to happen. Without this certainty the nuclear sector is felt by some to offer no or very limited career choices.

Some respondents are concerned that there may be conflicting demands for relevant skills, for example between the skills needed to develop new nuclear plants and those

required for decommissioning or waste management. The Government is also asked to consider that while increased interest in nuclear power internationally may cause temporary skills and /or supply chain shortages, the broader move towards a low carbon economy may have an even more significant impact, not just as a result of increased development of other energy sources, but also due to the need for grid upgrades and transport infrastructure modifications (such as for hydrogen or electrification of the railways). Some respondents believe such conflicting demands are unlikely, arguing for example that construction of new build would begin after current major projects such as construction for the London Olympics and Terminal 5 at Heathrow Airport.

Avoiding past mistakes

Some respondents emphasise, in addition to the need for an early decision to allow time to prepare, the need for a close relationship between the Government and industry to help avoid repetition of the 'dash for gas' and the 'rush for wind', when technologies and significant equipment came from outside the United Kingdom.

The responses that disagree with the Government's views can be roughly divided into two groups. One group is composed of supporters of nuclear power who believe that the Government is underestimating the magnitude of the challenges with respect to skills and supply chain issues.

The other group is composed of people who are generally opposed to nuclear power and/or would like to see the relevant skills used in developing renewable sources of energy and demand-side management measures rather than the nuclear industry. There is also some concern that development of the nuclear industry will take away efforts and resources from developing a renewables industry that is potentially very valuable. Some respondents are also worried that building nuclear skills capacity could contribute to weapons production and proliferation.

Question 14

Do you agree or disagree with the Government's views on reprocessing? What are your reasons? Are there any significant considerations that you believe are missing? If so, what are they?

Responses

1174 people responded to this question. Of these, 376 agree with the Government's views on reprocessing; 115 agree with qualifications. 216 disagree.

Responses to this question need to be read particularly carefully because it is apparent that some respondents misunderstand the Government's position. They mistakenly believe the Government's view is that spent fuel from new build would be reprocessed.

Approaches to re-processing

Of those who definitely do agree with the Government's views on reprocessing, most simply say that they agree. A few provide supporting arguments pointing, for example, to what they believe to be the unfavourable history of reprocessing in the United Kingdom, or to what they perceive to be other overriding problems with reprocessing, such as cost and safety.

Those respondents who qualify their agreement mention the need to consider the problem of waste as well as aspects of spent fuel storage and disposal. Many feel that, while reprocessing may not be an option now, it should not be closed off as an option for the future and could help with conservation of resources and security of uranium supply should this become an issue. Indeed, several people mention the need to store spent fuel in a retrievable state so that the option of reprocessing it remains open.

Those who express direct disagreement with the Government's views on reprocessing argue that reprocessing would resolve many concerns over the storage and disposal of spent fuel and waste, and highlight some of the potential benefits of reprocessing. Positive aspects of reprocessing put forward include security of fuel supply, the availability of existing facilities, and possible economic and environmental benefits. Some people feel that the government should put more resources into exploring and improving reprocessing technologies for future use.

Many are also anxious to point out that by not reprocessing we are in fact wasting a high percentage of the energy available from nuclear fuel, and missing an opportunity to complete the nuclear fuel cycle and make ourselves much more self-sufficient in energy.

Spent fuel: asset or waste?

Responses on the issue of reprocessing tend to revolve around whether the respondent believes that spent fuel is an asset or a waste, with waste being high on many people's agenda, either as a problem to be considered or as an overriding concern. Although many people feel that reprocessing would improve the waste situation or make it easier

to handle, there are a few who believe waste would be just as difficult or even harder to manage should reprocessing go ahead. Some of those who argue in favour of reprocessing do so because they consider spent fuel is not only too valuable but too dangerous to store: reprocessing is the only way, they believe, to make the 'waste' safe for long-term storage or disposal.

There are also several comments that, whilst not explicitly agreeing or disagreeing, do point towards the need to take specific considerations into account around the issue of reprocessing. These generally centre on issues of ownership and the strategic aspects of reprocessing as well as on costs and facilities.

There are a few other specific issues raised in relation to reprocessing, most notably specific concerns over discharges into the Irish Sea (which many supporters of nuclear power believe is overstated), and references to the potential for fast reactors in the future (in some cases as an argument for keeping the reprocessing option open).

Re-processing and nuclear weapons

A potential link to nuclear weapons is made by a few people: of those, most express concern that recovered plutonium could be used for weapons production, or that there could be a perceived link; a couple feel that recovered plutonium would be useful for maintaining the nuclear deterrent; others state that any plutonium recovered from reprocessing is of no use for weapons production.

Other responses

A number of people feel unable to comment, many stating that this is due to lack of knowledge or to the technical nature of the issue. A few explicitly state their indifference to the matter of reprocessing, but generally do recognise some of the issues involved. A few feel that reprocessing is not the key issue; these are mostly people who express explicit opposition to nuclear power.

There are also some respondents who express doubts over the Government's current position on reprocessing, believing that it is a political move to get around one of the main public objections to nuclear power.

Finally, there are a few comments that the United Kingdom either is or should be a world leader in reprocessing, as well as comments pointing towards what other countries are or are not doing in relation to reprocessing.

Question 15

Are there any other issues or information that you believe need to be considered before taking a decision on giving energy companies the option of investing in nuclear power stations? And why?

Responses

About a fifth of the 1101 people who responded to this question have nothing to add to their responses to previous questions. Many of the remainder repeat points they have made previously.

Some respondents take the opportunity to comment directly or indirectly on the consultation document and process. Many of its critics question the integrity of the process, saying that they believe that key decisions have already been taken. The main substantive criticism is that the consultation focuses on the future of nuclear power at the expense of discussing energy policy in general or providing a balanced account of all potential sources of energy.

This theme is taken up by many of the respondents who use this question to repeat points about the risks and dangers of nuclear power and the benefits of more investment in renewables. Some provide detailed accounts of particular technologies, such as geothermal power.

Economics and ownership

The economics of nuclear power are also further discussed by a number of respondents. Some believe that private companies will be unwilling to make the scale of investment necessary for new nuclear build in the United Kingdom without public subsidy; others believe that if they do so they will cut safety corners in order to ensure a profit, and for this reason some feel that if new nuclear power stations are to be built then it should be by the Government. Questions about incentives, subsidies and pricing mechanisms are raised and possible regulatory frameworks are discussed. The future of energy research is also raised here, with proposals such as a tax on nuclear produced electricity to fund further research and development into nuclear fusion. A strategy to develop the Climate Change Levy to provide a level playing field for nuclear power, and the alternatives if it does not work, is also suggested.

The ownership and management of electricity generation are raised by respondents as issues that need further consideration before decisions are taken. For example, the acceptable level of foreign ownership needs to be considered, the role of British Energy, and the future of nuclear sites in the context of the Nuclear Decommissioning Authority (NDA). Some concern is expressed at the idea that decisions about the future of the country's energy supplies are being left to energy companies: a number of respondents are adamant that it is the job of the Government to ensure that there is the proper policy framework in place then to take the decision on environmental grounds; the job of the energy companies is to build and operate power stations, not to make what are essentially political decisions about whether they should be built.

This latter point is also picked up by the many respondents who argue that if we invest in reducing the demand for electricity and increasing the efficiency with which we use what we generate, there will be no need to build new nuclear power stations.

Demand reduction and decentralisation

Many of those who argue for demand reduction also argue for more decentralised energy generation to reduce transmission costs and thereby again save energy. They point out that decentralised electricity production would also create local jobs (again reducing energy demand), and would reduce energy use because much of the energy generated would be used either as heat or as electricity, with possibility of 'trigeneration', which can also offer cooling systems in summer – perhaps, it is argued, a significant benefit as global warming increases.

Decentralised electricity generation, it is also argued, can create a demand for energy crops such as fast-growing coppicing crops like willow, or take advantage of straw that would otherwise be left to decompose. The electricity generated, supporters of decentralised energy argue, would be cheaper because the costs of the national grid would be removed, there would be competition between local energy supply companies, and the environment would benefit from the use of carbon neutral fuels. The issue for supporters of decentralised generation is not how we generate electricity, but how efficient the generation processes are.

Among responses in support of decentralisation are references to the critical role of energy storage, which some assert is increasingly common. This is a point they feel is a key omission from the consultation document and Government plans, because they believe the availability of domestic and industrial electricity storage could remove many of the requirements for uninterruptible supply and allow greater flexibility of generation.

Decisions required

Many people believe the Government needs to be more proactive and take immediate steps to address the energy problems we may face in the future. The vast majority of these are advocates of nuclear power expressing frustration at what they see as unnecessary delays to essential decisions. Some respondents believe that new nuclear power stations could be in place by 2017, earlier than the Government anticipates, providing it takes an early decision and ensures the necessary enabling frameworks. The planning process is raised by a number of respondents, with many of them voicing similar points and looking to the Government to expedite the planning and licensing process.

One of the themes articulated by some respondents, many of them looking to the Government for leadership on nuclear new build, is the need for more public education and awareness-raising of the benefits of nuclear power. Some of them point to the positive experience of other countries, though others use the experience of other countries to argue for alternatives to nuclear power. Those who mention the history of nuclear power are similarly divided, drawing opposing conclusions from the history of the last half century.

Strategic issues

A number of respondents use their response to this question to reflect on the strategic aspects of energy supply, asking some fundamental questions about where we are going and what we need to do to secure our energy supplies for the coming decades. For some, nuclear is the only answer, while others wonder about what comes after nuclear, given that uranium too is a fuel in finite supply, and whether investing in new nuclear build now will not preclude more ultimately sustainable options for the future. Some too would like to see this current debate placed firmly within the context of achieving sustainable development.

In addition to these points many others are raised about different aspects of nuclear power and its attendant operations from uranium mining to waste disposal. Other aspects of energy supply are also discussed, such as carbon storage, climate change, nuclear fusion and hydrogen power.

Question 16

In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?

Responses

Of the 1338 people who answer this question, 734 agree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations. 74 agree with qualifications. 424 disagree.

While the question is posed specifically in 'the context of tackling climate change and ensuring energy security', these issues are mentioned by very few people in their responses to this question. The vast majority of responses express overall positions in relation to nuclear power.

A number of letters and e-mails make points relevant to specific sites. 79 letters relate directly to the Wylfa Power station in Anglesey. The great majority of these respondents make the case for nuclear new build at the Wylfa site because of the importance of the power station to the local economy; a petition signed by 300 people make the case for new build in Anglesey. A few respondents also make the case against new nuclear build in Anglesey.

85 letters relate to the Dungeness site in Kent. These argue that there needs to be stronger and enforced planning control to ensure that a new or greatly expanded airport should not be sanctioned close to an existing or new nuclear power station.

Reasons for agreeing

The main reasons given for agreeing with the Government's view are that nuclear power is the only option that will provide the United Kingdom with a baseload capacity that is low carbon, a proven technology and uses fuel from secure sources.

Some supporters of nuclear power would like to go further than the Government suggests and see energy companies compelled to make such investments, and in the longer term to aim for a higher proportion of electricity generated from nuclear power than is the case at present.

Among the qualifications most frequently mentioned by those who otherwise agree with the Government's views are the need for stringent safeguards covering all aspects of safety and security; the preference for the nuclear industry either to be nationalised or for there to be at least some level of public ownership to facilitate the Government's oversight and control; and either that there should be no subsidies from the taxpayer or, conversely, that public resources should be used to ensure that issues such as waste management are properly resolved.

Other qualifications are that new nuclear power stations should be based on common designs to facilitate learning and oversight and to reduce costs; and that energy

companies should also be encouraged or compelled to invest in renewables with the aim of building a balanced mix of energy sources.

Reasons for disagreeing

Those who disagree with the Government's view that energy companies should have the option of investing in new nuclear power stations make their reasons clear in numerous responses to this and other questions, chief among them being concerns about the risks and hazards of nuclear power caused by safety lapses; action by terrorists; security of supply because we would be dependent on the transport of uranium, a finite resource, from overseas; the ownership and management by private companies and the perception that this increases the likelihood of accidents; the problem of creating new nuclear waste before there are settled plans to deal with the legacy of waste from the past and present; the threat to the environment posed by radiation leaks from power stations or waste; the high costs of nuclear power; and the consequent diversion of resources away from research and development into renewable and sustainable forms of power supply.

Many people also disagree because they believe that there are better and safer power sources and generation methods available, including tidal, wind, wave, sun, hydro, biomass, geothermal and clean coal and other fossil fuels combined with Carbon Capture and Storage (CSS).

Involving the private sector

In addition to articulating the major arguments for and against nuclear power, respondents take the opportunity to raise a number of other points, many concerning the role of the private sector. A number of respondents discuss whether private companies will be likely to take up the option, and how the Government will respond if they do not. Some responses ask what is currently stopping industry investing in nuclear power. Several responses (from large energy companies) indicate they are ready to invest once Government puts in place the framework outlined in this consultation.

Other respondents are suspicious that the private sector may be happy to wait for external pressures to mount in the hope of eventually receiving better terms for the investment, such as public subsidies or reduced liability for decommissioning and waste. Among opponents of nuclear power there are hopes that the private sector will not take up the option, or will be prevented through public opposition at the planning stages, so that the Government will be forced to switch its main focus to alternatives. Some supporters of nuclear power advise the Government that, should it decide to give private companies the option, it should engage in a careful media and public awareness campaign to help build public support. Others warn that the market will be most likely to build new gas burning stations if not given the nuclear option.

The consultation process

There are also comments on the consultation itself. Some respondents welcome the opportunity to contribute; some thank the Government for addressing what they feel is a key area in which the United Kingdom can take a lead; others feel the Government is dismissive of alternative views and poses leading questions. Some respondents

consider that this question is disingenuous and the Government should more clearly take responsibility rather than adopting what they perceive as a *laissez faire* approach.

Question 17

Are there other conditions that you believe should be put in place before giving energy companies the option of investing in new nuclear power stations? (For example, restricting build to the vicinity of existing sites, or restricting build to approximately replacing the existing capacity.)

Responses

Of the 1119 people who responded to this question 271 argue that new nuclear power stations should be restricted to existing sites while 121 argue against this. 249 state that no other conditions are needed, with 113 opposing any cap on capacity and 32 supporting it. 114 oppose giving energy companies the option of investing in new nuclear power stations.

Finding the right sites

There is a strong sense that wherever possible existing sites should be reused. There are a number of reasons for this: planning consent should be easier on existing sites and therefore expedite the whole process; existing infrastructure is already in place; a labour force and skills base already exists; and local people are more likely to accept new build on existing sites.

Those who argue against this do so on the grounds that, providing all planning, environmental and regulatory requirements are met, power stations should be sited as close as possible to where demand arises. These include those people who feel that nuclear power stations should be sited close to Westminster where political decision makers are. Conversely, a small number of people specify that new power stations should be located well away from populated areas. Furthermore, as many of those opposed to siting restrictions point out, climate change and sea level rises may mean that many existing sites are not suitable and this needs to be considered. A significant number of people feel that it is up to developers to identify the most appropriate areas. Some would also like to see the planning process streamlined in order to expedite the building of new nuclear power stations.

Other issues raised in relation to siting include the need to avoid building new power stations in otherwise pristine environments in order to avoid ugly overhead transmission lines and other eyesores. The underlying geological stability of sites is mentioned by others, and also the availability of technical necessities such as a water supply. There are suggestions that power stations could be sited in old mining or other disused industrial and brownfield areas. The design of power stations to make them as visually un-intrusive as possible, wherever they are sited, is also important to respondents.

Involving local communities

A number of people raise concerns about local communities, wanting to ensure that they can have their say through the planning process and that there will be compensation for any communities that do host new nuclear power stations.

Respondents representing some communities with experience of the nuclear industry would actively welcome nuclear new build.

A cap on capacity is opposed by many supporters of nuclear power on the grounds that the United Kingdom needs to do more than merely replace existing nuclear capacity. They argue that as nuclear power stations are the best way to generate large amounts of low-carbon electricity we should be building as many of them as possible. Some would like the United Kingdom to emulate France and generate up to 80 per cent of our electricity from nuclear power.

Some people take the opportunity to suggest conditions above and beyond land use planning conditions. These tend to be reiterations of points made in responses to earlier questions, such as investment and/or construction should only be allowed by British companies or that public ownership is preferred. Many respondents also feel that existing waste management issues should be resolved before any new build goes ahead, and that non-nuclear options and energy efficiency improvements should be considered first, and given at least the same level of support as nuclear power.

The role of the Government

Some respondents suggest a number of additional broader conditions relating to the Government's role, such as a perceived need for the Government to take the ultimate decision. Some also believe the Government should offer a stronger direction in the energy markets, for example by setting target planning quotas for each source of electricity. There are also calls for the Government to ensure a sufficiently high carbon price as a prerequisite, or to demonstrate a comprehensive commitment to climate change, for example by putting significant effort into reducing methane emissions.

Question 18

Do you think these are the right facilitative actions to reduce the regulatory and planning risks associated with such investments? Are there any other measures that you think the Government should consider?

Responses

Of the 1101 people who responded to this question, 440 agree that the facilitative actions suggested in the consultation document are the most appropriate to reduce the regulatory and planning risks associated with investment in nuclear power. 76 agree with qualifications. 133 disagree.

Support for the Government's proposed facilitative actions comes from respondents who believe that it is essential the building of new nuclear power stations is expedited, and that those measures will help to reduce risks and uncertainties for developers and secure private sector confidence in and commitment to new nuclear investment.

Simplifying and streamlining

Those who qualify their agreement do so for a range of reasons. There are some who believe the whole process is still too complicated, will take too long and needs further simplifying and streamlining. Others believe how waste will be managed needs to be set out in detail, with some believing it should the Government rather than the private sector that shoulders this burden. There are also comments about the value of choosing a single reactor design to make building and maintaining power stations as simple and cost-effective as possible.

Many of those who disagree with the Government's views that the private sector should be allowed to build new nuclear power stations nuclear power do not respond in detail to this question on the grounds that since they do not agree with nuclear power, they would not agree with any measures designed to facilitate its introduction.

Preserving planning laws

Those who set out the reasons for their disagreement often start from the belief that planning laws should not be weakened or adapted just for the nuclear industry, and that what is proposed could undermine the regulatory protections already in place. Some argue that these proposed measures are undemocratic and testament only to the fact that without them nuclear new build would be impossible. Others are concerned that these same measures will be used by developers to push through other major projects without sufficient scrutiny. Some question why the same facilitative measures have not been introduced to help the introduction of other forms of power generation, especially renewables.

A number of responses concern regulatory issues. Some point out that permitting new nuclear power stations is complex and involves several organisations. These views lead to suggestions that the Government should integrate all permitting work into a clear overall programme to help regulators and planning bodies to assess workload and

resource needs and, further, that Government should conduct the prioritisation process prior to regulators starting detailed assessments.

Other suggestions include the need for an agreed process of volunteerism, for the Nuclear Installations Inspectorate (NII) to accept the safety case of designs licensed in Europe and the US, and for competition authorities not to discourage long terms contracts that can reduce investment risks for low carbon technologies such as nuclear, tidal and hydro. Other suggested additional measures cover reprocessing, grid connections and the idea of a standing commission to examine all proposals.

Fiscal measures

One of the many issues addressed by respondents is the Climate Change Levy. Many supporters of nuclear power believe that there is an inconsistency of approach to renewables and nuclear power, and that it is reprehensible that nuclear power, which some believe emits fewer greenhouse gas emissions than renewables, is not subsidised in the same way.

A number of respondents provide detailed analyses and assessments of the fiscal measures that need to be added to the facilitative measures proposed. There are a range of additional measures proposed in response to this question, mostly relating either to energy prices, markets and subsidies; around insurance against accidents, and waste and decommissioning costs. How decommissioning and waste costs should be paid for also receive some attention, with various additional measures proposed, such as requiring developers to buy a bond that would cover costs in the event of an accident. There is also concern that the uncertainties around eventual waste management and decommissioning costs create a potentially large burden for a future government and its taxpayers, and there should be measures in place to address these issues.

The role of the Devolved Administrations

Some respondents are also concerned that the Government's facilitative measures will largely deny local communities the power to ensure their views are taken into account over planning decisions, and advocate an open and transparent public engagement process as a key element of future action. There is an echo of such concerns in the attitude of those who believe that Wales, like the other Devolved Administrations in Scotland and Northern Ireland, should have the right to make its own decisions. Others believe that such decisions need to be taken by Parliament in Westminster, and that the Devolved Administrations should not be allowed any power of veto over any aspect of British energy policy.

As this was the last question some responses conclude by commenting on the current and possible future consultations. There is praise for the regional events, regret that key anti-nuclear groups withdrew from the process thus depriving the Government of their views, and calls for further, wider, consultation such as a referendum.

Technical consultations – Summary of responses by question

Question 1a

Are Government plans to structure the proposed Justification process by making a time-limited "call for applications" helpful?

Responses

Of the 122 who responded to this question 74 support the proposed Justification process, 11 support it but would like the timeline to be reviewed and either shortened or extended, and 14 support it with other qualifications. 8 people do not support the proposed Justification process.

The main reasons for supporting the proposed Justification process, among those who provide reasons, are that it will help to focus applications and expedite the process towards building new nuclear power stations. The respondents concerned about the timeline divide between those who think the current timeline may be too short and those who think it may be too long. Most of those respondents who answer 'no' to this question seem concerned that the process will be too constraining and time-consuming when the need for new power stations is urgent.

Those who qualify their support do so for a number of reasons. Among them are that time limitations must coincide with or complement existing statutory time frameworks for Strategic Environmental Assessment and for assessment under legislation implementing Habitats Directive, and that it will be helpful provided that it does not limit the range of applications received, for example from companies with modern designs that are still to be certified for operation. Several respondents question the appropriate level of detail required for Justification given that it is intended to be a high level activity and flag the need to distinguish criteria that apply at generic level from those relevant to the site level.

Several respondents point out that the resources required both to prepare and assess applications make time limiting the process sensible, and that it makes sense for multiple applications to be assessed collectively within a limited time window, but noting that it would not prevent applications being made at other times even if this does influence the order in which they are addressed and the priority given to them. Equally, one respondent points out, the Justifying Authority could decide that an application made outside the application window should be grouped with an assessment being made for designs already submitted.

Another respondent suggests that the SSA process should be used to identify a list of suitable sites to give investors choice, and that effective local consultation takes place at the sites which meet the SSA criteria before a conclusion is reached.

The question of which technologies should be considered is raised by several respondents. It is pointed out that the reactor designs already submitted by AECL,

Areva, GE-Hitachi and Toshiba-Westinghouse have recently met the 'pre-licensing' eligibility criteria, and reducing the number of designs being considered would avoid unnecessary delays. It is also suggested that where there is little operational experience of a particular reactor type there is an enhanced need for public scrutiny at an early stage in the Justification process, and that each type of reactor is dealt with separately.

Other provisos include the need for the information, including all the guidelines, conditions and criteria emanating from Government, to be set out clearly, and for the process to involve a full programme of public and stakeholder engagement.

This latter point is one picked up by one respondent who does not believe the "call for applications" described in the consultation document is clear enough. That respondent believes that the Justification process should also enable applications for alternatives to nuclear power, arguing that this is the only way the Government can make balanced decisions. This and similar points are made by other respondents opposed to nuclear power.

This is also one of the reasons why a number of respondents believe that it should be the Government, not the private sector, which takes responsibility for nuclear new build.

Question 1b

Is the proposed application, assessment and decision-making process clear, appropriate and proportionate? If not, how can it be improved?

Responses

Of the 94 responses to this question 30 support it and 2 do not. Most of the comments about the process are around the need to make sure it does not take too long, with several respondents calling for a more exact timetable. Conversely, a number of respondents feel there is a danger of a very complex decision-making process being rushed.

Of the two responses opposing the process, one does so on the grounds that the process does not consider alternatives to nuclear power, the other on the grounds that the process is too involved, too long and disproportionate to what the respondent perceives to be the negligible risks involved.

There are a number of detailed responses, however, pointing out aspects of the process that need to be clarified or augmented. One, for example, asks for clarification of the Justification Authority: what exactly it is, and what is its role and remit, and goes on to point out the qualifications that will be required by its staff. This response goes on to say that there will need to be a specification setting out exactly what is required and important information such as the preferred form for financial arrangements so that applications from different suppliers can be compared.

There is also some discussion of the Justification processes in other countries. In Finland and in France, for example, according to a number of respondents, the Justification exercise for nuclear installations is embedded in the general licensing requirement calling for an overall evaluation of advantages and detriments, and therefore contributes to the evaluation of radiological protection; while in Sweden and in Spain, the role of Justification for nuclear installations is less defined and licences are granted by the competent authority if the applicant can demonstrate that the licensing prerequisites are fulfilled. In none of these is there separate public consultation specifically focusing on Justification. This latter point is also made by other respondents.

One clarification requested by a number of respondents is over the test being applied within Justification that there is a benefit and that this is greater than the potential radiological health detriment, but it is pointed out that ‘health detriment’ is not defined in the consultation and it should be clarified that it relates specifically to that arising from exposure to ionising radiation as defined in the EC Directive.

One respondent would also like guidance on whether the scope of nuclear power station technologies relates to classes of reactors or specific reactor designs, and how wide the class or type of practice could be drawn, saying that ‘the envelope of technologies within a class or type of practice should be defined on the basis of ‘commonality of the potential health detriments and benefits’ rather than simply on the basis of how alike or not the technologies are....Specifically, if the potential health

detriments and benefits across all the reactor technologies proposed for Generic Design Assessment are sufficiently similar, they could be considered generically.'

One response calls for guidelines for design specifications and constraints around matters such as visual appearance, site security requirements and decommissioning, and another says that process is insufficient to cover the issues associated with the construction infrastructure.

Other issues cited as requiring more detailed explanation include the variety of health detriments; what constitutes a 'practice'; guidance on the content of an application and the required level of detail; which aspects of the fuel cycle are already Justified; how the public engagement for Justification will be conducted and the timetable for this process.

There are a number of responses calling for specific consultees, such as nature conservation bodies, to be named, and for the public, and therefore the media, both locally and nationally, to be properly engaged throughout the process. The financial and insurance aspects of the process are also raised by a number of respondents

Finally, one response believes that, such is the need to make urgent decisions about our future electricity supplies, that the same process should run in parallel for non-nuclear generation proposals, so that should no nuclear new build be forthcoming there is a backup plan.

Question 1c

Is the indicative list of information, described in Appendix A, appropriate for applicants to be able to make applications?

Responses

44 of the 79 respondents to this question agree that the indicative list is appropriate, though several suggest areas of information that should be added.

As with responses to the previous question, some respondents feel that the information required should vary from site to site, depending on the environmental constraints, the implications for the national grid and local impacts such as on employment.

One respondent suggests, for example, the need for electrical data (such as Continuous Maximum Rating, auxiliary power, loading time shutdown to CMR, Power Ramp capability, power up and down procedures and fuelling procedures); reactor data (such as type of reactor, type of fuel, enrichment required, initial fuel charge, type of fuel cladding, maximum time for fuel assembly immersion in cooling pond, percentage of residual unburnt fuel, breeding capability to produce fissionable isotopes, fuel consumption per year, temperature at inlet to steam turbine, overall thermal efficiency and emergency shut down time and speed of control rod operation); and radiation and health data (some depending on type of reactor, such as whether reactor has a secondary heat exchanger circuit, steam radiation levels, whether components of steam turbine become radioactive and radiation level, maintenance procedures and measures taken to limit the exposure of staff, protective gear, radiation checks, and emergency instructions in the event of a nuclear incident) as well as the implications of other parts of the nuclear fuel cycle (fuel fabrication and enrichment, together with treatment of spent nuclear fuel) for radiological protection.

Another respondent believes that the heading “Description of the proposed technology’ is potentially confusing as the whole basis of Justification is the examination of a type or class of practice that involves the use of ionising radiation. This respondent goes on to suggest that it should be possible to ‘propose and Justify a type or class of practice that is defined by its societal benefits and radiological detriments; as long as a technology is sufficiently similar in nature and falls within the Justified “envelope” then it should be considered Justified…. It would be clearer if this section was titled ‘Description of the proposed practice’ and sought a clear definition of the type or class of practice and, if necessary, descriptions of technologies that fall within the definition.

Another respondent believes among other points that that a full analysis of potential radiological health detriments is necessary, while determination of which benefits to incorporate is a matter for the applicant. It is suggested that the table of indicative information could usefully be clarified so that Block 1 addresses the matter of how the envelope of technologies within a class or type of practice should be defined on the basis of ‘commonality of the potential health detriments and benefits’ as opposed to simply on how alike the technologies are, and Block 2 addresses all potential radiological detriments in the United Kingdom relating to the new practice, including those from waste and decommissioning for example. But it should not, in the

respondent's opinion, require submission of detailed material on 'secondary' activities such as fuel manufacture and transport which are existing practices.

Another respondent says the Justifying Authority should be provided with information regarding all environmental receptors of environmental effects, and that the relevant agencies and authorities should be consulted to determine what information is required since each individual application will involve different receptors, sites and issues.

One respondent suggests the need for information about the lifecycle carbon footprint of proposed plants and a full cost/benefit calculation around each proposal.

Another area on which respondents would like more detail is that concerned with security and the threat of terrorist attack, with one suggesting a comprehensive safety and security plan is essential.

Waste and waste disposal routes are also of concern to some, and whether there will be a central waste disposal body or each individual power station builder will be expected to deal with its own waste.

Question 1d

The Government is planning, where possible, to consider concurrent applications for Justification (relating to new nuclear power station technologies) through a single Justification assessment process. Is the Government's proposal appropriate?

Responses

42 of the 69 respondents to this question are generally content with the Government's proposal, though a high proportion of them offer further comments and caveats.

One concern among many is that the Government should do nothing that would delay or complicate the Justification assessment process, and to this extent many feel a process capable of handling multiple designs in a single application is preferable. It would make it easier, some feel, to assess the relative merits of different designs even if there may need to be, for example, a supplementary process should it become apparent, later in the Justification process, that some applications have aspects or implications that are not initially appreciated.

It is also argued that an application defined by a broad envelope of benefits and potential health detriments, within which a number of technologies could be shown to fit, should be suitable for a single Justification assessment to be made so that the benefits and detriments do not need to be tied to a particular technology. This point, this respondent asserts, is not clearly drawn out in the consultation document and would find it useful if the acceptability of this approach could be confirmed in principle. This response goes on to point out that under such circumstances, where the technologies are assessed together, separate decisions in respect of each technology may not be necessary and the class or type of practice so Justified could be defined more generically; thereby making any decisions more 'future-proof'.

There are a number of respondents with reservations about this approach, relating in particular to instances where proposed technologies are different. It is also felt that there should be provision at some sites to allow for stations with novel features, though there seems a general preference for stations of proven design (in which case, it is argued, there could be multiple applications and competition for each site, providing the Government's selection criteria are known).

Another respondent encourages the Government to ensure that the resources of all parties to the Justification process remain focused on existing and available generic nuclear technologies to allow maximum opportunity for contributors to provide meaningful responses to the likely front runners, rather than wasting resources on unlikely candidate designs.

Several respondents point to the importance of ensuring there are sufficient resources invested in the Justification assessment process, and that interested parties, such as local government and voluntary bodies, are supported in gathering evidence and participating in consultation processes.

Question 1e

Are there any other ways in which the draft Justification process can be improved? If so, we welcome your suggestions.

Responses

While 19 of the 59 respondents to this question have no further suggestions, the remainder provide a small number of specific ideas for improving the draft Justification process.

Among these are monitoring its success during initial applications to consider potential improvements; publishing a list of nuclear technologies that will not be considered; and processing more rapidly Justifications already made to and accepted by governments with whom the United Kingdom is already collaborating as they should require less scrutiny than new Justifications.

There is also a suggestion that a meeting or workshop of all interested parties be convened as a prelude to (or, the respondent suggests, instead of) all the paperwork.

It is also argued that there should be a precursor to the Justification process requiring an evidence based demonstration by the applicant that all other sources of low carbon/carbon-free energy generation are insufficient to meet the demand. This respondent would also like to see information about the extraction and transportation of the raw material and on the disposal of nuclear waste considered as part of the Justification so that the whole life costs of nuclear power are considered.

There is a suggestion that literal, visual, and audio formats be issued to the media at 'draft' and final stages so that the general public's understanding of the nuclear reactor programme is improved and they can be more fully engaged in it.

The timetable for the process and decision is also considered by respondents. There is support for a more detailed timetable to include full consultation with the aim of having new nuclear power stations functioning by 2017.

Question 2a

Is the proposed approach to the Strategic Siting Assessment a logical approach to identifying suitable sites? If not, how could it be improved?

Responses

39 of the 82 respondents to this question accept that the proposed approach is logical, though many add supplementary points to the effect that the obvious answer is to build on or adjacent to existing nuclear sites.

Several respondents feel, in fact, that too much is being made of this issue when it is apparent that such sites are for obvious reasons likely to be preferred, and that the process is generally over-elaborate.

There are a range of other points made about the Strategic Siting Assessment process. For example, the need to include consideration of ancillary developments, cumulative effects, decommissioning, waste disposal and transmission needs. Taking up the later point, there are arguments for siting new power stations nearer to towns and consumers now that there is sufficient confidence that nuclear power stations need not be in remote locations; one respondent, for example, advocates a Combined Heat and Power (CHP) unit to feed local conurbations.

Another issue raised is how the SSA process should develop. One respondent argues for a number of discrete stages, beginning with a final list of criteria that should include relatively few exclusionary criteria given that most issues can be overcome by engineering solutions or other mitigation measures. The criteria should be kept at a strategic level and should not include the detail which will form part of the subsequent stages in a project's development. In the subsequent stage the level of information required to be submitted when nominating potential sites should be clearly defined and readily available within the public domain. The final list of sites should then be made up of each of the sites nominated which meet the SSA criteria, are sufficient to ensure an effective and workable market develops in sites, and identifies at least sufficient sites for the replacement of the existing nuclear capacity.

The possible impacts of climate change, such as storm surges and sea level rises, are mentioned, and the idea of building up a bank of pre-licensed sites is floated.

One issue raised by several respondents relates to the role of the Devolved Administrations in this process. Some respondents believe, for example, that the possibilities and implications of Scotland's inclusion (or not) in the process need to be set out clearly from the outset. It is also suggested that an agreement endorsed by the Scottish Parliament and the Welsh Assembly is needed before the start of the site selection process.

Question 2b

Does the proposed incorporation of Strategic Environmental Assessment into the Strategic Siting Assessment represent a reasonable and robust approach to assessing environmental issues that would be raised by the construction and operation of new nuclear power stations? If not, how could such issues be taken into account?

Responses

In 51 of the 79 direct responses to this question there is general agreement that incorporating Strategic Environmental Assessment into the Strategic Siting Assessment makes sense; one respondent points out that the issues seem so inter-related that it is unclear how a site could be selected without incorporating the SEA.

One of the two responses that disagree with the proposed approach urges the Government to produce a more streamlined and efficient process for taking forward the overall requirements for environmental assessment for new nuclear build. This respondent is concerned that any limitations in the processes, such as data gathering limitations within the specified timeframes, or application across a potentially wide range of nominated sites, could potentially lead to a virtual re-run of all the environmental issues later on at a site-specific level.

A number of respondents also point out that if existing nuclear licensed sites are used then an SEA would have been done when the site was originally selected, or subsequently, and it will be possible to make use of the data to show how the site has been affected by nuclear generation from the environmental perspective. This is quoted as another reason for preferring existing nuclear sites.

There are a number of other points made, including about regulations that need to be taken into account such as DEFRA's Strategic Appropriate Assessment, Environmental Impact Assessment for specific sites and the regulations around Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites; the preference for starting with site specific proposals rather than generic assessment processes; and the need for the SSA to encompass not only SEA but also a full social and economic assessment of the impact of siting.

It is also appropriate, according to one respondent, that the potential environmental impacts of new nuclear build should be properly assessed, though the details of how SEA will be incorporated into SSA need to be clarified. This respondent feels that should the proposed planning reforms be introduced, the Stage 3 SSA consultation could encompass the required consultation for the nuclear NPS, and it is therefore important that the SEA should be suitable to support the nuclear NPS as well as the SSA. This would ensure that interested parties are consulted effectively and efficiently without repetition. Another respondent agrees, adding that it is also important that the timing of the different stages of the SSA and SEA processes are properly integrated so that they are capable of delivering a list of the sites that are shown to meet the defined criteria and ensuring that the environmental effects of the overarching plan have been properly assessed and mitigated. This respondent goes on to mention a significant

concern that the iterative nature of the SEA process may extend the overall timescale beyond that envisaged in the consultation, which would produce uncertainty about the eventual availability of suitable sites.

It is also suggested that in considering siting criteria the Government should take account of developments and improvements in reactor technology since existing nuclear plant was installed, and of siting practice elsewhere in the world, with only safety related criteria being exclusionary and the other criteria discretionary. These new criteria resulting from the SSA process should be seen as superseding all existing siting policies, including the Remote Siting Policy, to provide clarity for investors.

Other points made include the opportunity for local interests to debate the impact of the criteria on local issues; and a need to manage the relative timescale and interactive nature of the two processes to ensure that there is adequate consultation and a sufficiently detailed environmental report.

There are also a range of general points supporting or opposing new nuclear power stations, and suggestions for alternative approaches to power generation.

There is a final overall point that these processes should be conducted and developed in a transparent manner with their basis and interpretation being clearly stated; there is some agreement that full public consultation is particularly important in the context of siting decisions.

The future of nuclear power in the UK

An analysis report on the findings from the deliberative events with members of the public

December 2007

Contents

Summary

The Department for Business, Enterprise and Regulatory Reform (BERR) commissioned Opinion Leader to facilitate nine deliberative events with a demographically representative sample of the UK population. The aim of the events was to help the Government understand what people thought of its preliminary view on the future of nuclear power after they had considered the arguments and information in the consultation document. The deliberative events were one of a number of activities carried out as part of the Government's overall consultation on the future of nuclear power in the UK.

On the 8th September 2007, 949 members of the public participated across the UK. The approach taken to recruitment of participants, design of the deliberative events, how participants' responses were gathered and recorded, and the content development process is set out in Annex 1. Details about the sample are provided in Annex 2. The agenda, interactive quiz, handouts, reference sheets and template for facilitator notes are also appended in Annexes 3 to 7.

In brief, the agenda for the events was as follows:

- Plenary: Welcome (including introductory video or Ministerial address, keypad training and initial polling questions)
- Discussion: Introduction and warm up
- Plenary: Background information video and Part One of interactive quiz
- Discussion: Response to background information so far
- Plenary: Part Two of interactive quiz
- Discussion: Response to further background information
- Plenary: Video of stakeholder voices
- Plenary: Briefing on nuclear waste and safety
- Discussion: Nuclear waste and safety
- Feedback session and polling questions
- Plenary : Briefing on why the Government is considering nuclear power
- Discussion: Why the Government is considering nuclear power
- Feedback session and polling questions
- Plenary: Briefing on bringing it all together
- Discussion: Bringing it all together (in two parts with polling between Part One and Part Two)
- Wrap up and close

This summary covers the main points from each of the discussion sessions which took place during the course of the events and some of the key polling results.

Early impressions: the energy challenge and nuclear power

- Participants were very concerned about climate change. However, many do not believe that the actions of the UK alone will significantly help towards tackling the issue.
- Participants were aware that there is an energy security issue, though many are not clear about its implications for energy policy.
- Overall, concern was higher about energy security than climate change.
- Substantial reservations were raised with regards to safety risks associated with nuclear energy. In particular, participants were concerned about radioactive contamination from nuclear fuel and waste.
- Participants expressed great enthusiasm for renewable methods and new technologies.

Exploring the risks: nuclear waste

- The creation of waste, both now and for future generations, was of primary concern to participants.
- However, participants felt unsure about how to gauge acceptable levels of future waste. For some participants, no level of nuclear waste is acceptable.
- At the start of the day, and prior to hearing any specific information on waste and safety issues, 90% were concerned about the creation of new nuclear waste. Following discussions on the issue, participants' overall level of concern did not alter (89.5%).
- The main concerns were about the long-term timescales involved and therefore the certainty of storage and costs of waste.
- Opinion on the justification of producing new nuclear waste was divided. Many participants struggled to reconcile how something which could offer potential environmental benefits in terms of CO_2 emissions could also have serious environmental implications in terms of the hazardous waste produced. For others, the production of nuclear waste was a necessary drawback which could be managed. Those who held this view tended to also think that nuclear energy could help to make the UK's energy supplies more secure.
- Following a discussion about dealing with current and future waste, participants were asked how satisfied they were with the Government's proposal to manage new nuclear waste in the same way as existing nuclear waste. 24% were satisfied overall whilst 51% were dissatisfied.
- However, many participants were concerned that the waste would be 'buried' and then forgotten about. They wanted reassurance that the stored waste would continue to be monitored to ensure safety long into the future, regardless of who is in Government and any other changes that might take place in terms of public office.
- There was widespread concern about the role of the private sector both in bearing the cost of managing nuclear waste and in terms of playing a pivotal role in the building, management and monitoring of geological disposal facilities.

Exploring the risks: safety and security

- Participants expressed high levels of concern about the safety and security of nuclear power.
- Overall concern levels were high both before and after discussions. There was a small decrease in those reporting being either very or quite concerned (87% in the morning falling to 83% following deliberation).
- Overall, whilst participants were concerned about security issues such as terrorism, participants were more concerned about safety issues relating to accidents at nuclear power stations and possible contamination.
- A rigorous safety and security regime was judged to be essential to minimise human error and institutional negligence in any new nuclear power stations.
- Satisfaction with the measures in place to minimise the safety and security risks associated with nuclear power were divided with one third (36%) either very or quite satisfied and around one third (35%) either very or quite dissatisfied.
- There was general agreement that, regardless of the measures put in place, it would not be possible to guard against all possible safety and security risks and that, therefore, an element of risk would remain.
- Many participants expressed specific concern about the involvement of the private sector in managing these risks, with many calling for Government responsibility and control.
- Some participants wanted the number of power stations, as well as the spread of their locations, to be tightly controlled in order to minimise risk.

Why the Government is considering nuclear power

- The majority of participants considered climate change to be an important issue at the start of the day. 88% agreed overall that climate change is a critical challenge for the UK, with 60% agreeing strongly. Following deliberation, participants' level of agreement with the statement increased marginally to 90% overall.
- Some participants felt that nuclear energy has a role in reducing CO_2 emissions should not be ruled out as an option for the UK's energy generation. However, others were not satisfied that the contribution that nuclear could make would be sufficient, given the associated risks.
- At the start of the day, 65% agreed overall that nuclear power could make an important contribution to reducing the UK's CO_2 emissions. Following deliberation on this, the number agreeing overall fell to 60% and the number who disagreed increased from 8% to 21%.
- However, many participants wanted clear reassurances and guarantees that developing new nuclear power stations would not detract investment and research away from renewable energy and lifestyle change strategies.
- Many participants wanted the Government to limit reliance on nuclear energy and invest more heavily in alternative solutions, such as renewable energy.
- There was widespread agreement that the UK must ensure security of supply. 96% agreed at the start of the day that ensuring a secure and reliable supply of energy is a critical challenge for the UK and 94% agreed following the deliberation.

- Many participants felt that nuclear energy could be an important part of achieving this goal in the short-term. At the start of the day, 63% agreed that nuclear power stations could make an important contribution to providing the UK with secure and reliable energy supplies in the future. Agreement remained at the same level following deliberation on this issue (62%).

Bringing it together: balancing the risks and potential benefits

- Many participants felt that nuclear energy might be necessary in the short-term to meet the UK's energy needs in light of the twin challenges of tackling climate change and ensuring energy security.
- Overall, participants were uncomfortable about nuclear power being part of the UK's long-term energy future. Substantial reservations were expressed about the implications of nuclear waste, safety and security risks.
- Despite many participants' clear level of discomfort with some of the safety and security implications and concerns about creating new nuclear waste, 44% agreed that, in the context of tackling climate change and ensuring energy security, it would be in the public interest to give energy companies the option of investing in new nuclear power stations. 37% disagreed and 18% neither agreed nor disagreed, indicating participants' difficulty in coming to a firm view on the question.
- There was great enthusiasm expressed about renewable methods. Many felt that they could contribute greatly both to boosting the UK's energy security and to reducing CO_2 emissions.
- Participants generally looked to Government to provide reassurances that nuclear energy would be carefully monitored and regulated. They also sought reassurances about the accountability of the private sector and the Government's role in this.

1. The context

Following the publication of the Energy White Paper, the Government embarked on a period of consultation about the future of nuclear power generation in the UK. In the consultation document, 'The Future of Nuclear Power', the Government set out that it had reached the preliminary view that energy companies should be given the option of investing in new nuclear power stations. The consultation asked people a series of questions about the information and arguments set out in the document. The Government wanted to hear the views of a wide range of different people and the consultation used a number of different methods to enable this. This included written responses to the consultation document; responses received via the consultation website; events with interested parties representing communities living near nuclear power stations, a series of regional stakeholder meetings and the deliberative events with members of the public. A range of advertising and awareness raising measures were also undertaken.

In relation to the deliberative events, the Government wanted to understand the views of the public after they had heard the key arguments in the consultation. They wanted to use the events to ensure that they had understood the issues in relation to nuclear power that members of the public were concerned about.

The Government wants to make a decision on new nuclear power stations for three reasons:

- Over the next two decades, a significant number of the power stations which currently generate our electricity – both nuclear and those that burn fossil fuels like coal and gas – are scheduled to close and need to be replaced;
- Climate change, which is linked to man-made emissions of CO_2 from fossil fuel based energy sources, is accelerating; and,
- Domestic supplies of fossil fuels, notably oil and gas from the North Sea, are running down and the UK is becoming increasingly dependent on imported fossil fuels.

On this basis, COI, on behalf of the Department for Business, Enterprise and Regulatory Reform (BERR) commissioned Opinion Leader to facilitate nine deliberative events to consult with a demographically representative sample of UK citizens. The purpose of the deliberative events was to provide a mechanism for the Government to listen to the views and concerns of the UK public relating to the Government's preliminary view on the future of nuclear power.

Objectives and invitation to participate

The aim of this deliberative element of the consultation process was to enable a public debate that was conducted firmly in the wider context of the UK's energy policy, but also within the parameters of a discussion focussed on nuclear energy specifically.

The brief from BERR established two key objectives for the deliberative event element of the consultation process:

- To engage a representative cross-section of UK citizens in an informed, transparent consultation on allowing private sector energy companies the option of building new nuclear power stations
- To understand the opinions of participants through a mixture of qualitative and quantitative reporting of findings, and to understand how these have shifted as a result of the deliberative process

The parameters and basis of the deliberative research were necessarily based on of the Government's consultation document both in terms of:

- The questions asked
- The information presented

The deliberative consultation events were not intended in themselves to represent a decision making process; rather they were intended as another evidence stream within the Government's wider consultation which would feed into decision making. Thus, the questions asked were framed to gather public views about the Government's preliminary view rather than to create a 'yes'/'no' answer.

The approach taken to recruitment of participants, design of the deliberative events, how participants' responses were gathered and recorded, and the content development process is set out in Annex 1. Details about the sample are provided in Annex 2. The agenda, interactive quiz, handouts, reference sheets and template for facilitator notes are also appended in Annexes 3 to 7.

2. Early impressions: the energy challenge and nuclear power

Summary

- Participants were very concerned about climate change. However, many do not believe that the actions of the UK alone will significantly help towards tackling the issue.
- Participants were aware that there is an energy security issue, though many are not clear about its implications for energy policy.
- Overall, concern was higher about energy security than climate change.
- Substantial reservations were raised with regards to safety risks associated with nuclear energy. In particular, participants were concerned about radioactive contamination from nuclear fuel and waste.
- Many participants expressed great enthusiasm for renewable methods and new technologies.
- Some participants perceived that Government could do more to reduce energy consumption in the UK. They were also keen to know what efforts are being made to help to reduce carbon emissions in areas other than electricity generation.

Introduction

This chapter reports on participants' views on climate change, energy security and nuclear energy at the start of the day. It also reports on their level of awareness of electricity generation and their top of mind views on nuclear energy specifically.

At the start of the day, participants were given information on climate change, the UK's energy mix, and energy consumption. The information was delivered through a variety of methods (see Annex 3), including a series of short films, an interactive quiz and a series of handouts.

The start of the day's deliberations

At the start of the day, participants were given some time to discuss their top of mind views on nuclear energy, before hearing any information.

Overall, participants expressed varying levels of mistrust towards nuclear energy at the beginning of the day. Some spontaneously recognised nuclear energy as a low carbon energy source. However, more frequently, top of mind views on nuclear energy were dominated by the potential risks it presents. Most table discussions were focussed on safety risks, with many spontaneously associating nuclear energy with 'radioactive waste', 'Chernobyl', 'nuclear weapons and the cold war'. The overriding perception of nuclear energy was as something that presents substantial risks and dangers. For many participants, thinking about nuclear energy raised significant concerns and questions as well as some passionate and emotive responses.

> *"I find nuclear power quite frightening. I'm concerned about the safety issue and want to find out more."*

North West

"This is a small country and an accident the size of Chernobyl would affect half the country."

West Midlands

"You always associate it with the army and weapons and guns."

North East

The climate change challenge

The term 'climate change' was widely recognised and many participants acknowledged that world temperatures, weather conditions and sea levels were changing.

"Everybody's more aware of their carbon footprint now."

North East

However, not all participants agreed that climate change was a result of increased CO_2 emissions. Some thought that climate change is a natural occurrence that is independent of human actions. Some participants also questioned the extent of the implications of climate change and wondered whether the Government and others have sought to use 'scaremongering' about climate change for their own purposes. The exception was in Exeter and Norwich where there was consensus agreement that increases in CO_2 are the result of human actions. Participants in Norwich also expressed the view that, as a direct result of climate change, rising sea levels were posing a threat to the East of England.

Those who did not believe climate change was due to CO_2 emissions said that there was scientific evidence to the contrary and questioned why this information had not been presented at the event. The most sceptical participants believed that Government was using climate change to gain support for nuclear energy and was therefore not presenting a balanced argument.

"I believe the discussion [about climate change] is being steered by the Government towards the uses of nuclear energy."

East of England

However, in contrast, the participants who thought climate change was a result of increased CO_2 emissions were confident that scientific evidence supported their view. They called for global action to tackle the issue, and at the same time for individuals to modify their behaviour.

Reaction to targets and statistics relating to climate change

Across all locations there were some participants who expressed surprise towards the statistics on climate change given during the interactive quiz (see Annex 4). In particular, they had not expected domestic

emissions to make up 27% of total UK CO_2 emissions. Instead they had expected that emissions from industry and transport (which in fact represent 29% and 28% of total emissions respectively) would be significantly higher than domestic emissions.

Participants also expressed surprise at the target set by Government to reduce UK CO_2 emissions by at least 60% by 2050. Many questioned whether the target was achievable. They also questioned what impact this would have on climate change, after learning that the UK CO_2 emissions make up 2% of global emissions.

UK's role in combating climate change

Regardless of whether or not participants believed that climate change was due to man-made CO_2 emissions, many felt that any action taken by the UK to reduce emissions would be unlikely to have a significant impact on the global issue. On many tables, participants discussed other countries perceived as having a greater impact on climate change and what they should do about climate change. For example, some argued that America needed to do more to tackle their CO_2 emissions and set an example to the rest of the world. Similarly, China, as a country that generates a high proportion of the world's CO_2 emissions, was also thought to need to address its CO_2 emissions.

The energy security challenge

Initial views on energy security

Almost all participants were aware of an energy security issue of some sort in the UK. The prevalent view emerging from the table discussions on energy security, which took place after participants heard some information on the energy mix, was that it was key for the UK to be as self-sufficient as possible in its energy production.

> *"We may be getting the gas from our friends at the moment but we don't know how long that will last for."*
>
> Northern Ireland

Participants expressed concern about being dependent on countries that they perceived to have a volatile relationship with the UK. Many reported that conflict in the Middle East and media stories relating to Russia cutting gas supplies to Belarus had contributed to their view of, and concern about, energy security. However, a minority believed that the issue of energy security was over-stated and gave the following reasons:

- It is not in the financial interests of gas and oil producing companies to withhold supplies, so they are unlikely to do so
- There are still unexploited coal and gas reserves in the UK

Most participants agreed that the energy issue was both an immediate and long-term concern and they believed that the Government needed to take prompt action to address it. They said they did not want the energy issue to reach a crisis point in which the country experienced black outs.

Reaction to information on energy security

Many participants reported being unaware that a number of UK power stations were nearing the end of their productive life. In addition, some participants were surprised to discover that there were currently as many as ten nuclear power stations operating in the UK.

Some were further surprised that consumer demand for energy had only risen by 10% since the 1970s. They had believed that an exponential increase in consumer demand, driven by developments in technology, was a key contributing factor to the energy security issue.

Participants were concerned to find out that, by 2020, up to 80% of the gas needed in the UK could be imported. Although many knew that the UK was increasingly reliant on imports, they had not anticipated the extent to which the UK could be reliant on imports in the future.

> *"I'm mortified that we may soon be importing 80% of our gas."*
>
> South West

Additionally, many participants were surprised to hear that other countries, such as America, France and Germany, have a very different energy mix to the UK.

In contrast to the statistics presented on climate change, few participants questioned the reliability or provenance of the statistics on energy security.

Including nuclear power in the energy mix

Initial views on the contribution that nuclear energy could make

A view that emerged from some table discussions in the early part of the day was that there is little alternative to nuclear energy in the short-term. This was largely due to the perception that renewable sources and new technologies are not yet ready to deliver to the extent that would be necessary to meet energy demand.

> *"Wind turbines and water turbines have already been proven as insufficient."*
>
> South West

Some participants said that the UK should have addressed the energy issue 20 years ago and that, at this stage, there is no viable alternative to nuclear energy. However, whilst they believed that nuclear energy could help in the short-term, many were less happy to accept it as the basis of a long-term energy strategy in the UK. They believed that a comprehensive, long-term energy strategy needed to:

- Place greater emphasis on the generation of renewable energy
- Focus on reducing energy consumption as well as increasing production

Many participants reported that they would be much less willing to accept nuclear energy as an option if it compromised research, investment and Government action in these renewable areas.

Participants also wanted more information about the energy policy of other countries. Many had been intrigued to find out that nuclear energy provided 80% of France's electricity but they were also very interested in the reasons why Germany had decided not to build new nuclear power stations. They wanted to know what, if anything, the UK could learn from its neighbours.

> *"We should look around the world and learn from others."*
>
> West Midlands

Developing renewable energy sources and new technologies

Participants were keen to highlight that developing renewable energy was their preferred method of addressing the UK energy issue in the long-term. Furthermore, they believed that renewable energy was key to addressing the issues of energy security and climate change because they believed:

- Renewable energy is not dependent on imports i.e. uranium
- Renewable energy produces low CO_2 emissions

Some participants were aware of new technologies such as Combined Heat and Power and Carbon Capture and Storage. They expressed enthusiasm for increasing the use of these also in the future to help to reduce the UK's CO_2 emissions.

A number of participants were concerned that the act of increasing investment in nuclear power would result in less money going into research into renewable energy and new technologies.

> *"If you give the green light to nuclear, the problem is it's going to affect the way you think about renewables."*
>
> London

However, although many wanted to see more investment in renewable energy, other participants believed that renewable energy came with its own set of issues. In particular participants made several references to the 'unsightliness' of wind farms and the potential impact that the production of renewable energy would have on the environment, for example, the damage that a Severn Barrage would have on wildlife habitats.

> *"Wind farms are coming out of our ears, and if there is no wind we can't have power. If the wind is over a certain speed they turn the wind farms off. There's loads of dead birds because they fly into wind farms. Wind farms are destroying the land. They cover 10 acres near Devils Bridge."*
>
> Wales

Reducing energy consumption and making low carbon choices

Participants were keen to know more about how the Government intended to reduce energy consumption in the UK and what efforts are being made to help to reduce carbon emissions in areas other than electricity generation. A number of participants believed that Government could do more in this area and suggestions included:

- Legislation to ensure electrical manufacturers produced energy efficient goods e.g. a no 'stand-by' option
- Enforcing legislation intended to encourage energy efficient buildings
- Ensuring that public transport is more economic than private car use
- Ensuring that low CO_2 transport is more economic than transport modes which produce high amounts of CO_2 (this relates most specifically to the use of internal flights rather than trains)
- Incentives to make more lower carbon choices and punitive measures where individuals and businesses chose not to
- Better information on being energy efficient and making lifestyle changes which would result in less energy being used and lower carbon emissions

> *"If we cut down on packaging we could do so much on saving energy and electricity."*
>
> East Midlands

Participants believed that individuals also needed to modify their own behaviour in terms of energy consumption. However, participants acknowledged that individual behaviour change may be more difficult to influence and expressed concern about how difficult it would be overall to reduce consumption.

Key issues relating to the production of nuclear energy

In the final discussion session of the morning, participants discussed the issues they thought needed to be looked at in considering the future of nuclear energy in the UK. Participants reported a number of key issues relating to the production of nuclear energy. These can be summarised as:

- Waste disposal/storage and transportation
- Location of nuclear power stations
- Safety procedures inside power stations
- Private sector involvement
- Terrorist threat
- Cost of production
- Uranium supplies (both in terms of how long they would last and the UK's dependence on others for fuel).

Waste disposal/storage and transportation

Undoubtedly, the overriding concern emerging from the beginning of the day was the issue of the disposal/storage and transportation of nuclear waste.

In table discussions, participants highlighted that nuclear waste remains radioactive for thousands of years and that the issue of nuclear waste would be a problem both now and for future generations.

The issue of waste disposal/storage was a major concern for participants in all locations. For many participants, concern about waste disposal/storage was driven by the fear that radioactive waste could contaminate land and cause illness in surrounding areas. There were local differences in the examples used to highlight their concerns about waste. In particular, participants in Scotland frequently cited radioactive waste from the nuclear research reactor at Dounreay contaminating beaches in Caithness.

Many participants argued that transportation of waste was also a key issue. They anticipated that waste would not be stored near the nuclear power station and therefore that stringent measures had to be taken to ensure safety of waste in transit.

Location of nuclear power stations

Regardless of whether or not participants supported the production of nuclear energy in the UK, few would want a nuclear power station to be built in the vicinity of their home. Participants in rural areas expressed most concern about the location of nuclear power stations, as they believed that a nuclear power station was more likely to be built near them than near a major city.

Some participants' spontaneous concerns about the location of a new nuclear power station were largely driven by fears that nuclear power stations would cause contamination of the local area and potentially lead to an increased incidence of severe illnesses amongst the local population, including new born children. Several tables referred to 'leukaemia pockets' occurring in areas close to nuclear power stations.

Concerns about safety

Many participants raised significant concerns about safety issues. Table discussions in this section of the day tended to be focussed on safety procedures within the nuclear power stations themselves. Participants believed that there was a great deal of scope for human error. A number of participants cited the Pirbright laboratory's role in spreading foot and mouth as an example of how procedures for safety did not always provide the level of protection that was intended. Many voiced concerns about the substantial possible risks to the health of the public health in terms of radiation and contamination.

Private sector involvement

Many participants believed that the profit-driven motivations of the private sector were not compatible with producing nuclear energy. Participants expressed concern that private sector companies may try to make savings in areas that impact on waste and safety procedures.

> *"If private companies are allowed to run them [nuclear sites], they're going to go with the cheapest options. They're not going to think about the waste."*
>
> Scotland

Many argued that the issues of how to dispose of nuclear waste should not be subject to commercial influence. They were also concerned that competitive tendering processes would result in the cheapest rather then the safest nuclear power stations being built.

Security issues

A number of participants referred to the potential for nuclear power stations to become a target for terrorism. Participants felt that, if built in rural areas, power stations would be less attractive to terrorists. Furthermore, there was a sense that, overall, the indiscriminate nature of terrorism meant that any building could be singled out as a potential target and there was no reason to believe that a nuclear power station would attract more attention.

Cost of producing nuclear energy

Some participants raised the cost of producing nuclear energy as another important issue to consider. In the main, these participants referred to five key areas relating to cost:

- The cost of constructing a new nuclear power station
- The cost of raw materials
- The cost of decommissioning nuclear power stations
- The cost of nuclear energy compared to other forms of energy production
- The end cost to customers

Supply of fuel to create nuclear energy

Some participants were aware that uranium is the fuel used to produce nuclear energy. These participants raised questions about how long supplies of uranium would last and concerns about what would be used to produce electricity should uranium supplies run out. Some of these participants were also aware that uranium supplies come from abroad. They questioned what this would mean in terms of the UK's security of supply and dependence on other countries for fuel.

Views on the consultation

At the start of the day, some participants spontaneously raised views about the consultation events and about the Government's view on the future of nuclear energy. Some participants felt that the purpose of the consultation events with the public was to persuade the public to agree with the Government's view and to get their permission to continue the generation of nuclear energy in the UK.

> *"There is a feeling that it's inevitable. It's almost as though the decision has been made and now they're informing the public to gain their support."*
>
> London

This was primarily driven by the perception that the Government had already made a decision about the future of nuclear energy in the UK and were not genuinely interested in listening to the views of the public. Some felt that Government had come to a view that they were happy with and would not be prepared to change.

> *"I'm aware the Government is pro-nuclear."*
>
> North East

> *"If we say no, they'll still do it anyway."*
>
> London

However, not all participants held this view. Some felt that whilst the Government had a view, a decision had not yet been made.

"I think the Government have a view but have not decided."

East of England

"If Government knew the answer, they wouldn't be asking us."

Scotland

3. Exploring the risks: nuclear waste

Summary

- The creation of waste, both now and for future generations, was of primary concern to participants.
- However, participants felt unsure about how to gauge acceptable levels of future waste. For some participants, no level of nuclear waste is acceptable.
- At the start of the day, and prior to hearing any specific information on waste and safety issues, 90% were concerned about the creation of new nuclear waste. Following discussions on the issue, participants' overall level of concern did not alter (89.5%).
- The main concerns were about the long time scales involved and therefore the certainty of storage and costs.
- Opinion on the justification of producing new nuclear waste was divided. Many participants struggled to reconcile how something that could offer potential environmental benefits in terms of CO2 emissions could also have serious environmental implications in terms of the hazardous waste produced. For others, the production of nuclear waste was a necessary drawback which could be managed. Those who held this view tended to also think that nuclear energy could help to make the UK's energy supplies more secure.
- Following a discussion about dealing with current and future waste, participants were asked how satisfied they were with the Government's proposal to manage new nuclear waste in the same way as existing nuclear waste. 24% were satisfied overall whilst 51% were dissatisfied.
- However, many participants were concerned that the waste would be 'buried' and then forgotten about. They wanted reassurance that the stored waste would continue to be monitored to ensure safety long into the future, regardless of who is in Government and any other changes that might take place in terms of public office.
- There was widespread concern about the role of the private sector both in bearing the cost of managing nuclear waste and in terms of playing a pivotal role in the building, management and monitoring of geological disposal facilities.

Introduction

This chapter is based on table discussions and polling on the creation of new nuclear waste and how this would be managed, should new nuclear power stations be built in the future.

Concerns about nuclear waste

For many of the public taking part in the consultation event, this was the first time they had received any information on the issue of nuclear waste and the first time that they had given it any sustained consideration. Participants on some tables reported that they had not known that nuclear waste existed already in the UK.

After receiving some information on the issue of waste, there was consensus agreement in table discussions that radioactive waste is a serious issue, both in terms of the waste that already exists and the waste that would be generated by any future nuclear energy production. After hearing about the long timescales involved, with some waste remaining radioactive for thousands of years, participants generally regarded the creation of radioactive waste as the foremost downside to nuclear energy. For some participants, the existence of nuclear waste was a greater cause for concern than any other safety or security consideration surrounding the production of nuclear energy.

The main concerns centred around the nature and amount of waste, and the long timescales involved.

The nature and amount of waste

There was widespread concern about the consequences of nuclear waste, both now and for future generations. Many participants understood that nuclear waste presented potential dangers but were uncertain about the precise nature and the scale of these. Participants questioned what exposure to waste would mean for people and the environment.

On hearing about the UK's current levels of nuclear waste, many felt that this sounded like a lot of waste, but they were not sure how this compared to nuclear waste outside of the UK and in relation to the number of power stations the UK has had. Because they felt that they could not assess the scale of the issue, participants generally struggled to decide what amount of waste would be acceptable and what would be unacceptable to them. Some participants disagreed with the creation of new nuclear waste on principle and therefore felt that no amount of waste was acceptable.

Overall, lack of awareness and unfamiliarity with the issue meant that many participants were unsure about how concerned they should be. Many table discussions were dominated by questions about nuclear waste. Once participants had received some information about nuclear waste, this generated further questions and an appetite for more information.

The long timescales

Participants were surprised and concerned that some nuclear waste will remain radioactive for such long time periods. They felt that no one could know with absolute certainty what might happen over such long timescales, giving rise to substantial reservations about producing any new nuclear waste. Some questioned whether scientists really understood the long-term implications of radioactive waste. They felt that it was not possible for scientists to forecast the future of nuclear waste in the absence of experiential knowledge.

> *"We're talking about thousands of years compared with fifty years of actual experience."*
>
> East of England

Participants overall felt that, whatever measures were put in place or whatever precautions were taken, the waste might be exposed to all sorts of unanticipated or unpreventable events or disasters. Their concern about an unpredictable future was driven by a perception that both the natural world and human society have become less predictable in recent years. Participants pointed to possible significant changes to the environment through global warming and the number of natural disasters in recent years, both within the UK (e.g. flooding) and across the world as a whole (e.g. hurricanes, tsunamis, earthquakes). They also pointed to the unpredictable impact of human actions that they thought might threaten the continuous and high standard waste management that would be necessary over long timescales.

The management of nuclear waste

Discussions around the management of nuclear waste centred around three key themes:

- The need for effective management of waste
- Response to proposals for geological storage
- The cost of waste management

The need for effective management of waste

Participants believed that safe and secure storage of waste is essential, as is an effective system of regulation and monitoring. Many participants were surprised and concerned to learn that the UK has not until recently developed a long-term strategy for the management of nuclear waste.

Many participants were unhappy to learn that existing waste is kept in interim storage. These participants were concerned that such measures might be makeshift in nature and may not be safe and secure. They also feared that if an accident or leakage did occur there was greater risk of harm to the wider human and natural environment because the waste was on the surface.

Participants felt that when nuclear power stations were first built, there was a lack of a long-term strategy to deal with waste. This gave rise to concerns about the competence of the Government to deal with new nuclear waste going forward. For some participants, learning that plans had not been made for nuclear waste from the outset of nuclear energy in the UK, substantially undermined their confidence in any reassurances that waste would be safely managed in the future.

> *"It's not a great track record, is it? Done nothing for fifty years."*
>
> West Midlands

> *"They don't have a coherent plan."*
>
> Yorkshire and Humberside

However, some participants were satisfied that the Government was now looking at the issue comprehensively and was taking expert advice. For these participants, it was the jurisdiction of experts, and not the public, to decide whether or not nuclear waste management is safe and proper.

Response to proposals for geological storage

Participants generally understood the rationale for storing radioactive waste in repositories deep underground and felt more comfortable with this than the current arrangement of interim storage. Nevertheless, many expressed unease at the idea. Part of this unease stemmed from the suspicion that geological disposal was favoured as an 'out of sight out of mind' policy: they feared that the Government and the nuclear industry might be seeking to 'dump' or 'hide' the waste (both literally and as an issue) rather than taking active responsibility for its safe storage and management. This perception was encouraged by the fact that, for many people, the closest comparison they could make to deep repositories were landfill sites for household refuse.

> *"I have a mental image of a big hole in the ground with loads of toxic waste being thrown in and then forgotten."*
>
> South West

> *"It's not disposal. The stuff will last thousands of years."*
>
> North East

Some table discussions centred on whether there were any alternatives to geological disposal. Participants wanted to know whether it would be possible instead to reduce the waste's radioactivity and make it less harmful. Some also wanted to know if it would be possible to transport waste into space or to store it in a deep seabed. They wondered whether Government and industry had considered these alternatives and, if so, why they were not being pursued.

After an initial discussion about the proposal for geological storage of existing and future waste, table discussions soon turned to where storage facilities would be and how many might be necessary. There was a clear view that storage facilities should be located as far away as possible from homes and communities. Essentially, participants generally did not want storage facilities to be placed too near them. Many people recognised that a major accident or disaster might have far-reaching consequences (for instance, the Chernobyl disaster had an impact across Europe) but it was still safer to be as far away as possible.

People were unclear whether a single large facility would be sufficient to store existing and future waste or whether there would need to be multiple facilities around the UK. People were concerned about there being a number of facilities because that would multiply the risk of accidents happening. On the other hand, some people were concerned that a single facility would require the transportation of waste over long distances, which increased the risk of something going wrong en route. To avoid this risk, some people argued that the waste produced by a power station should be stored in a deep repository at or near that particular station.

It was commonly agreed that the decision of where to locate the one or more facilities should not be left in the hands of private companies. Rather, some form of independent body charged with upholding public interest should take the decision.

The costs of waste management

The discussions about waste management gave rise to discussion on the cost of waste management and therefore, the cost of nuclear energy. Many participants expressed concern about the costs of waste management. They wanted to be able to see a total, comparable cost for nuclear power (set against other methods, such as coal, gas etc.) However, they struggled to understand how the full costs of future waste management could possibly have been included in the overall predicted costs of nuclear energy now. They questioned how it was possible to budget accurately and to ensure the on-going finances for facilities that would need to be maintained over hundreds and thousands of years. They felt that, if the full costs of waste management (including the costs of building geological disposal facilities) were included in calculations, nuclear energy would prove to be more expensive than other sources of electricity.

> *"There's no mention of money. How can you cost something over hundreds of years?"*
>
> South West

> *"How much will nuclear power cost over the next 5,000 years? You say it's cheap, but we want the long-term figures."*
>
> Yorkshire and Humberside

Some participants felt that the 'true' costs of nuclear energy had been obscured and that the cost would inevitably be higher than anticipated. To support this view, some participants cited examples of major public construction projects that had overrun their original budgets e.g. Wembley Stadium, Millennium Dome, 2012 Olympics. Some felt that, in the case of building and maintaining waste storage facilities, this tendency for projects to go over budget would be exacerbated by the timescales involved.

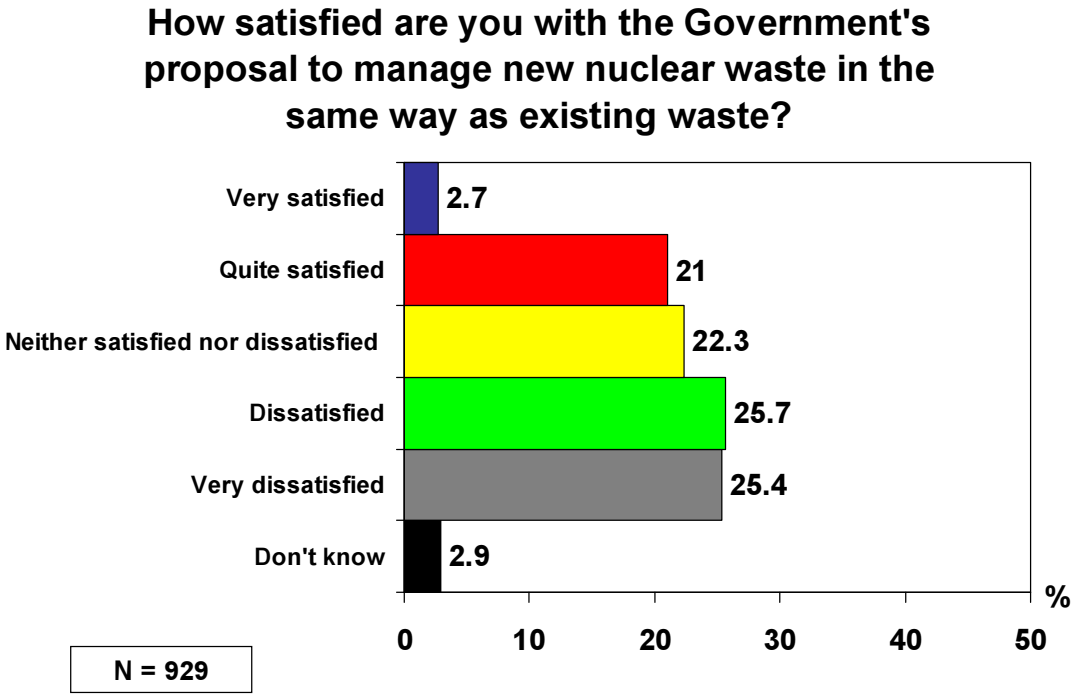
Underlying people's concerns about the cost of nuclear, was the belief that one way or another it would be the general public, either as consumers or taxpayers, who would pay the costs of decommissioning and storing the waste. There was general consensus that the nuclear industry should pay the costs of waste management, but also widespread scepticism that in practice the industry would meet its obligations. Much of this doubt was driven by a general scepticism about the motivations of private sector energy companies. Few participants were reassured by the idea of energy companies building up a fund to pay for waste and decommissioning costs. Some participants argued that such funds are susceptible to the same risks as pensions and cited examples of pensions which had fallen short of savers' expectations. Given these concerns about private companies, it was felt that the Government instead should take responsibility for waste and therefore control of its cost, though it is important to note that participants did not mean that they wanted the tax payer to bear the financial cost.

Some participants returned to a point raised in their earlier discussions relating to the difficulty to accurately know what would be required in terms of waste management in the future. They argued that, given this, it

would not be possible for energy companies, or the Government, to accurately estimate the cost. As a result, they felt that ultimately, the Government and the taxpayer would be required to meet any shortfall.

Satisfaction with Government's proposals for managing new nuclear waste

Following a discussion about dealing with current and future waste, participants were asked how satisfied they were with the Government's proposal to manage new nuclear waste in the same way as existing nuclear waste. 24% were satisfied overall whilst 51% were dissatisfied. 22% were neither satisfied nor dissatisfied and 3% were uncertain.



There were some significant differences in the satisfaction levels between different groups. Older people were more satisfied than young people; 30% of those aged over 60 years vs. 19% aged 16 to 29 years were either very or quite satisfied. Men were also more satisfied than women (30% vs. 18%).

The creation of new nuclear waste

There was widespread concern about producing new nuclear waste on the grounds that it was wrong to burden future generations with the legacy of waste. Some table discussions considered the possible benefits, in terms of a reduction in CO_2 emissions, and tried to consider the production of new nuclear waste in light of this. For many people, this highlighted the difficult nature of the decisions that need to be taken with regard to the UK's energy.

> *"You're damned if you do and damned if you don't."*
>
> West Midlands

> *"It's six of one and half a dozen of the other. Whichever way you go, you're not going to win."*
>
> South West

Opinion on this issue was divided. On the one hand, some participants perceived the benefits of nuclear energy to be relatively small (for more on the deliberations on the benefits of nuclear energy, see Chapter 5) and so did not think the implications in terms of new waste were worthwhile. Other participants, however, felt that climate change is a larger-scale problem than nuclear waste in that it affects the entire planet. By contrast, the problem of radioactive waste, they felt, could be contained in a safe and secure facility. Some participants also argued that future generations might develop the technology to reduce or eliminate the radioactivity of the waste.

> *"The waste worries me, it takes hundreds of years before it disappears."*
>
> East Midlands

> *"Nuclear could be a reversible decision, but the implications of high CO_2 emissions are not."*
>
> Scotland

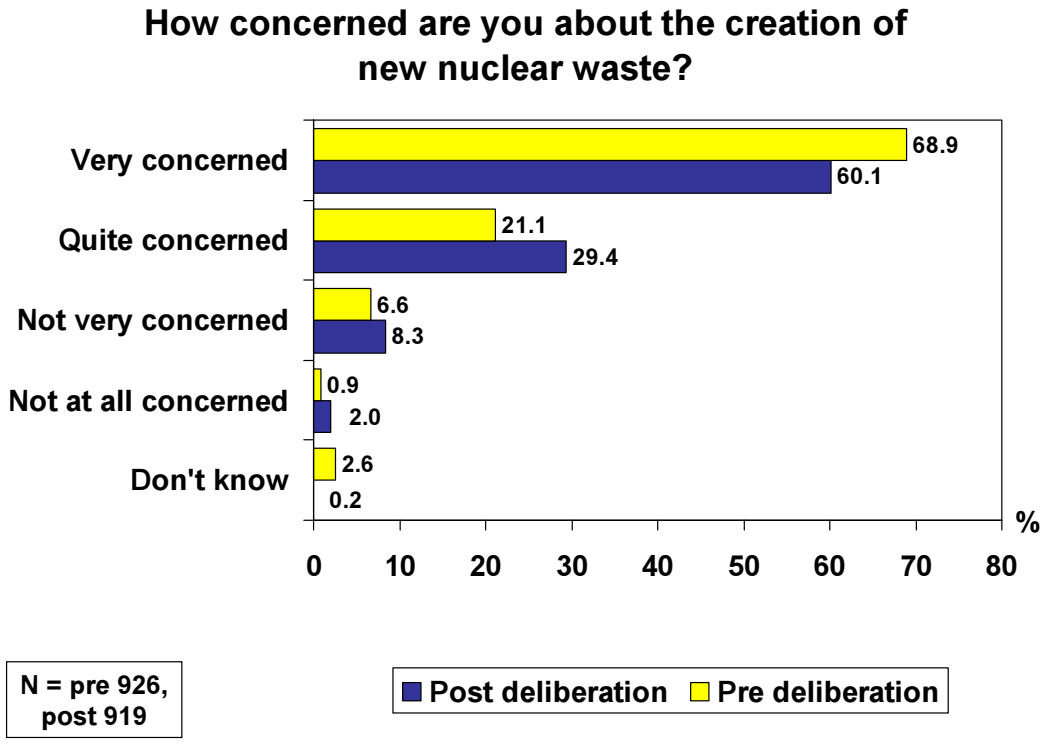
> *"At least nuclear waste can be captured and isolated."*
>
> Wales

Whilst some participants did feel that the generation of such waste was a reason to rule out new nuclear power stations, many felt that it was not. It is important to note that this was not expressed as support for the creation of new nuclear waste, but rather as a resigned acceptance that nuclear energy might be necessary in the short-term and that therefore, new waste would be produced.

> *"Yes, there are risks attached. But people want their electricity, don't they?"*
>
> Northern Ireland

Polling results on the creation of new nuclear waste

Participants were asked how concerned they were about the creation of new nuclear waste. They were asked the same question at the start of the day, before they had seen any information or perspectives on the issue, and again, later on in the day, once they had received some information and had discussed it (see agenda, Annex 3).



At the start of the day, and prior to hearing any specific information on waste and safety issues, the majority (90%) were concerned about the creation of new nuclear waste. Following discussions on the issue, participants' overall level of concern remained at around the same level (89.5% either very or quite concerned).

However, there was a shift in the intensity of concern expressed, with the proportion of those being 'very concerned' falling (69% to 60%) and the number of those being 'quite concerned' rising (21% to 29%).

There were some significant differences between men and women in terms of the level of concern reported about the creation of new nuclear waste, though neither group changed substantially post deliberation. Women were significantly more concerned than men at both stages (93% of women vs. 87% of men either very or quite concerned at the start of the day).

For many people, the seriousness of the waste issue reinforced their belief that the share of nuclear power in the overall energy mix should be kept as small as possible. It also confirmed their desire to see renewable energies occupy a larger share of the mix with the development of, and investment in, alternative energy sources regarded as a priority. It also reinforced people's view that overall energy consumption needs to be reduced.

There was a substantial appetite for further information on the issues of waste. There was also an appetite to hear uncontested knowledge from experts; some looked to experts to tell them how concerned they should be but found that there is no consensus agreement amongst experts and stakeholders. This meant that, for many participants, their discussions on nuclear waste had been tentative and they had been unable to come to any firm conclusions they were confident in.

It was clear that for many of those taking part, the consultation event provided a first opportunity to think about and discuss nuclear waste. Many felt that they should have known more about nuclear waste and questioned why the public were not more aware of the issue. As such, many sought to be reassured of openness and transparency. This was seen as central to building public confidence that Government and industry were handling the waste issue effectively and responsibly. Accountability was also perceived to be critical to public confidence on the issue, with people wanting reassurance that those who oversee and manage nuclear waste have the interest of the public at heart.

4. Exploring the risks: safety and security

Summary

- Participants expressed high levels of concern about the safety and security of nuclear power.
- Overall concern levels were high both before and after discussions. There was a small decrease in those reporting being very or quite concerned, falling from 87% in the morning to 83% following deliberation on safety and security.
- Overall, whilst participants were concerned about security issues, such as terrorism, participants were more concerned about safety issues relating to accidents at nuclear power stations and possible contamination.
- A rigorous safety and security regime was judged to be essential to minimise human error and institutional negligence in any new nuclear power stations.
- Satisfaction levels with the measures in place to minimise the safety and security risks associated with nuclear power were divided. Overall, one third (36%) were either very or quite satisfied and around one third (35%) were either very or quite dissatisfied.
- There was general agreement that, regardless of the measures put in place, it would not be possible to guard against all possible safety and security risks and that, therefore, some element of risk would remain.
- Many participants expressed specific concern about the involvement of the private sector in managing these risks, with many calling for Government responsibility and control.
- Some participants wanted numbers of power stations, as well as the spread of their locations, to be tightly controlled in order to minimise risk.

Introduction

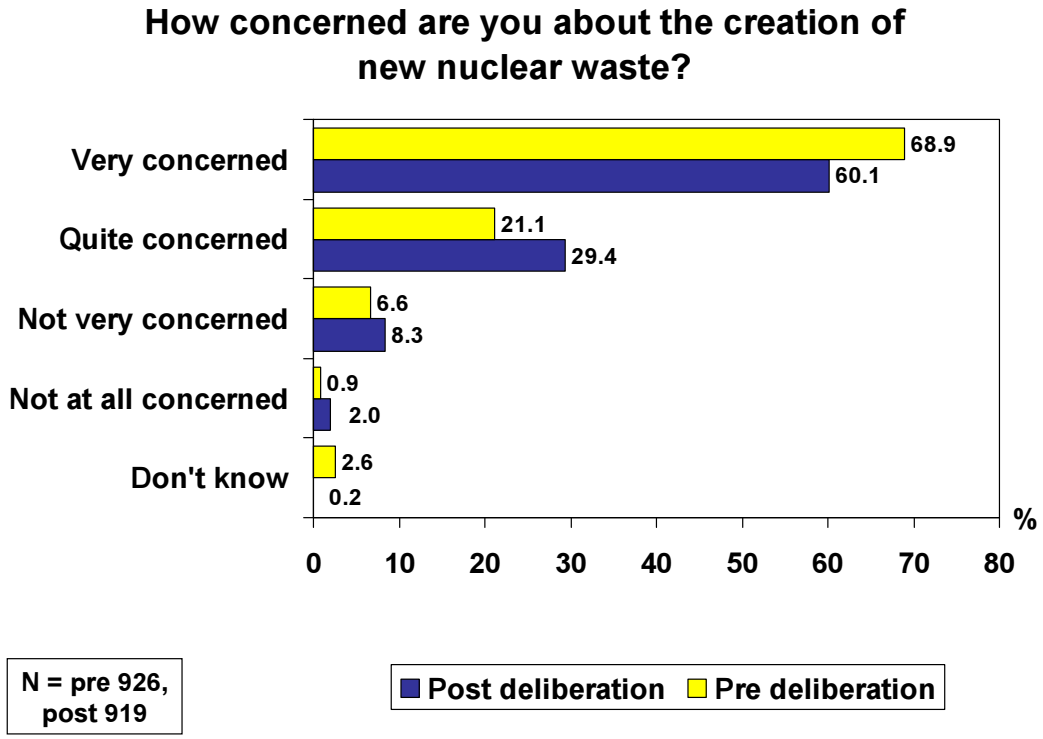
This chapter reports on polling questions and discussion on safety and security implications of nuclear energy. Participants were asked to discuss their concerns with regards to safety and security issues and how satisfied they were with the current and planned arrangements to minimise and manage the risks associated with nuclear energy.

Concern about safety and security

Polling results on safety and security

Participants were asked how concerned they were about safety and security issues associated with nuclear energy. They were asked this question at the start of the day, before they had considered any information or perspectives on the issues, and again, later on in the day, once they had received some information and had discussed it (see agenda, Annex 3). Overall concern levels were high both before and after discussions. There was a marginal decrease in those reporting being concerned following deliberation on

safety and security (87% very or quite concerned before vs. 83% after). The level of concern also fell slightly (61% very or quite concerned at the start of the day vs. 53% later on). Women were significantly more concerned than men following the deliberation (90% vs. 76%).



Overall concerns

Concern about safety and security issues was also reflected in table discussions where there was consensus that safety and security should be the absolute priorities with regard to nuclear energy, both now and in the future. This common view stemmed from perceptions of the potential widespread consequences that any mistakes or disasters could have on the human population and natural environment of the UK.

> *"If it goes wrong, it goes wrong big."*
>
> West Midlands

> *"If a power station goes into meltdown, it will explode."*
>
> South West

> *"It would only take one Chernobyl."*
>
> South East

In the main, people expressed greater concern about *safety* issues than about *security* issues. That is, they felt that accidents and leakages occurring at power stations were a more likely threat than the stations coming under deliberate sabotage or attack by terrorists.

"Engineering errors and human faults are a greater risk than terrorist attacks."

Yorkshire and Humberside

The prospect of accidents or leakages was tangible for many people because there were actual or perceived precedents that they could draw on. In the case of accidents, many people cited the Chernobyl disaster and this remained the common reference point as a worst-case scenario throughout the discussion of safety and security. In the case of leakages, people talked about reports of higher-than-average incidences of cancer and leukaemia in areas surrounding power stations.

It should be stressed that many participants *did* express concerns about security and most particularly in relation to the risk of terrorism. Many participants felt that terrorism would be an on-going risk that has to be planned for, but should not determine the UK's choice of energy supply.

Participants envisaged the possibility that terrorists might fly an aeroplane into a power station or else there might be a security breach whereby terrorists gained access to a station and triggered some kind of explosion. However, such possibilities were regarded as unlikely scenarios, and therefore, less of a tangible risk than an everyday failure in safety procedures.

Participants approached the topic of safety and security issues with the same broad concerns they expressed with regards to nuclear waste: they worried most about accidents and leakages arising from human error and institutional negligence; they also worried, to a lesser degree, about the threat of terrorism; they expressed distrust of the private sector's commitment to public safety and insisted on the need for a rigorous regulatory system. Human error was cited as a constant cause for concern. Pirbright and Buncefield were both mentioned as recent examples.

In addition to these overall concerns, participants also raised some specific concerns about the transport of waste, the safety of storage facilities, the involvement of the private sector, and the number and location of any new power stations. These issues are discussed in more detail below.

Concern about the transport of waste

Many participants expressed concerns about the transportation of radioactive waste. They were worried mainly about the possibility of accidents rather than susceptibility to terrorist attacks or criminal theft. In safety and security terms, many participants felt that the transportation of waste and fuel represented the greatest period of risk in the lifecycle of nuclear energy. This was due to concern about the movement of radioactive materials through built-up and residential areas. It was commonly agreed that, in order to reduce the risks, transportation of radioactive waste should be kept to a minimum.

In part, people expressed strong views on the risks of transportation because it was a subject they actually felt they knew something about. They knew how transport accidents could happen, and they could relate it

to their own everyday experiences of road and rail travel. By contrast, they had little or no knowledge or experience of what actually goes on inside a nuclear power station and so found it more difficult to evaluate the risks.

Concern about the safety at storage facilities

As with all power stations, participants were worried about the potential for accidents or leakages at waste storage facilities. Some participants were particularly concerned because of the long timescales involved. Participants were concerned about the eventual deterioration of the materials involved in containing the waste: that is, both the immediate storage containers and the repository facility itself. They worried that protective barriers would weaken over time, allowing the radioactive materials to seep out and contaminate the wider natural and human environment.

> *"The Government must show us, beyond a shadow of a doubt, with scientific opinion, that waste storage is absolutely safe. Is concrete going to degrade? Will water get contaminated?"*
>
> Wales

Participants were also concerned about whether a deep geological repository would be able to withstand the natural disasters that might occur, e.g. earthquakes, floods, rising sea levels, meteors. Many were also concerned about how possible it would be to guarantee an effective regulation and inspection regime over such long timescales. It was commonly felt that safety and security measures might well be rigorously enforced and monitored in the short-term but that this may not happen over the course of hundreds and thousands of years.

Concern about the private sector

Underlying people's concerns about safety and security was a concern about the private sector's involvement in nuclear power. People argued that safety and security considerations were the absolute priority when it came to nuclear power stations and radioactive waste. Even where the level of risk might be low, these were felt to be matters of national interest because of the potential scale of disaster if something did go wrong. Essentially, participants did not trust private sector energy companies to prioritise safety and security issues. Participants felt that companies were driven primarily by commercial imperatives, not by public interest, and therefore feared that they would compromise public safety in pursuit of financial gain. This was felt to have happened in the case of the UK's privatised railway industry. It was argued that several high-profile railway accidents were the direct consequence of private companies putting profits ahead of safety considerations.

> *"The priority should be safety, not economics."*
>
> East Midlands

"For me, the threat is more whether it's Government run or privately run. That's a bigger concern than a terrorist attack."

South East

"A nuclear plant should be a matter of national interest… because it's a national effect if something goes wrong."

North East

It was feared that, in a bid to boost profits, companies would take cost-cutting measures both in the construction and the subsequent maintenance of power stations and waste storage facilities.

"Is it the best idea to have a plant built by the cheapest bidder?"

Northern Ireland

"They might go for the cheapest option. Dig something only 200 metres deep, not 1000 metres."

West Midlands

"Where money's concerned, there's always someone willing to cut corners."

North East

It was also feared that, unless properly regulated and monitored, companies might neglect the necessary safety and security measures, thereby increasing the twin risks of human error and negligence, as well as exposing their facilities to terrorist attack. In an effort to reduce costs, they might invest insufficiently in staff expertise and numbers and they might fail to ensure the proper procedures and regular, thorough monitoring.

"Would they try to get away with only minimum standards due to concerns about their profits?"

Wales

"The Government needs to be more involved. Hands-on Government and patrolling of the companies and initiatives."

North East

The number and location of power stations

For many participants, the risks associated with nuclear power meant that the number of new nuclear power stations should be kept as low as possible, in order to minimise the risks.

> *"The more stations the greater the potential for accidents to occur."*
>
> South West

> *"The risks shouldn't rule out nuclear power as an option, but there should be a cap on the number of plants."*
>
> Scotland

There was considerable debate about the appropriate number of new stations. Some participants argued that the number of new stations should be restricted to ten. This would make them a direct replacement for today's ten stations. They reasoned the advantage would be that the new stations would be more productive, so that ten new stations would produce more power than ten old ones, and therefore a greater share of the UK's energy needs would be met by the same number of facilities. Other people argued that the UK should restrict its future nuclear energy to current levels of output – and to its current share of the overall energy mix. Given that the new power stations would be more productive, there would not need to be so many of them: the number of new power stations should be restricted to six or seven, enough to produce the same amount of power as today's ten facilities. Some people raised the point that there should only be enough stations built to meet the UK's energy needs. They felt that no new nuclear power stations should be built with a view to selling power to other countries.

There were some participants who felt that there should not be any restrictions on the numbers of new nuclear power stations built. Some of these people argued that the priority was to build as many facilities as necessary to meet energy needs. This was especially the case if there was a genuine threat of the UK being unable to meet its future energy needs.

Many agreed that they would not want a power station to be built near to where they lived and ideally they would want all power stations to be located as far away as possible. This was because they had fears about dangerous levels of radiation occurring in the areas around power stations and the increased risk of cancer and leukaemia. They also wanted to be as far away as possible from a nuclear power station if something did go wrong.

Some participants were concerned that the UK is 'running out of space' and that therefore it would be difficult to place new nuclear power stations sufficiently far away from populated areas. This concern about 'running out of space' was driven by awareness of housing shortages in the UK and also a perception that the UK is running out of landfill sites for household refuse.

Many people said that, ideally, new stations should be built on the decommissioned sites of old stations. The advantage of such a strategy would be to 'contain' the issue, restricting new build to established locations. However, participants were unsure whether this was actually a feasible option. A related point made with reference to 'containing' nuclear energy and the associated risks was that there should be fewer larger power stations rather than many smaller ones.

There was widespread concern that the Government intended to allow private companies to decide the number and location of new stations. This was generally regarded as unacceptable. It was strongly felt that the number and location of new stations was an important matter of public interest in light of the potential risks and impact of something going wrong. Therefore, participants overall felt that the matter should be decided either by the Government or by some kind of independent governing body.

Managing safety and security risks

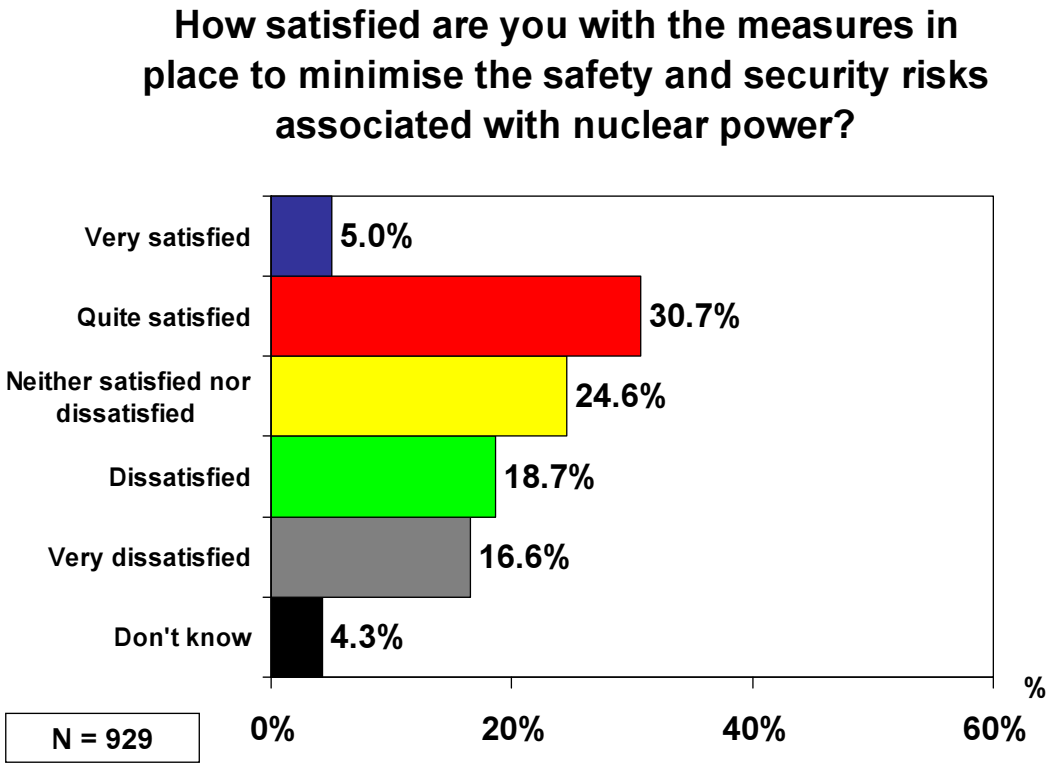
There was a widespread acceptance that it is impossible to eliminate all risks and that, ultimately, nuclear energy will involve some element of risk, regardless of the measures put in place. Human error in particular was thought to be one area of risk that would always exist. That is, regardless of steps taken to prevent accidents, someone could always make a mistake.

> *"There is no failsafe 100% method."*
>
> North West

Many participants argued that accidents and leakages might also occur due to organisational negligence. That is, there might be a failure of care by those involved in the handling of nuclear energy. As discussed earlier, many people felt that the possibility of such negligence was greatly increased by the involvement of the private sector in energy production.

Polling results on safety and security risks

Following a discussion about safety and waste, participants were asked how satisfied they were with the measures taken to minimise the safety and security risks associated with nuclear power. Opinions were polarised with around one third (36%) either very or quite satisfied and around one third (35%) either very or quite dissatisfied. A quarter (25%) were neither satisfied nor dissatisfied, however, men were significantly more satisfied than women (42% vs. 28%).



In discussions, participants raised three key issues around managing safety and security risks: the need for a controlled safety and security regime, the role of Government control and the need for transparency and accountability.

The need for a controlled safety and security regime

Participants thought that a rigorous safety and security regime was essential to minimise the twin risks of human error and institutional negligence. Participants wanted a comprehensive framework of safety and security regulations and an effective monitoring process with some form of independent inspection regime to ensure that companies were complying with all regulations.

> *"The regulatory framework needs to be robust, so the cost savings don't put the public at risk."*
>
> Northern Ireland

> *"There must be effective rigorous monitoring, including unannounced visits."*
>
> Yorkshire and Humber

Some expressed satisfaction that such a regime was already in place and would continue to safeguard public safety and security in the future. These people were confident that the Government could be trusted to enforce safety and security measures. Others argued that the matter was out of the public's hands and

there was no option but to get on with everyday life and hope that, behind the scenes, the Government was doing its best.

Many participants were reassured by the information they had been given, which explained there have been no serious accidents to date in UK civil nuclear power, though some were sceptical about the accuracy of this information. Some felt that this was a very positive indicator of future safety and security because, they argued, accidents and mistakes were more likely to occur in the early years of an operation, when experts were still learning and developing their systems. They felt, therefore, that things could only get safer and more secure, based on increased knowledge of potential problems.

> *"I'm satisfied that we know enough for it to be safe."*
>
> Wales

> *"I've got faith that technical knowledge keeps improving."*
>
> North West

However, many other participants were less confident. Some felt that they did not have sufficient information about the past and they questioned the nuclear industry's safety. Participants across the regions and devolved nations mentioned Sellafield as having a poor safety record; in particular, they cited leakages and pollution in the Irish Sea. These participants felt that there probably *had* been accidents and leakages over the past fifty years but that the nuclear industry and the Government had covered these up.

> *"Is our record as good as the handout suggests?"*
>
> Scotland

Government control

Many people felt that the best and safest option would be to have all nuclear power stations and waste storage facilities in public ownership, not in the hands of private energy companies. This was not because people regarded Government and the public sector as infallible. Nevertheless, they felt that Government ownership and management was preferable to the private sector because:

- Government has a primary duty to protect the public and national interest rather than to pursue commercial gain.
- Government was seen as a better guarantor of safety and security over the long timescales involved, especially with regard to the storage and disposal of radioactive waste.
- Government is not subject to the same market volatilities as the commercial sector. People wondered what would happen if private energy companies went into administration, for instance, or were taken over by other companies.

Whilst there was an appetite for public ownership and control of nuclear power stations, it is worth noting that some participants were concerned that neither the Government nor the private sector has an unblemished record for openness.

The need for transparency and accountability

Transparency and accountability were regarded as crucial components of an effective safety and security regime. Many participants felt that Government, although often fallible in their view, is more easily scrutinised and held to account than the private sector. People felt that, simply put, there was less chance that Government would be able to 'get away' with failings and errors.

Some people raised the necessity for some form of independent watchdog – independent from the nuclear industry (whether privately or publicly owned) and independent from Government. This organisation would provide an additional level of scrutiny by monitoring and enforcing industry compliance with safety and security measures. It was crucial for such an organisation to remain independent from day-to-day party politics (which are felt to concentrate on the short-term). An independent body would provide continuity of expertise and concern for the public interest that exists outside of the changing policies and actions of successive governments.

In summary

Whilst considerable concerns about the safety and security risks associated with nuclear power were raised, few participants argued that these risks should actually rule out the future use of nuclear power. Overall, participants felt it was absolutely crucial that the UK Government was committed to enforcing a rigorous safety and security regulatory regime, so that the on-going risks were minimised. They also wanted to ensure that an independent regulatory authority monitors Government policy in this area. There was general agreement that, regardless of the measures put in place, it would not be possible to guard against all possible safety and security risks and that, therefore, an element of risk would remain.

5. Why the Government is considering nuclear power

Summary

- The majority of participants considered climate change to be an important issue at the start of the day. 88% agreed overall that climate change is a critical challenge for the UK, with 60% agreeing strongly. Following deliberation, participants' overall level of agreement with the statement increased marginally to 90%.
- Some participants felt that nuclear energy has a role in reducing CO_2 emissions and should not be ruled out as an option for the UK's energy generation. However, others were not satisfied that the contribution that nuclear could make would be sufficient, given the associated risks.
- At the start of the day, 65% agreed overall that nuclear power could make an important contribution to reducing the UK's CO_2 emissions. Following deliberation on this, the number agreeing overall fell to 60% and the number who disagreed increased from 8% to 21%.
- However, many participants wanted clear reassurances and guarantees that developing new nuclear power stations would not detract investment and research away from renewable energy and lifestyle change strategies.
- Many participants wanted the Government to limit reliance on nuclear energy and invest more heavily in alternative solutions, such as renewable energy.
- There was widespread agreement that the UK must ensure security of supply. 96% agreed at the start of the day that ensuring a secure and reliable supply of energy is a critical challenge for the UK and 94% agreed following the deliberation.
- Many participants felt that nuclear energy could be an important part of achieving this goal in the short-term. At the start of the day, 63% agreed that nuclear power stations could make an important contribution to providing the UK with secure and reliable energy supplies in the future. Agreement remained at the same level following deliberation on this issue (62%).

Introduction

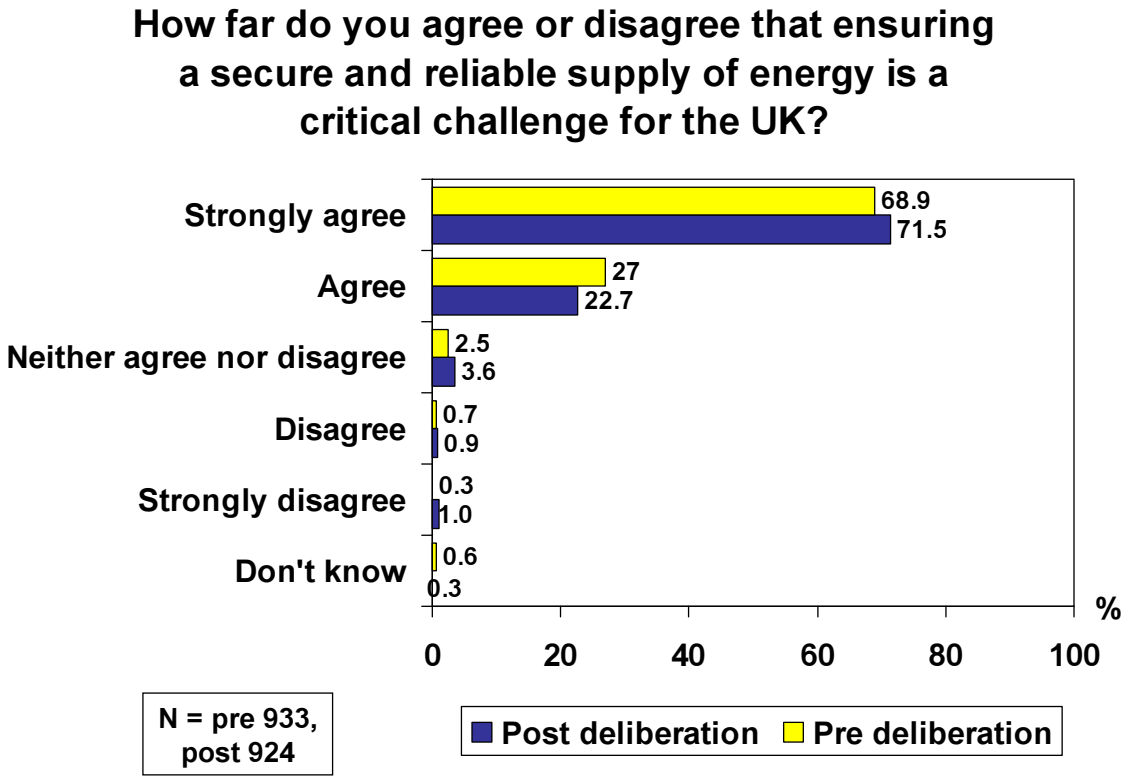
This chapter reports on polling questions and table discussions relating to why the Government is considering nuclear energy. It explores participants' perspective on the Government's preliminary view on nuclear energy. Participants were given information on the potential benefits of nuclear energy, as perceived by the Government. The Government's preliminary view is that nuclear energy offers the UK two main potential benefits:

- Helping to reduce the UK's CO_2 emissions which contribute to climate change
- Helping to make the UK's energy supply more secure in the future

Tackling climate change

Participants were asked how far they agreed or disagreed with the statement 'tackling climate change is a critical challenge for the UK'. They were asked this question at the start of the day, before they had been

exposed to any information or perspectives on the issue, and again, later on in the day, once they had received some information and had a discussion about it (see agenda, Annex 3). The majority of participants considered climate change to be an important issue at the start of the day with this increasing marginally after deliberation (88% vs. 90%).



Many participants felt that the UK would be unable to tackle climate change alone and that it was likely that any actions would be insufficient to prevent climate change. Some thought that the UK was a very small country in global terms and could not hope to impact on climate change. Others disagreed and felt that the UK had an important role in demonstrating international leadership.

Climate change was perceived to be a relatively recent issue currently receiving a lot of 'hype'. Some participants described climate change as a 'smokescreen' or a 'red herring' that was being used by politicians to frighten the public into accepting nuclear energy.

> *"There's too much focus on reducing carbon emissions. Running out of coal is a more convincing argument."*
>
> East of England

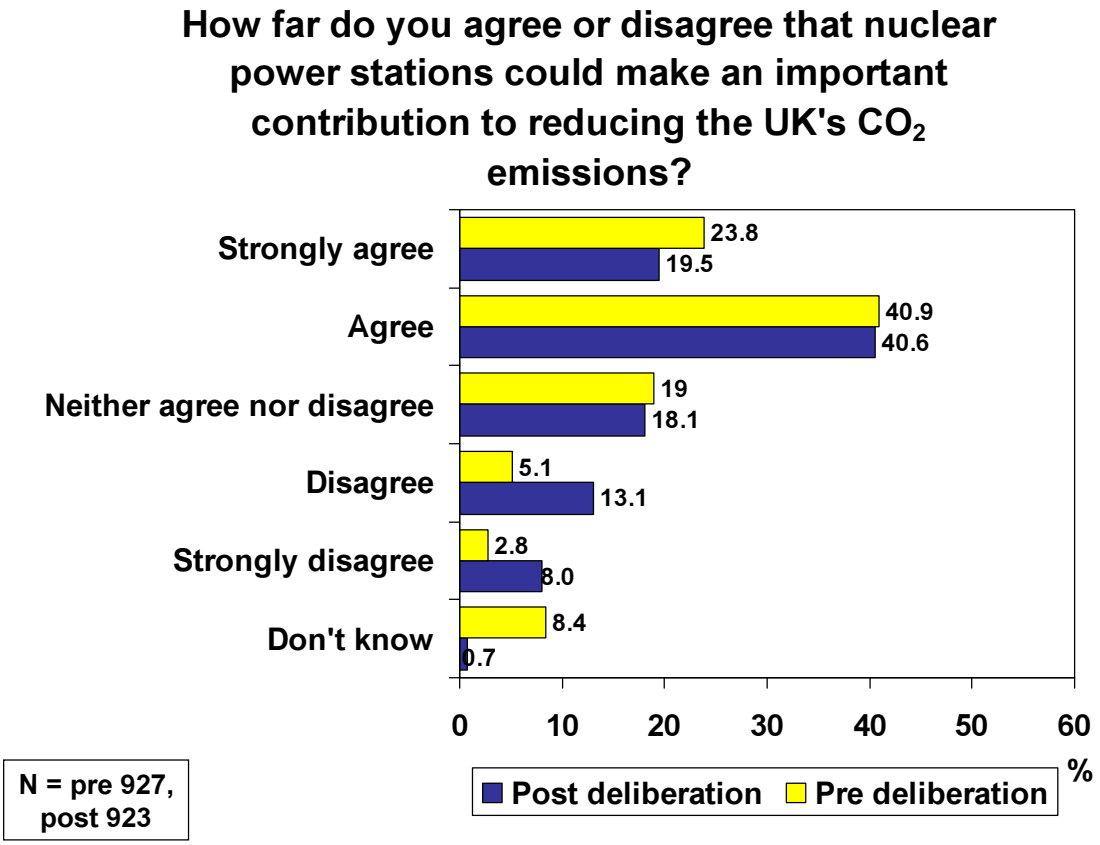
The contribution nuclear power could make to tackling CO_2 emissions

Polling results

Participants were asked how far they agreed or disagreed with the statement 'nuclear power stations could make an important contribution to reducing the UK's CO_2 emissions'. They were asked this question at the start of the day, and again later on in the day, after they had received some information on the Government's perspective and heard the views of others. At the start of the day, 65% agreed overall that nuclear power could make an important contribution to reducing the UK's CO_2 emissions. Following deliberation on this, the number agreeing overall fell to 61% with the number of those who disagreed increasing from 8% to 21%.

There were some significant differences between sub-groups for both sets of results. Looking at the results from the final polling:

- 66% of men agreed overall, compared with 55% of women.
- Older people also reported higher agreement, with 72% of those aged over 60 years of age agreeing that nuclear power could make an important contribution to reducing the UK's CO_2 emissions, compared with 53% of those aged 16-29 years.



Nuclear energy as a low carbon energy source

During table discussions, many participants reported being surprised that nuclear power is a low carbon energy source that emits no CO_2 at the point of electricity generation. Participants perceived this to be a benefit of nuclear power over other high carbon electricity generation methods, such as fossil fuels.

For some participants, considering nuclear energy as a 'green' option, in terms of low CO_2 emissions, was a leap of the imagination. These participants found it hard to emotionally relate to nuclear energy as a 'green' option after years of associating it primarily with environmental pollution and hazards. In addition, some participants, and especially those who expressed a real interest in 'green issues' were reluctant to endorse a strategy that appeared to replace one environmental problem with another, even though they thought it might be a pragmatic choice.

Level of impact on CO_2 emissions

Many participants questioned how much of a contribution nuclear energy could make to tackling climate change and therefore, whether its future use could be justified. The Government's estimate on potential CO_2 emissions savings from nuclear energy (between 5 and 13%) was perceived to be very low. Table discussions were often focused on questioning whether this percentage was sufficient to justify the associated risks and implications discussed in the previous session (see Chapters 4 and 5).

> *"The level of carbon emissions reduction of 5-13% is not worth the associated risk."*
>
> East Midlands

Some participants felt that the contribution that nuclear energy would make to reducing CO_2 emissions had been overstated.

> *"Don't overstate the case. It's not that nuclear is going to save us."*
>
> North West

However, some other participants took a different view. They argued that the urgent need to reduce CO_2 emissions required that all possible steps should be taken.

> "*Every bit helps*."
>
> London

A central concern for participants overall was how many nuclear power stations would be required in order to make a sufficient impact on CO_2 emissions. Some felt that using nuclear energy as a way of tackling climate change might lead to a much greater proportion of energy being generated through nuclear and perhaps even an emulation of the French approach of 80% of electricity being generated by nuclear power stations. This possibility worried many participants and made them cautious about agreeing to the principle of using nuclear energy to address climate change.

Considering the alternatives

Many tables focussed their discussion on what the alternatives to nuclear energy might be. Many felt that there must be other ways to reduce CO_2 emissions from energy generation and called for more investigation into alternatives, in particular renewable energy technologies. There were many requests to hear more about the alternative plans proposed by others. Solar and wind power were thought to be a preferable way to limit CO_2 emissions because they were seen as both clean and green. Wave and tidal power were also mentioned, particularly amongst participants from Wales and the South West. There were also calls for the Government to look into new technologies such as Carbon Capture and Combined Heat and Power. Limiting CO_2 emissions through new transport policies and lifestyle change measures were also considered essential.

> *"The root cause of the problem lies in abuse of energy. We should be more punitive on this."*
>
> East Midlands

> *"I think it's more important that we reduce the number of cars on the roads. Surely that's a safer and easier option."*
>
> London

> *"Who's to say we can't cut emissions by 60% through other means?"*
>
> London

Despite an overall preference for these alternatives, many participants felt that nuclear would prove to be a necessary option for Government in the short-term for the following reasons:

- They perceived it to be more established and predictable than renewable technologies,
- They believed that the Government would rather continue the use of nuclear energy than put pressure on the public to change their lifestyles (as a way of reducing CO_2 emissions),
- Nuclear energy was perceived to be more economically viable in the short-term than other low carbon alternatives.

There was a serious concern arising from many of the discussions that investing in nuclear allowed a 'business as usual' approach that would detract from longer-term solutions being devised. Some participants felt therefore, that the Government would choose nuclear energy as an 'easy option'.

> *"It's not creative enough – doesn't look at our lifestyles and broader issues."*
>
> East of England

Commitment to development of renewables and new technologies

Overall, participants thought that before the Government allowed nuclear energy plans, reassurances should be given that maximum efforts in terms of finances and research were being put into alternative means of reducing CO_2 emissions.

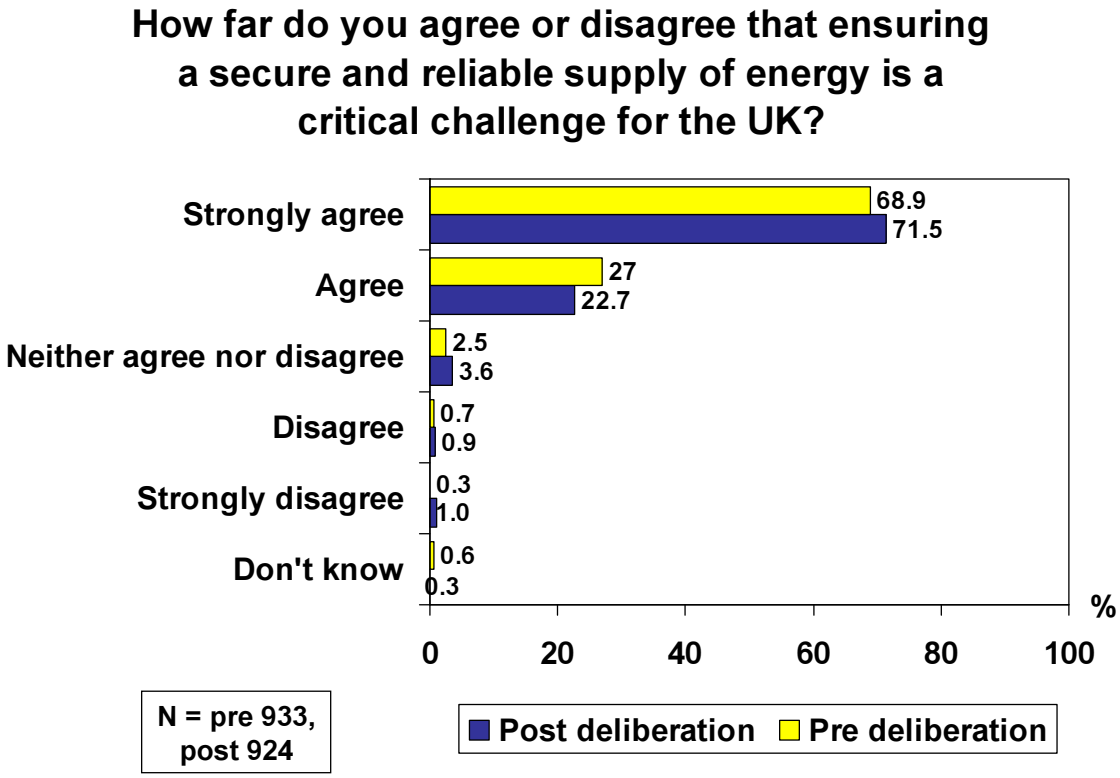
> *"If we knew that that [renewable energy] was being exhausted and pursued as much as possible [then nuclear could be considered]…."*
>
> London
>
> *"I personally feel we don't explore renewable energy enough…we haven't explored the alternatives far enough."*
>
> Belfast

Ensuring energy security

Participants were asked how far they agreed or disagreed with the statement 'ensuring a secure and reliable supply of energy is a critical challenge for the UK'. They were asked this question at the start of the day, before they had been exposed to any information or perspectives on the issue, and again, later on in the day, once they had received some information and had a discussion about it (see agenda, Annex 3). There was very little shift in overall agreement with this statement from the start of the day to after the deliberation (96% vs. 94%.). There were some significant differences between the regions on this question at the end of the day however, with more agreeing in the East Midlands (98%) and the North West (98%) than in London (86%).

On finding out more about the issue, many participants were concerned at the UK's reliance on imported energy. There was particular concern over the UK's reliance on energy from countries perceived to be unstable or unfriendly. There was a general feeling that the proportion of imported fuel should not be allowed to increase and there was consistent agreement with the principle that the UK should produce more of its own energy. Participants took this issue very seriously and felt that all options should be considered in order to 'keep the lights on'.

> *"Security of energy supplies is really important – the Government is right to be concerned – we don't want to be politically held to ransom."*
>
> East Midlands

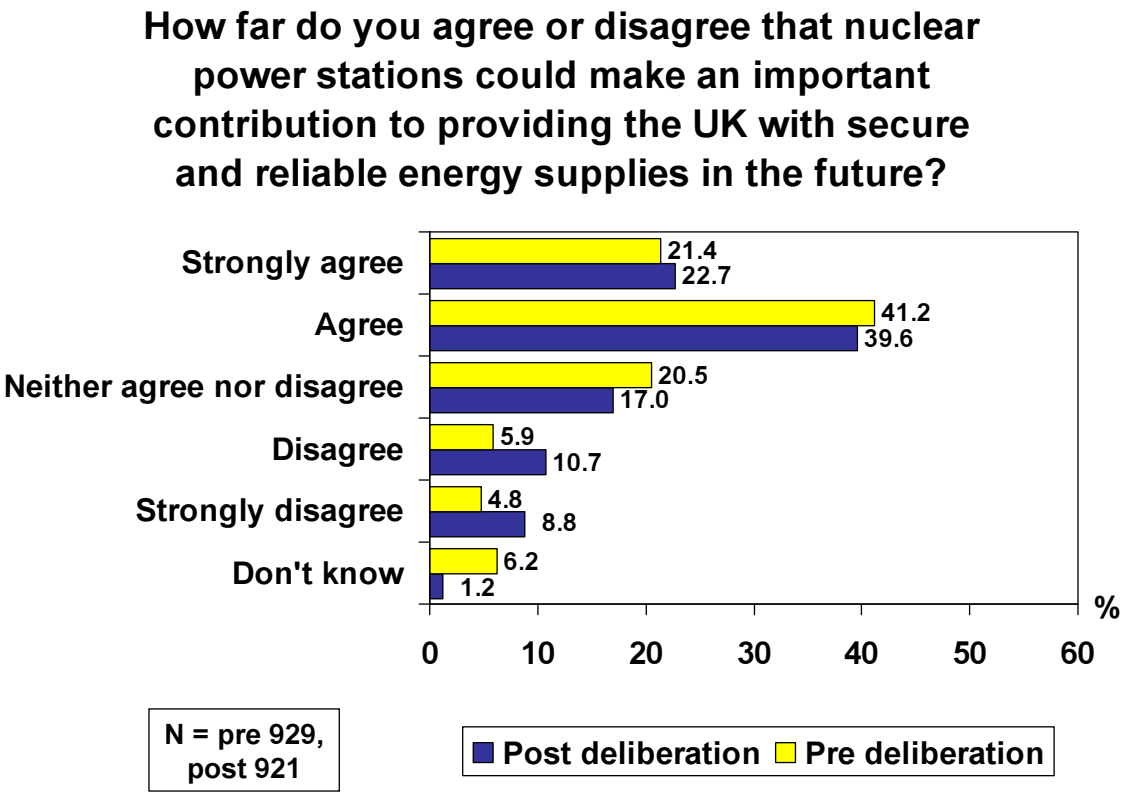


The contribution nuclear energy could make to ensure energy security

Participants were asked how far they agreed or disagreed with the statement 'nuclear energy could make an important contribution to providing the UK with secure and reliable energy supplies in the future'. They were asked this question at two points during the day's deliberations; at the start of the day and prior to receiving any information on energy security and then again following deliberation on the issue.

Again, there was little shift in the responses to this question, suggesting that views were unchanged by exposure to information on the issue and after hearing the perspectives of others. Figures for those who agreed that nuclear power stations could make an important contribution to providing the UK with secure and reliable energy supplies in the future changed little from pre to post deliberation (63% vs 62%). However, there was a more notable shift in the levels of disagreement expressed, with more disagreeing after deliberation (11% vs. 20%). This shift in view is perhaps explained by participants initially perceiving nuclear energy to offer benefits over fossil fuel methods in terms of CO_2 emissions and then later hearing information about the extent of the contribution that nuclear could make to reducing CO_2 emissions in the UK.

Significantly more men agreed than women at both votes (75% vs. 51% at the start of the day), and this changed little following deliberation (73% vs. 51% at the end of day). As seen on some of the other issues, older people agreed more than some younger groups (73% aged over 60 years vs. 64% aged between 16 and 29 years at the start of the day). While older people became slightly more positive after deliberation (the level agreeing rose to 76%), the proportion of younger people agreeing fell (59%).



Keeping options open

On deliberating the issue, the overall view was that having a range of energy generation methods, including nuclear power, would help ensure energy security because it would reduce reliance on any one supplier or method of generation. This was frequently expressed as the 'eggs in different baskets' principle.

> *"The best thing for having security is diversity – nuclear is one of the options that we should have – not the main or the only one but a variety."*
>
> North West

Some participants also felt that nuclear should be included in the energy mix because it can provide a 'constant baseload' of electricity that they felt to be important.

Beyond this general agreement, there was a need for reassurance from the Government about a number of important issues: the sourcing and transportation of uranium, and plans for longer-term measures to ensure energy security – particularly renewables and new technologies.

Sourcing uranium

Firstly, many raised concerns about sourcing uranium in the long-term. Participants thought that nuclear power cannot be thought of as a truly 'self sufficient' option because uranium is sourced from overseas.

> *"Is uranium going to become the new fossil fuel?"*
>
> Liverpool

Although participants did find it very reassuring that uranium is sourced from nations such as Canada and Australia, they also believed that relationships with other countries cannot always be guaranteed and mentioned difficult relationships with the USA and European neighbours.

There was also apprehension over whether reserves of uranium might run out or become prohibitively expensive. Some participants wanted power plants to stockpile uranium to ensure a long-term supply. Others thought that developments in reprocessing spent fuel might overcome these issues.

Discussions about the sourcing of uranium gave rise to some discussion on the CO_2 emitted during the mining and transportation of uranium. Some participants struggled to reconcile the idea that CO_2 would be produced in transporting uranium long distances in order to reduce the UK's CO_2 emissions.

Short-term solution to energy security

Many participants described nuclear energy as a short-term solution to the challenge that was seen to have arisen through power plants coming to the end of their lives and renewable alternatives not yet being sufficiently developed. A common thread running through these discussions was a desire for Government to further investigate and invest in renewable energy. Renewable energy was preferred by the public as a long-term energy security solution because the wind, waves and sun were perceived to be readily and freely available and do not require imported fuel to produce energy. Some participants also argued that security of supply could not be wholly achieved until people begin to use much less energy.

In addition, some participants agreed with some of the stakeholder views outlined in stimulus material (short films and handouts) that nuclear energy would not address the UK's reliance on imported oil for transport or gas for domestic heating. Some participants were keen to know how electricity could be used to meet other energy needs currently met through gas and oil. They felt that if this could be achieved, it would help to boost the contribution that nuclear energy could make to reducing CO_2 emissions.

In summary

Many table discussions concluded with the view that nuclear energy could have a role in reducing emissions and certainly should not be ruled out as an option. However, for others, the CO_2 savings that nuclear energy could make were not perceived to be sufficient enough for it to be considered as an important contribution.

Nuclear energy was seen by many as a pragmatic and realistic way to plug the energy gap, but there were widespread concerns about placing too great a burden on future generations because of a short-term energy security challenge. To mitigate against this, the public wanted reassurances that the Government would continue to invest in longer term solutions such as renewable energy, as well as legislating against too great a reliance on nuclear in the future, perhaps by capping the number of power stations.

6. Bringing it together: balancing the risks and potential benefits

Summary

- Many participants felt that nuclear energy might be necessary in the short-term to meet the UK's energy needs in light of the twin challenges of tackling climate change and ensuring energy security.
- However, overall, participants were uncomfortable about nuclear energy being part of the UK's long-term energy future. Substantial reservations were expressed about the implications of nuclear waste, safety and security risks.
- Despite many participants' clear level of discomfort with some of the safety and security implications and concerns about creating new nuclear waste, 44% agreed that, in the context of tackling climate change and ensuring energy security, it would be in the public interest to give energy companies the option of investing in new nuclear power stations. 37% disagreed and 18% neither agreed nor disagreed, indicating participants' difficulty in coming to a firm view on the question.
- There was great enthusiasm expressed about renewable methods. Many felt that they could contribute greatly both to boosting the UK's energy security and to reducing CO_2 emissions.
- Participants generally looked to Government to provide reassurances that nuclear energy would be carefully monitored and regulated. They also sought reassurances about the accountability of the private sector and the Government's role in this.

Introduction

This chapter reports on findings from the final session of the day. This session comprised of two discussion sessions and one polling question. Participants were asked to balance the potential benefits and risks of nuclear energy. They first discussed this on their tables and were then asked the Government's in principle consultation question[1], as it appears in the public consultation document. Following this, there was one final discussion session in which participants focussed on what conditions they would place on new nuclear build.

[1] *"In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?"* Source: 'The Future of Nuclear Power', p.34

Balancing the benefits and the risks

Perceived benefits

Participants reflected on the information they had received, the perspectives they had heard and the discussions they had had throughout the day. On balance, many participants felt that nuclear energy did offer some potential benefits.

The key benefit that was identified in many table discussions was the contribution that nuclear power stations could make to the UK's energy security. Many participants, as mentioned in previous chapters, were concerned that power stations (fossil fuel and nuclear power stations) are coming to the end of their lifespan. They were also concerned to learn about the UK's level of dependence on imported fuel. There was a widespread view that the inclusion of nuclear energy in the UK's energy mix would mean that sources of electricity production would be increased, thereby making the UK less dependent on a few sources of fuel, and potentially less dependent on a few countries who can supply this fuel.

Participants also identified the contribution that nuclear energy could make to reducing CO_2 emissions as a benefit, but to a much lesser degree. Some table discussions were often divided on whether the contribution that nuclear energy would make to tackling the global issue of climate change was sufficient to justify the associated risks that they had discussed. Some felt that, unless it could be demonstrated that nuclear power could make a substantial contribution to reducing CO_2 emissions, and more than the Government's estimate of 5-13%, the risks associated with nuclear energy were not reasonable risks to take. However, other participants felt that any contribution to reducing CO_2 emissions and tackling climate change was a useful contribution and that therefore this was a central benefit of nuclear energy. A few participants felt that nuclear energy could provide the short-term benefit of time to identify and explore the potential of other renewable and longer term electricity production options.

Participants also identified a number of other benefits of new nuclear power stations that can be summarised as 'labour market' benefits. Some participants raised the potential impact that new nuclear build might have on local jobs, both in terms of the construction of new nuclear power stations and in terms of the staff necessary to run them. These participants also felt that this would require a skills boost to ensure that British workers could compete with the skill sets of other countries which have recently developed new nuclear power stations. However, it should be noted that of the participants who felt that this was a key benefit of nuclear, few felt that this benefit was sufficient on its own to justify building new nuclear power stations.

Perceived disadvantages

Perhaps unsurprisingly given the level of concern expressed about waste and safety issues associated with nuclear energy, table discussions in this final session were very much focussed on the risks and drawbacks of nuclear energy. Overall, participants felt that the risks associated with nuclear power are considerable and represent a major drawback in terms of the continuing use of nuclear energy in the UK in the future.

"We need to make sure that the whole operation is safe and policed correctly."

Yorkshire and Humber

Of primary concern was the creation of new nuclear waste. Participants found information about the existence of nuclear waste and the timescales involved in managing it quite shocking; this was especially the case for those who were unaware that the UK already had nuclear waste and were unfamiliar with the implications of this. Many participants felt that their concerns about nuclear waste had not been alleviated by the information they had been given. The deliberation on the issue had raised many questions and, as a result, participants felt that in the absence of more information, nuclear waste was the greatest disadvantage of nuclear energy. It was perceived as a 'great unknown' which raised substantial concerns about possible long-term risks for future generations.

Participants raised reservations about the safety of nuclear power. In particular, they were concerned about possible 'leakages' of radioactivity, either from nuclear power stations themselves, from waste storage facilities or from the transit of fuel and waste.

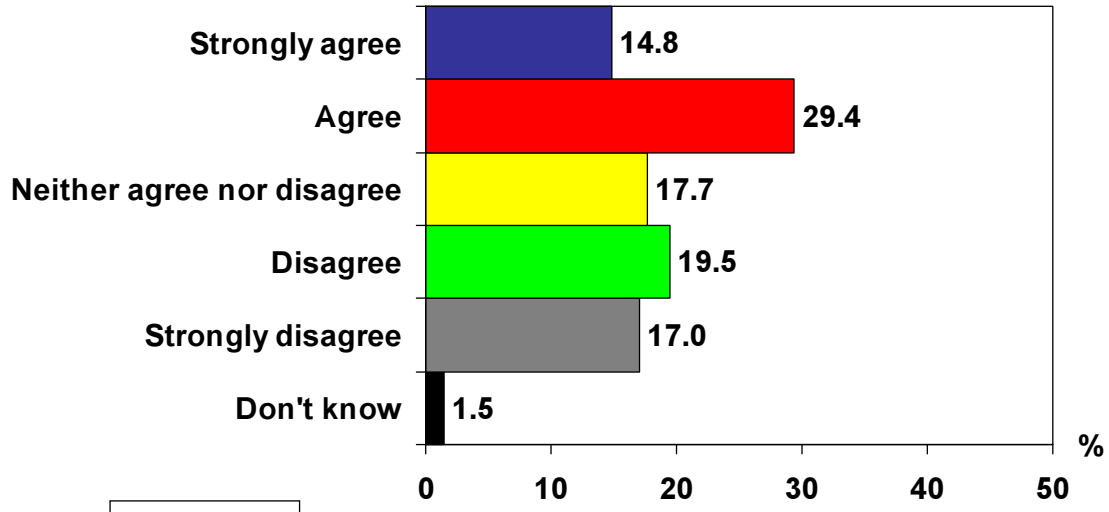
Whilst security risks were thought to be significant, they were not identified to be as much of a disadvantage as waste and safety issues.

Overall balance of benefits and disadvantages

Participants were asked to respond to the Government's in principle consultation question: 'in the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?'. Despite participants' clear discomfort with some of the safety and security implications and concerns about creating new nuclear waste, 44% agreed (15% strongly), 37% disagreed and 18% neither agreed nor disagreed, therefore indicating participants' difficulty in coming to a firm view on the question.

As already seen on a number of issues, there were some significant differences between sub groups in the responses to this question. Older people agreed more than younger people (54% of those over 60 vs. 39% aged 30 to 44 years). Men agreed more than women (65% vs. 33%).

In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?



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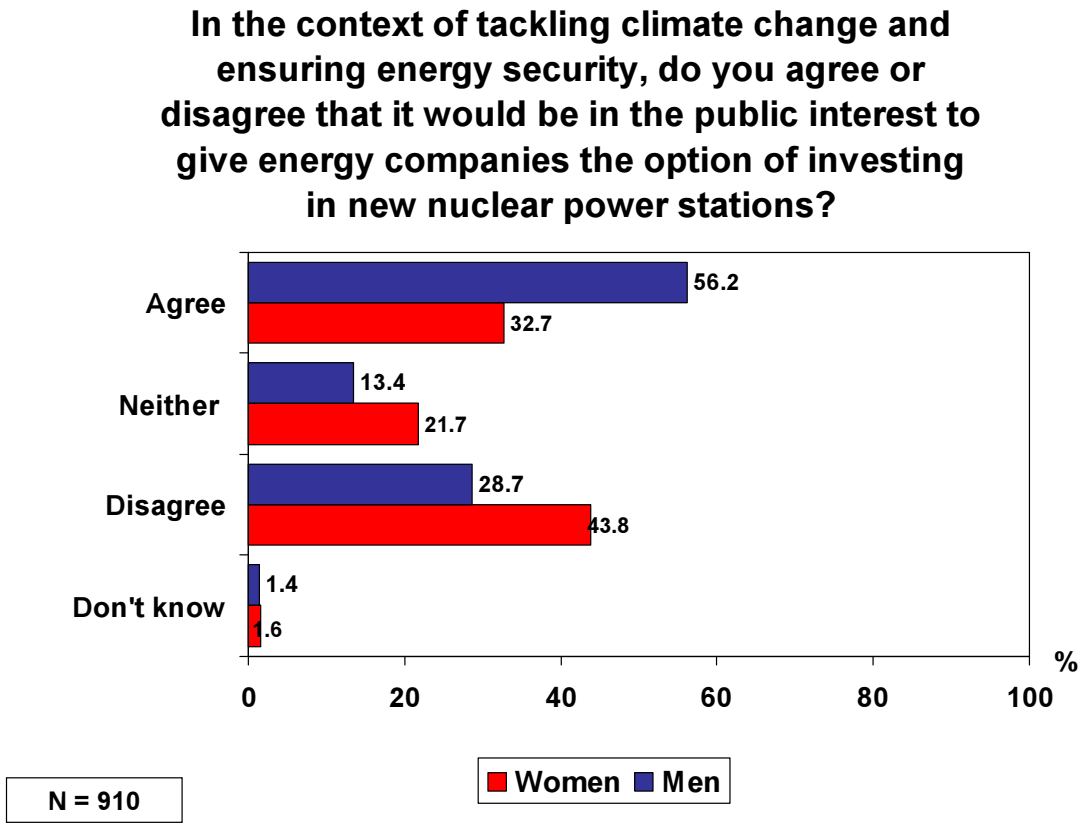


During table discussions on the balance of the benefits and drawbacks of nuclear energy immediately before this polling question was asked, many participants reported coming to an overall view with a 'heavy heart'. Despite the concerns and issues that participants raised about the continuing production of nuclear energy in the UK, many felt that, overall, nuclear power had a role to play. However, though many agreed with the Government's view that nuclear energy offered benefits, participants in the main were unhappy about the disadvantages they had identified.

Those who thought that nuclear energy did have a role to play had, in the main, arrived at this view in the absence of any alternatives. Participants generally perceived that renewable methods and new technologies might not be sufficiently developed to meet the UK's electricity needs in the short-term future and in the context of the timetable for power station closure. Nuclear energy was considered by many to be a possible short-term solution. Overall, participants did not believe that nuclear energy should be part of the UK's longer-term energy strategy and felt that steps to ensure that it will not be should be taken.

"It's more of a 'yes' when the chips are down, but I still think we could exploit renewables more."
North West

During this discussion session, some participants reported feeling that they were not able to come to a fully informed view because they needed to hear more information and to learn more about the perspectives of

others. They felt that the information that they had been provided with did not help them to arrive at a view and instead left them with an appetite to know more.

> *"The Government need to give us more accurate figures and basically communicate more with us on the role nuclear power will play."*
>
> North West

> *"They're not making it clear to me about what the alternatives are. How can I make a decision on my support of nuclear when the alternatives haven't been made clear?"*
>
> Cardiff

There was an appetite to hear more from those who disagreed with the Government's preliminary view that nuclear energy should continue in the UK and their reasons for this and most particularly from green groups.

> *"We would like to hear more of Greenpeace."*
>
> North East

In addition, some participants felt that the information given had been designed to lead them to a particular view. They thought that the materials for the events sought to present nuclear energy in positive terms or as the only possible solution.

> *"Come clean and present the full picture."*
>
> North East

> *"Everything is a little dressed up. It's all a little bit too perfect regarding nuclear power."*
>
> North West

Conditions on new nuclear build

Following the final polling question (page 51), participants discussed what, if any, conditions should be put in place before giving energy companies the option of investing in new nuclear power stations. Participants raised a variety of conditions, discussed below.

Global commitment to tackling climate change

Many participants wanted reassurance that other countries were also taking steps to tackle climate change. There was concern that the contribution that nuclear power would make to reducing the UK's CO_2 emissions would not be matched by the efforts being made in other countries. Some participants felt that, if the Government is proposing the continuing use of nuclear energy in the UK on the grounds of helping to tackle climate change, they must first demonstrate that all other possible steps are also being taken, both at home and abroad.

Commitment to renewable energy and new technologies

As mentioned earlier, there was widespread desire for renewable energy methods to make up a much larger proportion of the UK's electricity supply in the future. This was argued to be on the grounds of both the contribution that renewable energy could make to reducing CO_2 emissions and to ensuring security of supply. Participants were attracted to renewable methods such as wind and solar, as they require no fuel and therefore no dependence on other countries for imported fuel.

Participants wanted the Government to provide guarantees that new nuclear build would not result in reduced investment in the development of renewable energy and new technologies than would have been the case in the absence of new nuclear build. Whilst participants were made aware of the increases in investment to be made in renewable energy over the next fifteen years as a result of the Renewables Obligation, many felt that even greater increases needed to be made in the short to medium term.

> *"The condition I would have to set on all of this would be that the Government has to invest in renewable sources of energy before going down the nuclear path."*
>
> Wales

Commitment to safety, security and waste management

Many concerns were voiced in relation to safety, security, waste disposal and decommissioning. Participants wanted guarantees that these issues would be addressed and robust plans put in place prior to the construction of new plants. A number of participants suggested that companies should pay into a "decommissioning fund" to ensure adequate finance is available to carry out this vital aspect of the work.

Government must play a key role

There was substantial concern about the involvement of the private sector; from their involvement in building new nuclear power stations and running them, to managing and storing waste. Many participants doubted that private energy companies would be held to account and were concerned that, ultimately, any difficulties with any aspect of nuclear energy in the future would fall to the Government and the taxpayer to address. The long timescales involved added to this concern for many, who doubted whether energy companies would make plans and budgets for the full lifespan of a nuclear power station, including the costs of waste and decommissioning. There was significant concern that energy companies would not act in the interests of the public with regards to safety issues, with many believing that commercial gain would take priority.

> *"Why do Government have to rely on the private sector? The Government should build these plants. That way they can be brought to account."*
>
> South East

"I'm not opposed to nuclear power. I'm just opposed to it falling into the wrong hands."

North West

Participants wanted reassurance from Government that their fears with regards to private sector involvement would not be realised. They sought specific reassurances in relation to regulation and inspection. Many participants felt strongly that this role must be undertaken by an independent inspection / regulatory group of experts who would not be subject to political or private sector influences and would act in the interests of the public especially in relation to safety and security. Some suggested that 'spot checks' should be undertaken to ensure that measures to minimise safety risks are not being compromised.

Participants overall would prefer to see nuclear energy delivered and run entirely by Government although there was also a feeling that the taxpayer should not subsidise the cost of construction / operation of nuclear power plants. There was acknowledgement from many that energy in general is delivered by the private sector and that this was therefore unlikely to change.

Greater communication

For many participants, the information they were given about the UK's energy mix, nuclear power stations in the UK, nuclear waste and safety and security risks associated with nuclear energy was new to them. Some felt that this was information that they should have been aware of and that the Government has a duty to inform the wider public about nuclear energy in the UK. Many felt that, because of the inherent risks, nuclear energy differs from other sources of energy in terms of the need for public education. There was also a feeling that greater consultation is needed both with the general public and with the specific communities in which power stations may be built.

Number and location of nuclear power stations

Location is critical and many participants wanted reassurance that the environmental impact of nuclear power stations would be minimised by using existing sites for the construction of new plants and / or locating plants in remote locations. Some participants also wanted to be given reassurances that giving energy companies the permission to consider nuclear energy as an option would not result in an unlimited number of nuclear power stations being built, and, that the number should be capped. Many participants felt that new nuclear power stations should only provide as much electricity as is currently provided by nuclear power in the UK's electricity mix (18%). Few participants thought that nuclear energy should make up a greater proportion of the UK's electricity than is currently the case.

"I think if there are going to be new nuclear power plants they should only replace the ones that are about to be disbanded."

North East

In the main, participants felt that nuclear energy should not provide more of the UK's electricity in the future if this would require that the UK has more nuclear power stations than is currently the case. This view was

primarily driven by a desire to limit the amount of new nuclear waste produced and fears around there being an excessive amount of new waste.

In summary

Overall, more participants agreed than disagreed that it would be in the best interests of the public to give energy companies the option of investing in new nuclear power stations. However, it was clear from table discussions that many participants had great reservations about this. These reservations were primarily about the generation of new nuclear waste and concerns about safety implications for people and the environment.

Participants were concerned also about the involvement of the private sector and who would ultimately be responsible and accountable for nuclear energy. Many looked to Government for reassurances that every aspect of producing nuclear energy would be carried out with the interests of the public, and not commercial interests, in mind.

There was substantial interest in renewable methods and new technologies, and what they could contribute to both reducing CO_2 emissions and to making the UK's energy supply more secure. It was felt that nuclear should only provide a 'stop gap' until these new methods of electricity generation and technologies could fully meet all of the UK's energy needs.

Annex 1: Methodological notes

Overview

pinion Leader was commissioned by BERR, through COI, to undertake nine deliberative events with the public as part of their wider consultation on the future of nuclear energy in the UK. The deliberative approach was designed to be primarily qualitative, although the design also lent itself to incorporating some quantitative measures.

Deliberative forums

Deliberative forums, unlike other more traditional research approaches such as focus groups or depth interviews, provide participants with information on the issues that they are being asked to discuss and an extended period of time (as compared with a focus group, for example) in which to have the discussions.

Nuclear energy is an unfamiliar subject for many people; using a deliberative approach meant that the public could be given some information to stimulate discussion and the expression of views on the subject. Using a deliberative approach also ensured that discussions on nuclear energy took place in the context of the 'bigger picture' of the UK's energy mix, the challenges it faces and the wider views of others outside of Government.

Qualitative element

The forums sought to understand the public's views and concerns, what conditions they would place on new nuclear build and what reassurances they would want if nuclear energy continued in the UK in the future.

People spent their day in mixed groups, made up of people from a range of backgrounds. In their groups they had detailed discussions on the issues around new nuclear power stations. To help inform the discussion, participants received information through video briefings, handouts and an interactive quiz.

Each table had its own facilitator. Table facilitators were briefed to:

- Ensure that all participants had their say
- Keep participants' discussions within the timings set out on the agenda (see Annex 3)
- Pose key questions to stimulate discussions and keep these 'on track' within the objectives of the forum (see Chapter 1)
- Take notes of the main points of the discussions and provide a good flavour of the discussions that took place on their table, using a proforma provided on a laptop

In addition to the notes taken by table facilitators, verbatim quotations were taken by note-takers who listened into table discussions. These note-takers were briefed to take verbatim quotations that reflected the diversity of responses given in discussion sessions.

Quantitative element

Qualitative discussions allowed us to understand what people think in relation to key issues, what is more/ less important to them and what conditions (if any) they would attach to a new nuclear build in the UK. The quantitative element was intended to allow us to explore the extent of a view amongst participants, rather than the dynamics of it.

During the day's deliberations, participants had the opportunity to 'vote' on key questions, using voting keypads.

The quantitative element was intended to capture overall responses to key questions. Where possible, polling questions were designed to cover the same issues as the key questions contained in the Government's consultation document. The final polling question was taken directly from the consultation document.

The quantitative element also enabled the measurement of change in views and attitudes as a result of having been exposed to information and having had the opportunity to discuss this as part of a group. In order to achieve this, some questions were asked twice during the day: at the start of the day, before any information had been shared; and later on, once participants had been exposed to some information and discussed it.

Developing the content

Using the consultation document

In commissioning the deliberative events, the Government sought to understand what the public thinks about their preliminary view on the future of nuclear energy. As such, the core source material for the deliberative events was the Government's own consultation document. This provided arguments, models and information that have either been developed by Government or from sources which the Government used as evidence in coming to their view. The parameters and basis of the deliberative events were necessarily established within the foundations of the wider consultation both in terms of:

- The question asked
- The information presented

Including other perspectives

The deliberative element of the events was essentially to inform participants about the Government's view and why they had arrived at this view. However, to help the public to assess the Government's preliminary view, it was necessary to outline the views and arguments of others. These additional perspectives were covered in order to help participants to understand that: a) there are a variety of perspectives and that others, aside from the Government, also have a view on the future of nuclear energy in the UK; b) that some key stakeholders disagree with the Government's view and their key reasons for this. To this end, key stakeholders were invited to summarise their view and give this to the public via the medium of several pre-

recorded short films to be shown throughout the day. The films did include pre-recorded comments from a major green group. However, that group along with certain other green groups withdrew from the consultation process on the day before the events were due to take place. This meant that the contributions of that green group to the video stimulus had to be edited out and replaced by voiceover. Additional perspectives were also outlined in the handouts which provided supporting material to the short films. Stakeholders were invited to comment on/ provide input to the representation of their view in the handouts (see below for more on stakeholder involvement in the development of materials).

The format of the day

The outline agenda was as follows:

- Welcome and introductions
- Background information, with opportunities for discussion
- Briefing and discussion on nuclear waste and safety
- Briefing and discussion on why the Government is considering nuclear power
- Final discussion to bring together the key themes and issues

See Annex 3 for the full agenda with timings.

The stages of development

The information supplied to participants went through various assessments to ensure it was easy to understand and provided the necessary basic level of information to have a discussion about the Government's preliminary view. These assessments included:

- A Citizens' Advisory Board
- A Stakeholder review group
- A Development Event to pilot the final draft of the agenda and materials among a small group of people recruited to represent a broad cross section of the public.

At all these stages, input was integrated into the materials in order to make them as accessible but also as comprehensive as possible.

The Citizens' Advisory Board

The Citizens' Advisory Board provided a means of ensuring that public consultation processes were grounded and accessible to public scrutiny. The Citizens' Advisory Board, made up of 10 members of the public, met three times over a two-month period. During the interim, and based on their feedback, materials were re-worked and then presented back again for their consideration. The CAB provided an invaluable resource for commenting on stimulus materials, providing a keen reality check and ensuring that all materials were clear and accessible.

Stakeholder group

BERR also convened a Stakeholder group that was tasked with reviewing and commenting on the stimulus material to ensure it was as fair and accurate as possible, from their informed point of view. These comments then led to further restructuring of the materials presentation format, and further inclusion of specific or expert points of view. The stakeholder group met once and stakeholders involved in the group were invited to comment on two iterations of the handout materials.

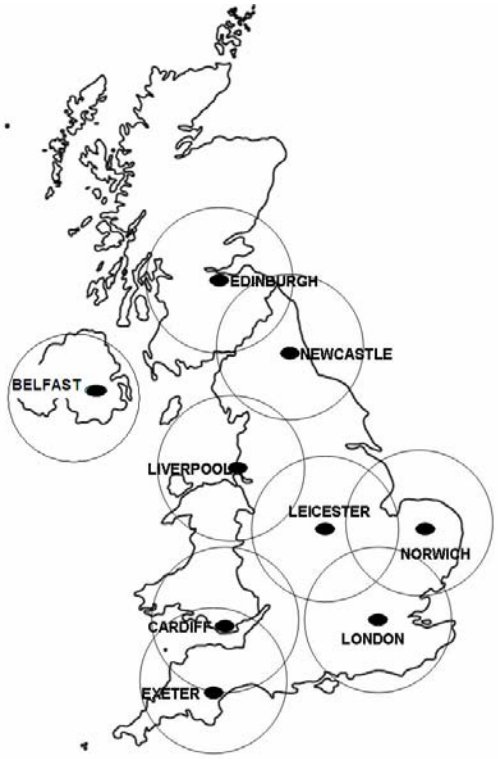
The Development Event

The Development Event then provided an opportunity to test out the materials before the main events. 30 members of the public were recruited (via purposive methods) to reflect the demographics of the UK. The Development Event ran as the main events would, and were thus an invaluable opportunity to review and refine materials and structure, based on real experience.

Recruitment

Locations

Nine event locations were selected across England, Wales, Scotland and Northern Ireland with a view to achieving the greatest geographic spread possible.



Achieving regional spread

In order to represent all the nine Government-defined regions of England via the six events taking place across the country, three events were selected as capable of representing an extra, adjacent region

These were:

Newcastle: North East + Yorkshire & Humber

Leicester: East Midlands + West Midlands

London: London + South East

The regions and event correlation breaks down as follows:

Region	Event location	Regional target sample size	Target event size	Regional achieved sample size	Achieved event size
North East	Newcastle	90	180	73	159
Yorks & Humber		90		86	
North West	Liverpool	90	90	77	77
East Midlands	Leicester	90	180	73	147
West Midlands		90		74	
East of England	Norwich	90	90	80	80
London	London	100	200	78	160
South East		100		82	
South West	Exeter	90	90	84	84
Wales	Cardiff	90	90	83	83
Scotland	Edinburgh	90	90	85	85
Northern Ireland	Belfast	90	90	74	74

The reasoning behind larger event allocation in London and the South East was based on analysis of relative population size.

Recruiting participants

In order to recruit the participants, over 100,000 people were selected from electoral registers and asked to complete a brief questionnaire about themselves. From this, participants were chosen to reflect the demographic make-up of the UK. The subject of the consultation was not disclosed until after participants had been recruited, to ensure that, as far as possible, participants' views reflect those of the wider public and not those with a particular interest in the subject.

Analysis

Qualitative analysis

All of the notes taken by table facilitators (using a structured proforma) were organised into a grid. Each table's notes were given a row in the grid. Each column referred to a specific discussion session of the day. This approach allowed the totality of responses on a single area/ question to be looked at.

Following this stage, key themes were identified from each of the discussion sessions. These key themes from each section provided the structure of writing the core chapters for this report.

The analysis process was then replicated by a team of researchers who had not been involved in the core team (working on content development and design of the events). Without having read draft chapters, they looked at data collected in the overall grid containing all of the notes from all of the discussions. They then identified key themes. These key themes were then compared to those originally identified and the draft chapters were then reviewed on this basis.

Quotes contained in the report come either from verbatim quotes taken by table facilitators or by note-takers tasked with taking verbatim quotes during table discussions throughout the day. The quotes are used to provide illustration of the findings and to situate findings in the words of those who took part.

Quantitative analysis

The quantitative data from the events was weighted to be representative of the UK. Both cell and rim weighting was applied to the sample. The cell weighting was carried out for the regions, to get the regions to the same proportions as in the universe. The other weighting variables were included in a rim weighting process. The two weights (cell and rim) were then combined into one final weight. The weighting efficiency was 80% (that is, the effective sample is at least 80% of the real sample size).

Following the process of applying weights, bi-variate analysis was then carried out along with significance testing for differences between groups. The following points should be noted about the quantitative results given in this report:

- Differences between groups have been reported only where they are statistically significant (note that where differences between groups are reported in this report as 'significant', this refers to statistical significance testing).
- The recruited sample was not selected via entirely random selection for reasons of time and budget. As such, the quantitative results can be said to be demographically representative and are based on a sample size which is generally considered to be large in common market research practice.
- The events involved exposure to information on the day which the wider public had not seen nor deliberated in the same way. As such the results from the events cannot be generalised to the wider public.

Evaluation

At the outset, COI commissioned an independent evaluation of the process. This is being carried out by Shared Practice who are gathering the views of people involved in delivering the consultation events and those who took part. This evaluation will report in detail on participants' views of the process and their experience of taking part. The report will be available during spring 2008.

Annex 2: About the sample

The margin of error for the quantitative data presented in this report is affected by the fact that the data has been weighted. It is not possible to give a margin of error or confidence interval for the sample as a whole, as it varies dependent on the percentage answer e.g. confidence intervals are higher for results near to 50%, but it will be higher than for comparable unweighted data. For example, 44% of the sample agreed with the main consultation question (In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?). The confidence interval for this result is 4.1% based on the weighted data (if weighted data had not been required, it would be 3.3%).

This annex provides characteristic information of the sample. Note that data is given for the weighted sample. Count totals may differ due to rounding or missing cases from base (unweighted data).

Table 1: Gender breakdown

Gender	Weighted Count	Weighted %
Male	463	48.8%
Female	487	51.2%
Total	950	100%

Table 2: Region breakdown

Region	Weighted Count	Weighted %
North East	41	4.3%
Yorkshire & Humber	80	8.4%
North West	108	11.4
East Midlands	67	7.1%
West Midlands	84	8.9%
East of England	87	9.2%
London	116	12.2%
South East	130	13.6%
South West	81	8.5%
Wales	47	4.9%
Scotland	84	8.8%
Northern Ireland	26	2.7%
Total	950	100%

Table 3:Socio-economic grouping breakdown

SEG Grouping	Weighted Count	Weighted %
AB	209	22%
C1	295	31.1%
C2	214	22.6%
DE	232	24.4%
Total	950	100%

Table 4: Employment status (grouped) breakdown

Employment Status	Weighted Count	Weighted %
Employed	521	54.8%
Unemployed	25	2.6%
Retired	207	21.8%
Student	64	6.7%
Other inactive	134	14.1%
Total	951	100%

Table 5: Age breakdown

Age categories	Weighted Count	Weighted %
16-24	129	13.6%
25-29	80	8.4%
30-44	271	28.5%
45-59	223	23.5%
60-74	160	16.8%
75+	88	9.2
Total	950	100

Table 6: Ethnicity (grouped) breakdown

Ethnic categories	Weighted Count	Weighted %
White	877	92.3%
Non-white	73	7.7%
Total	950	100

Table 7: Ethnicity breakdown

Ethnic categories	Weighted Count	Weighted %
White British	832	87.6%
White Irish	11	1.2%
White Other	33	3.5%
Mixed	11	1.1%
Asian	37	3.8%
Black	23	2.5%
Other ethnic group	3	0.3%
Total	950	100

Table 8: Location breakdown

Location categories	Weighted Count	Weighted %
Urban/suburban	823	86.7%
Rural	126	13.3%
Total	949	100

Results of knowledge/attitudinal questions

These tables show results for three brief questions asked of the recruited sample immediately after they had agreed to attend the event (before they were told of the subject matter) and at the events themselves.

This was to identify whether sensitising participants to the subject of nuclear power in July resulted in a shift of opinions in the lead up to the event itself. Broadly speaking, the sample of participants became slightly less likely to claim knowledge of how electricity is generated in the UK today at the event than at the initial recruitment period. However, this had little effect on their claimed knowledge of the types of fuel used in electricity generation today, or in how they felt about the continued use of nuclear power to generate electricity in the future. It should be noted however that because participants were recruited in July to avoid peak summer holiday season, there was a need to carry out top up recruitment nearer the event meaning that the sample was not identical at each stage.

The same questions were also asked on an ICM omnibus in July (during recruitment) and in September (the weekend the events took place) to identify whether any shifts observed in the sample were also evident in the general population. Though there was a slight increase in the proportion of people claiming to know about how electricity is generated in the UK today in September (different from the movement in the recruited sample), knowledge about fuel groups used in electricity generation, and support for the continued use of nuclear power in the future remained relatively constant.

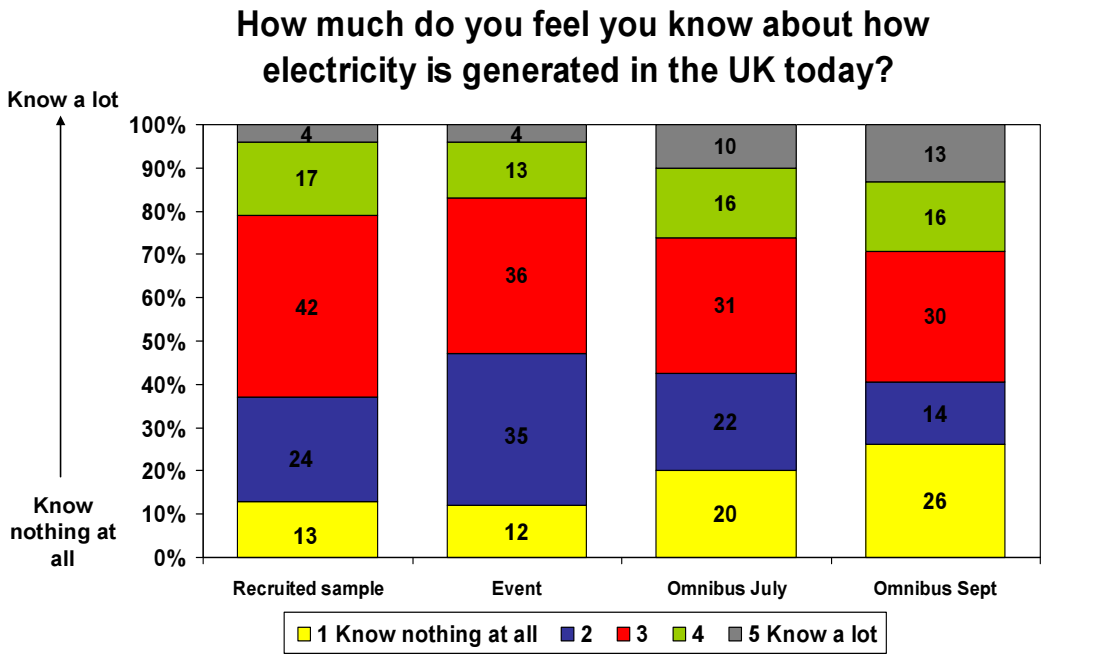
Direct comparison between omnibus results and sample data should be made with care because differences due to variables such as the way the sample was selected and the questions administered can

not be measured. Furthermore, while the sample remained relatively constant between July and September (albeit with the drop out and top up of new participants), the omnibus questions were answered by discrete, non-overlapping samples. Finally, the approach to weighting the two samples was different, as shown in the table below:

Table 9: Approach to weighting

Gender	Omnibus sample	Recruited sample
Male	49%	48.8%
Female	51%	51.2%
Region		
North East	4.35%	4.3%
Yorkshire & Humber	8.46%	8.4%
North West	11.50%	11.4%
East Midlands	7.07%	7.1%
West Midlands	8.91%	8.9%
East of England	9.15%	9.2%
London	12.26%	12.2%
South East	13.65%	13.6%
South West	8.43%	8.5%
Wales	4.94%	4.9%
Scotland	8.68%	8.8%
Northern Ireland	2.59%	2.7%
SEG Grouping		
AB	23.16%	22%
C1	27.37%	31.1%
C2	21.85%	22.6%
DE	27.62%	24.4%
Employment Status		
Working full-time	45.79%	n/a
Working part-time	11.19%	n/a
Not working	43.02%	n/a
Employed	n/a	54.8%
Unemployed	n/a	2.6%
Retired	n/a	21.8%
Student	n/a	6.7%
Other inactive	n/a	14.1%
Age categories		
16-24	13%	13.6%
25-44	37%	36.9%
45+	50%	49.5%
Tenure		
Owned outright	28.35%	n/a
Mortgage	42.18%	n/a
Council	16.72%	n/a
Other	12.74%	n/a
Cars		
None	22.26%	n/a
1	43.46%	n/a
2	25.91%	n/a
3+	8.37%	n/a
Holidays		
Yes	57.46%	n/a
No	42.54%	n/a

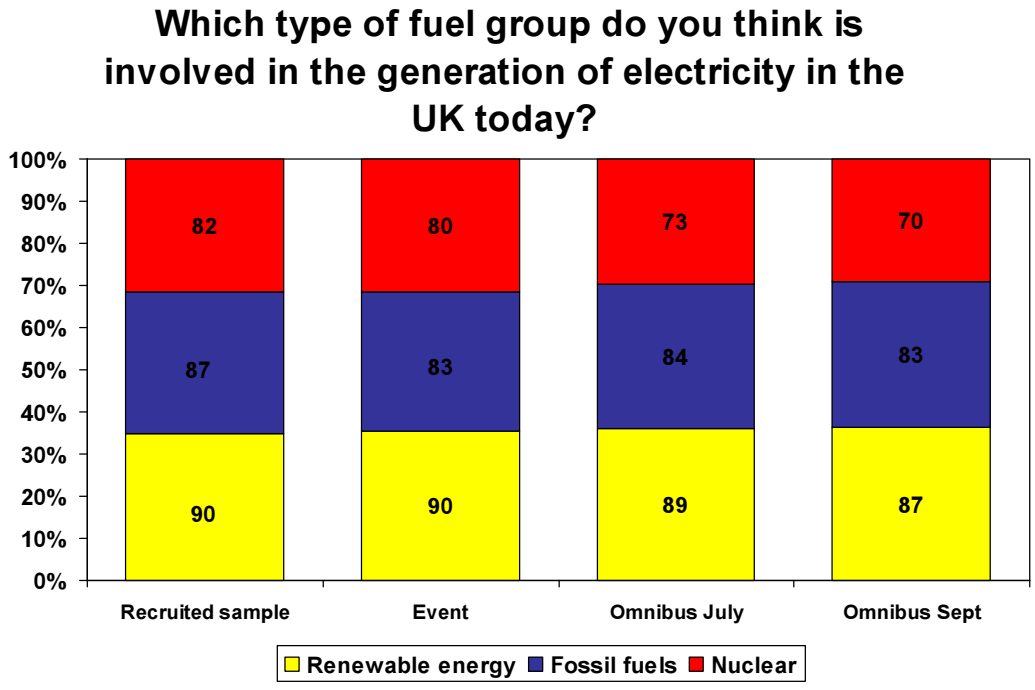
Chart 1: Level of knowledge about how electricity is generated



Base: Recruitment (949), Event (926), Omnibus July (3,188), Omnibus Sept (1,066)

Question: *"How much do you feel you know about how electricity is generated in the UK today? Please use a scale of 1-5 where 5 means you know a lot and 1 means you know nothing"*

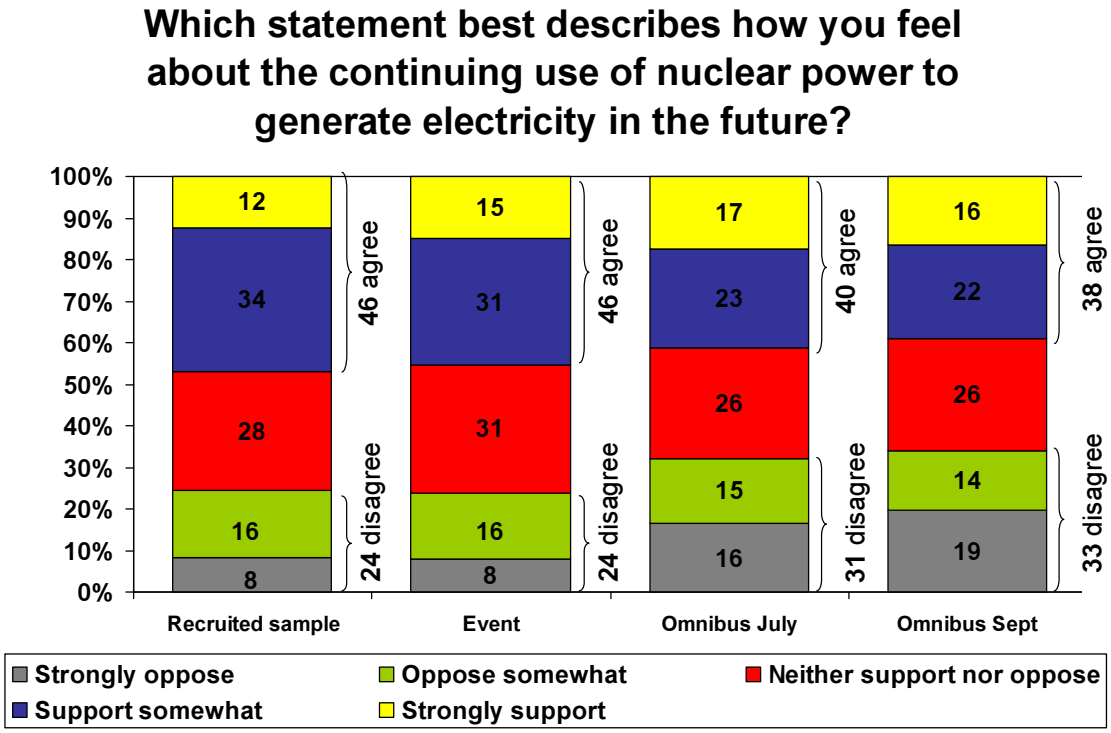
Chart 2: Awareness of methods of electricity production in the UK



Base: Recruitment (948), Event (922), Omnibus July (3,188), Omnibus Sept (1,066)

Question: *"I am going to read out three different types of fuel groups and for each one I would like you to tell me whether you think it is involved in the generation of electricity in the UK today"* MULTI CODE POSSIBLE

Chart 3: Awareness of methods of electricity production in the UK



Base: Recruitment (948), Event (924), Omnibus July (3,188), Omnibus Sept (1,066)

Question: ***"Nuclear power produces one fifth of the electricity in the UK today and our electricity use is rising. I'm going to read out a list of phrases and I'd like you to tell me which best describes how you feel about continuing to use nuclear power to generate electricity in the future"***

Note: The base size for the recruitment results is higher than the base sizes for the event results, as some people were absent at the time of voting, due to taking comfort breaks etc.

Annex 3: Agenda

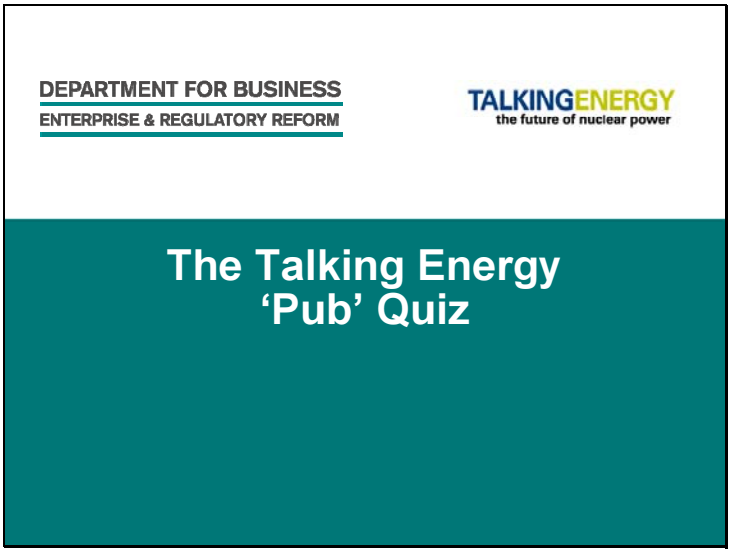
Time	Session	Stimulus materials
8.00	***Arrive and set up***	
9.00 – 9.45 45 mins	***Participant arrival and registration***	
9.45 – 9.50 5 mins	***Welcome***	Led from the front
9.50 – 10.00 10 mins	***Keypad training session using practice questions followed by questions asked in recruitment and on the omnibus***	Led from the front
10.00 – 10.05 5 mins	***Introductory video/ Ministerial address***	Led from the front
10.05 – 10.10 5 mins	***Facilitator slides – setting out the agenda and purpose of the day***	Led from the front
10.10 – 10.15 5 mins	***Initial polling questions*** 1. To what extent do you agree or disagree with the following statement: Tackling climate change is a critical challenge for the UK. 2. To what extent do you agree or disagree with the following statement: Nuclear power stations could make an important contribution to reducing the UK's CO_2 emissions. 3. To what extent do you agree or disagree with the following statement: Ensuring a secure and reliable supply of energy is a critical challenge for the UK. 4. To what extent do you agree or disagree with the following statement: Nuclear power stations could make an important contribution to providing the UK with secure and reliable energy supplies in the future. 5. How concerned are you about safety and security issues associated with nuclear power? 6. How concerned are you about the issue of creating new nuclear waste?	Led from the front

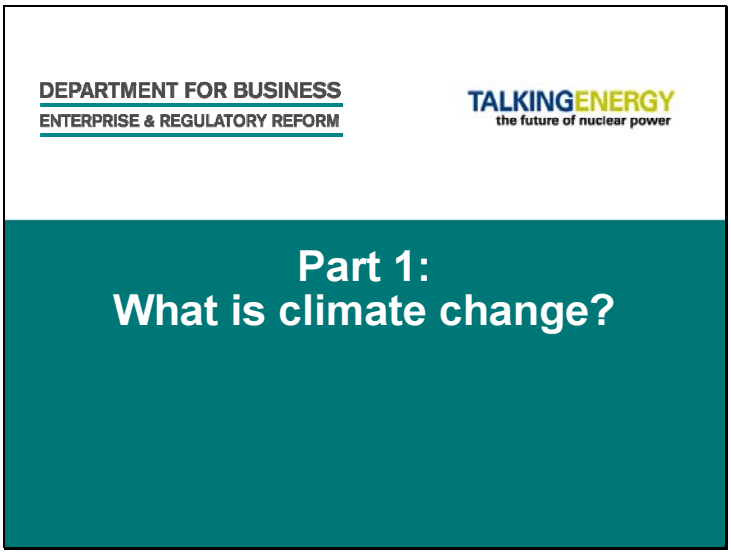
10.15 – 10.35 20 mins	***Discussion: Introductions and warm up*** Discussion session on spontaneous views on nuclear power to allow participants to express their views openly before any information is introduced	*Handout 1*
10.35 – 10.45 10 mins	***Plenary: Background information*** Video introduction – overview and scene setting	*Video* Led from the front
10.45 – 11.00 15 mins	***Plenary: Pub quiz 1***	Led from the front
11.00 – 11.20 20 mins	***Discussion: Response to background information so far*** Short discussion of initial reactions	*Handout 2*
11.20 – 11.40 20 mins	***Plenary: Pub quiz 2***	Led from the front
11.40 – 12.10 30 mins	***Discussion: Response to further background information***	*Handouts 3, 4 and 5*
12.10 – 12.15 5 mins	**Plenary: Stakeholder voices**	*Video* Led from the front
12.15 – 1.05 50 mins	***Lunch***	
1.05 – 1.15 10 mins	***Plenary briefing: Nuclear waste and safety***	*Video* Led from the front
1.15 – 2.15 **1 hour**	***Discussion: Nuclear waste and safety*** Discussion session focussing on the key issues around nuclear waste and safety (covering waste and decommissioning, reprocessing of fuel, transportation, safety, nuclear power and the environment)	*Handouts 6, 7, 8 and 9*
2.15 – 2.25 10 mins	***Feedback session***	*Led from the front*

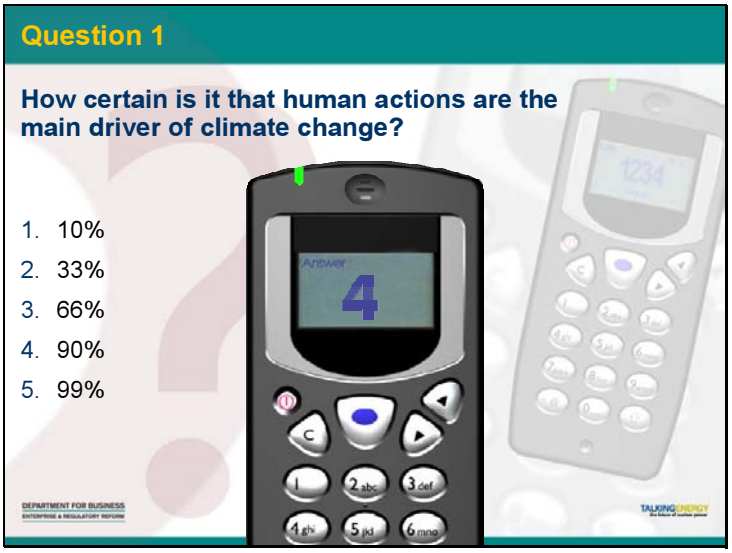
2.25 – 2.30 5 mins	***Polling questions on nuclear safety and waste*** • How concerned are you about safety and security issues associated with nuclear power? • How concerned are you about the issue of creating new nuclear waste? • How satisfied are you with the Government's proposal to manage new nuclear waste in the same way as existing waste? • How satisfied are you with the measures in place to minimise the safety and security risks associated with nuclear power?	*Led from the front*
2.30 - 2.45 15 mins	***Afternoon break***	
2.45 – 2.55 10 mins	***Plenary briefing:*** ***Why the Government is considering nuclear power***	*Video*
2.55 – 3.35 40 mins	***Discussion: Why the Government is considering nuclear power*** Discussion session on the potential benefits of nuclear (nuclear power and carbon emissions and security of supply)	*Handouts 10 and 11*
3.35 – 3.45 10 mins	***Feedback session***	*Led from the front*
3.45 – 3.50 5 mins	***Polling questions on why the Government is considering nuclear power*** • To what extent do you agree or disagree with the following statement: Tackling climate change is a critical challenge for the UK. • To what extent do you agree or disagree with the following statement: Nuclear power stations could make an important contribution to reducing the UK's CO_2 emissions. • To what extent do you agree or disagree with the following statement: Ensuring a secure and reliable supply of energy is a critical challenge for the UK. • To what extent do you agree or disagree with the following statement: Nuclear power stations could make an important contribution to providing the UK with secure and reliable energy supplies in the future.	*Led from the front*

3.50 – 3.55 5 mins	***Plenary briefing: Bringing it all together***	*Video*
3.55 – 4.10 15 mins	***Discussion: Bringing it all together (Part 1)*** Discussion session reflecting on all the issues discussed and considering the implications for the future of nuclear power in the UK	*Handout 12*
4.10 – 4.15 5 mins	***Polling questions*** • In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?	*Led from the front*
4.15 – 4.30 15 mins	***Discussion: Bringing it all together (Part 2)*** Final discussion session looking at the conditions that the public would place on new nuclear build	
4.30- 5.00	***Wrap up and close*** *Lead facilitator and Minister/ BERR official*	

Annex 4: The interactive quiz






Question 1
How certain is it that human actions are the main driver of climate change?
1. 10%
2. 33%
3. 66%
4. 90%
5. 99%
Answer
4
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Question 2

How many of the last 12 years have been the hottest on record?

1. 5
2. 7
3. 8
4. 11
5. 12

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Question 3

Between now and 2100, average global temperatures are predicted to rise by…?

1. Between 0.5 and 1 degree C
2. Between 2 and 4.5 degrees C
3. Between 4.5 and 6.5 degrees C

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Question 4

What is CO_2?

1. A ship
2. A gas which contributes to climate change
3. A metal
4. The latest boy band

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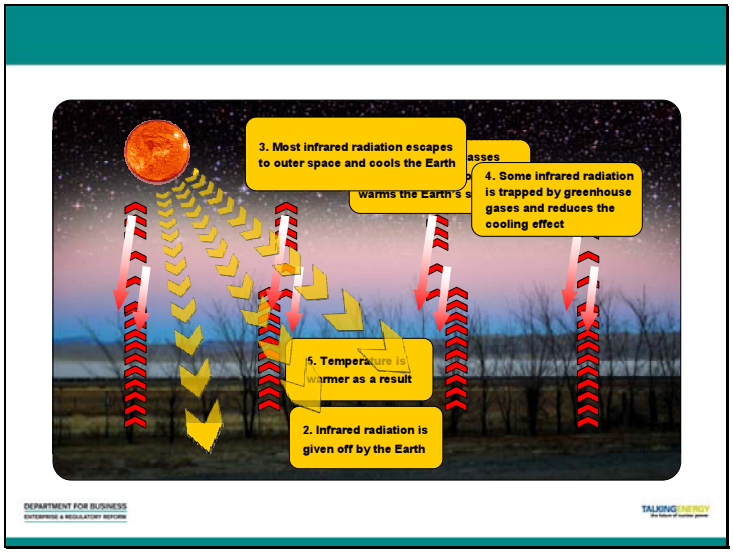

Question 5

The amount of CO_2 in the earth's atmosphere has increased by what % since 1750?

1. 15%
2. 22%
3. 31%
4. 37%
5. 42%

CO_2 emissions

- 24 billion tonnes of CO_2 is emitted globally each year
- The UK contributes about 2% to this
- In 2004, total UK CO_2 emissions were almost 560 million tonnes
- Target to reduce the UK's CO_2 emissions by 60% by 2050
  - The Government wants to see real progress towards meeting this target by 2020

Question 6

CO_2 emissions per person in the UK are 10.9 tonnes per year. What is the equivalent figure for China?

1. 3.2 tonnes
2. 4.5 tonnes
3. 8.5 tonnes
4. 11.6 tonnes

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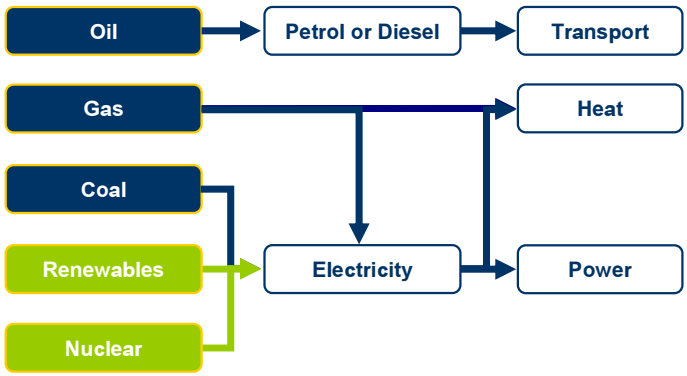
The UK's energy needs



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Question 7

How much of the UK's man-made CO_2 emissions are from the energy we use in our homes?

1. 5%
2. 12%
3. 27%
4. 38%
5. 62%

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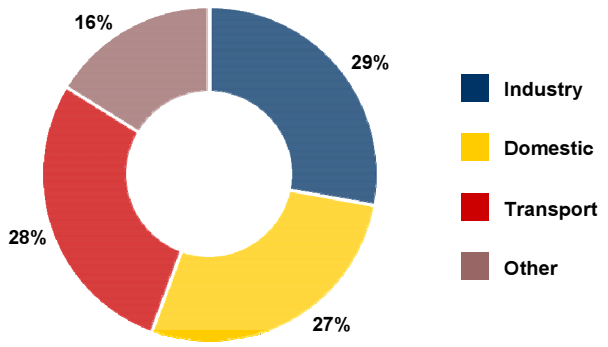
Carbon dioxide emissions in the UK, 2004



Question 8

How much did United Kingdom's overall energy consumption increase between 1970 and 2001?

1. 10%
2. 13%
3. 25%
4. 40%

Energy demand

- Demand for energy is rising
- In 2001, energy consumption was higher than in any other year over the last thirty years

Response Results

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the future of nuclear power

Part 2:
UK Electricity supplies and nuclear power

Question 9

How much of our gas could be imported by 2020?

1. 25%
2. 48%
3. 73%
4. 80%

Question 10

Currently, the UK has 80 large power stations in the UK. How many of them do you think will still be running in 2050?

1. 80
2. 65
3. 12
4. 0

Question 11

How much of our current electricity comes from coal and gas sources

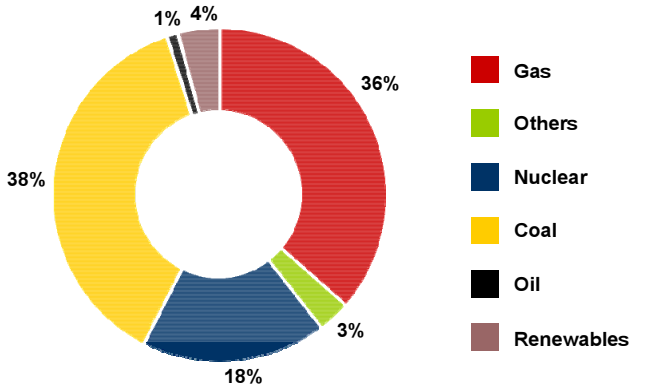
1. 40%
2. 64%
3. 73%
4. 90%

Question 12

How much of our current electricity used in homes and workplaces come from nuclear power?

1. 0%
2. 12%
3. 18%
4. 25%

Current UK electricity generation mix



Question 13

Currently, how many operational nuclear power plant sites exist in the UK?

1. 0
2. 7
3. 10
4. 25

Question 14

Who decides how the UK's electricity is generated?

1. The Government
2. Private sector energy companies
3. Both

Who does what?

Power Companies

Build and run different types of electricity generation – including nuclear power stations and renewable sources

The Government

Sets the rules for the electricity market

Enforces safety measures through industry regulators

Question 15

What proportion of CO_2 emissions in the UK come from electricity generation? Approximately:

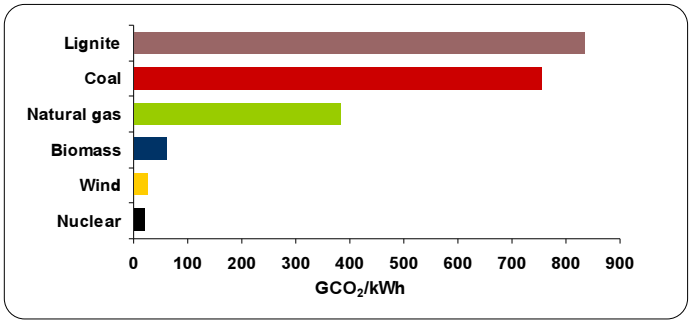
1. A quarter (25%)
2. A third (about 33%)
3. Three quarters (75%)
4. More than three quarters (over 75%)

Question 16

Which of these statements do you think is correct?

1. Nuclear energy produces four times as much CO2 as wind power
2. Nuclear energy produces twice as much CO2 as wind power
3. Nuclear energy and wind power produce about the same amount of CO2

CO_2 emissions from electricity sources



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Reducing the UK's CO_2 emissions

- Reducing the amount of electricity we use
- Boosting renewables sources
  - By 2015 the amount of electricity we get from renewables will have tripled
- Investing in new technologies
  - Carbon capture and storage
- Considering allowing nuclear to continue to be an option as an electricity source in the UK
  - Alongside other low carbon options

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Response Results


Response Results
'Table no goes here'
'Table no goes here'
'Table no goes here'
2
1
3
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Annex 5: Handouts

Handout 1: Why we are here/ why are we discussing nuclear energy now?

Energy is an essential part of everyday life in the UK. It plays a vital role in almost every aspect of our lives: from generating the electricity that lights our homes to fuelling our economy and powering our transport.

One third of energy is used to produce electricity. Like most countries, the UK's electricity supply comes from a variety of sources. The UK is one of 30 countries where this mix includes nuclear power.

Currently nuclear power generates about 18% of our electricity. However, the way we generate electricity is set to change as many power stations (fossil fuel and nuclear) close over the next 20 years.

The Government believes that in the UK we now face two major challenges in meeting our energy needs. These are:

- Helping to tackle climate change by reducing our CO_2 emissions (which are closely linked to the supply and use of energy)
- Ensuring we have a secure supply of affordable energy as current UK gas and oil supplies decline and we become increasingly dependent on imported fuel.

The Government's initial view

Given the scale of these challenges, the Government believes it is important to have every option open to make sure we do not limit the ways that we can tackle them. The Government believes that having many different ways of producing energy is central to helping to tackle climate change and to ensuring a secure energy supply for the UK. The Government has reached the initial view that energy companies should have the option of investing in new nuclear power stations.

The consultation

All but one of the UK's nuclear power stations is due to close by 2023. Because nuclear power stations take so long to plan and build, in order for nuclear power to continue to be an option in our future energy mix to replace the capacity closing over the next two decades, a decision on whether energy companies should have the option of investing new nuclear power stations needs to be taken this year. That is why we are consulting now.

The key questions we are now consulting on are:

Q. In the context of tackling climate change and ensuring energy security do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?

Q. Are there any conditions that you believe should be put in place before giving energy companies the option of investing in new nuclear power stations (for example restricting build to the vicinity of existing sites, or restricting build to approximately replacing the existing capacity)?

Handout 2: Tackling climate change and implications for our energy supplies

What is climate change?
Our planet is surrounded by a thin blanket of gases called the atmosphere which keeps the surface of the earth warm and able to sustain life. As we pump out "greenhouse gases" like CO_2, the nature of the atmosphere changes, making it trap more heat, and so warming the earth further. As a result, our climate is starting to change. Scientific research indicates that, because of climate change, we will experience more frequent extreme weather events. Indeed, there is plenty of evidence that this is already happening.

There is an overwhelming scientific agreement that much of climate change is happening as a result of human activity. The Government and many others across the world see climate change as a significant risk to our economy and environment, and are keen to address it.

Did you know? *There is an ambitious domestic target to reduce the UK's CO_2 emissions by at least 60% by 2050. A Climate Change Bill to put this target into law has been published by the Government and will be introduced later this year. The Government wants to see real progress towards meeting this target by 2020.*

Although nuclear would only make a relatively small contribution by 2020, because the first power stations will only have just started to become operational it could have a significant contribution to meeting our long-term $C0_2$ targets.

Where do CO_2 emissions come from?
More than two thirds of the UK's CO_2 emissions come from the way energy is produced and used.

In 2004:

- Domestic usage made up 27% of the total UK CO_2 emissions
- Industry accounted for 29% of the total UK CO_2 emissions
- Transport accounted for 28% of the total UK CO_2 emissions
  - mainly in the form of burning petrol and diesel, which are refined forms of oil, a fossil fuel

Did you know? *Some methods of generating electricity contribute less to climate change than others. Power stations burning coal, gas and oil, for example, produce the vast majority of emissions coming from electricity generation. They produce far more CO_2 emissions than renewable electricity generation and nuclear power. In the future it may be possible to capture and store some of these emissions, but the technology has not yet been demonstrated at full scale.*

What does this mean for the energy we use and where we get our energy from?
We need to think about our energy because the amount we use and the way it is produced has a significant impact on climate change.

Handout 3: What is the Government doing about our energy in the context of climate change?

Meeting the 2050 target to reduce CO_2 emissions by 60% isn't easy and will require a wide range of measures to be taken. The Government's recent statement of energy policy (the Energy White Paper) says we must take action in a number of ways:

- **Using less energy and becoming more efficient about the energy we use**
  The Government has introduced measures to encourage improvements in the energy efficiency of consumers and businesses. This has had some success but demand has continued to increase. The Government predicts that demand for energy will continue to increase despite improved energy efficiency.
  This is important because using less energy and being more energy efficient will reduce our CO_2 emissions which cause climate change.

Just think of the large number of appliances that we plug in to our electric sockets compared to fifteen years ago (for instance mobiles, laptops, DVD players and dishwashers)

- **Investing in new and renewable technologies and alternative electricity generating methods**
  The Government introduced the 'Renewables Obligation' in 2002. It places an obligation on electricity suppliers to obtain a specific amount of electricity from renewable sources such as wind, hydro, wave and solar. The obligation increases year on year and will rise to 15.4% of all electricity by 2015/16.

> ***Did you know?*** *Since 2002, generation of electricity from renewable sources has more than doubled from 1.8% to 4% in 2005. The Government has said this must triple by 2015.*

  Some fossil fuel power stations can be adapted so that the waste heat, which is generated during the electricity making process, is used to heat nearby homes and businesses. This is known as Combined Heat and Power.

  This is important because using low carbon energy sources, like renewable electricity and Combined Heat and Power, will help to reduce CO_2 emissions that contribute to climate change.

- **Making it less cost-effective for energy companies to use methods that contribute more to climate change**
  The European Union Emissions Trading Scheme (ETS) puts a price on CO_2 which makes it more expensive for energy companies to produce electricity using methods that emit higher levels of CO_2.
  This is important because it will encourage energy companies to invest in energy sources which contribute less to climate change.

- **Considering electricity generated from nuclear energy and consulting on whether nuclear should be part of the overall energy mix**
  The Government believes that this could help, alongside other measures, to tackle climate change.

Handout 4: Thinking about our energy mix

As you have heard, the electricity we use comes from a variety of sources. Our electricity comes from:

Gas
Oil
Coal } Fossil fuels (74%)
Nuclear (18%)
Renewables (4%) [which is from a diverse range, most of which is wind]

What's the difference between energy and electricity?
The term 'energy' refers to all the different ways we use power. For example, electricity to light our homes, gas for heating and petrol and diesel for our cars and buses.

As well as many UK power plants being scheduled to close over the next 20 years, the UK's reserves of fossil fuels, like gas from the North Sea, are being used up. This means that unless we use ways of generating electricity in the UK that don't depend on gas, we will become increasingly dependent on imports of gas from other countries. This is occurring at a time of high global energy prices and international political volatility.

Did you know? *Currently, about 80% of the gas we use still comes from UK supplies, but we are already buying gas from Norway and from the European Union in order to generate electricity. By 2020, up to 80% of the gas needed in the UK could be imported, including from potentially less stable regions of the world than those mentioned above.*

In addition, a significant proportion of our power stations – coal and oil power stations and nuclear power stations – are closing. So, the decisions we make about replacement power stations will now have significant and long lasting implications for the level of future CO_2 emissions as well as our level of dependence on imported fossil fuels. Because electricity prices affect the competitiveness of the UK businesses internationally, they could also be important for the long-term success of the economy.

The Government believes that a diverse energy mix, which includes options that produce lower levels of CO_2 than coal, gas and oil, such as nuclear and renewables, Combined Heat and Power and (if possible) Carbon Capture and Storage, will help towards meeting climate change targets AND make us less reliant on imported fuel from potentially volatile regions.

Why doesn't the Government focus on tackling the contribution that transport and heat makes to climate change? Don't they produce a lot of CO_2 too? Why are we focusing on electricity?
Ways of reducing CO_2 emissions from transport and heating are set out in the Government's overall energy strategy set out in the White Paper. But we need to take action on all fronts so considering low-carbon electricity generating options, higher efficiency electricity generating options (like Combined Heat and Power), as well as how we reduce CO_2 emissions from other energy sources, is important. Today's discussion is specifically about electricity.

Points to remember on the energy picture

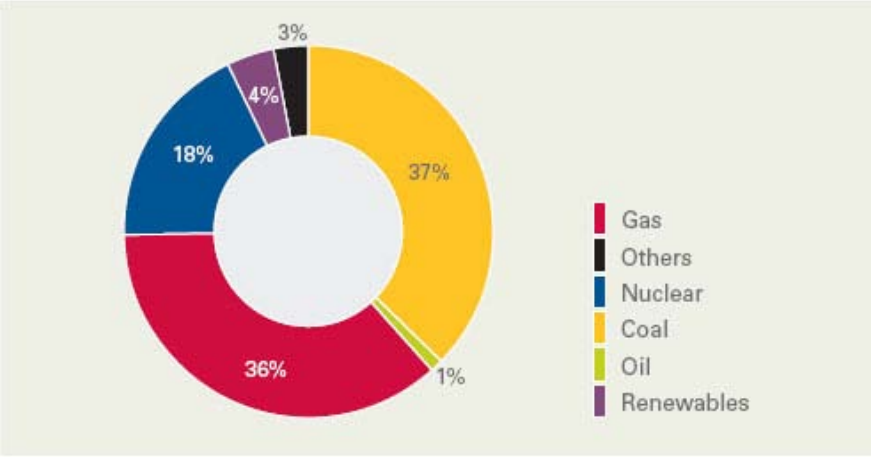
- As a result of steady economic growth, our need for and usage of energy has increased dramatically.
- We use energy to heat our homes and offices, schools and hospitals in winter and (increasingly) to cool them in summer. Industry uses energy for manufacturing goods. Electricity is needed for a huge range of essentials and luxuries which we take for granted (lights, telephones, computers) at home and work. And we all rely on energy for transportation. All of these can create CO_2 emissions.
- The Government has more chance of reducing CO_2 emissions if we can increase the amount of electricity we get from low carbon sources.

Handout 5: Our electricity mix and low CO2 electricity options

Some useful information on our electricity supply

- Three quarters of our electricity supply comes from burning coal and gas.
- Since the 1950s, nuclear power has generated a significant proportion of total electricity, reaching a peak of more than one-quarter (about 25%) of electricity output in the 1990s.
- Nuclear power currently produces nearly one-fifth (18%) of the electricity used in homes and workplaces, provided by 10 nuclear power plants.
- Renewable energy currently provides 4% of our electricity but there are targets to boost this to one-fifth by 2020.
- No nuclear power stations have been built in Britain in the last 10 years. Most reactors are scheduled to close in the next 20 years.
- Electricity cannot be stored in bulk like fuels. Instead it must be generated at the time it is needed and in sufficient quantity so as always able to meet the demand.
- Some methods of generating electricity (like nuclear) deliver a constant supply which can cover the normal continuous level of demand, or base-load; others (like some renewables) have a variable output that depends on factors outside our control, and some (like gas) are more flexible and so better equipped to respond to peaks in demand. We need to ensure an appropriate mix of base load, variable and flexible generating plants in order to meet the daily and seasonal variations in electricity demand.

The chart below shows how our electricity is currently generated:



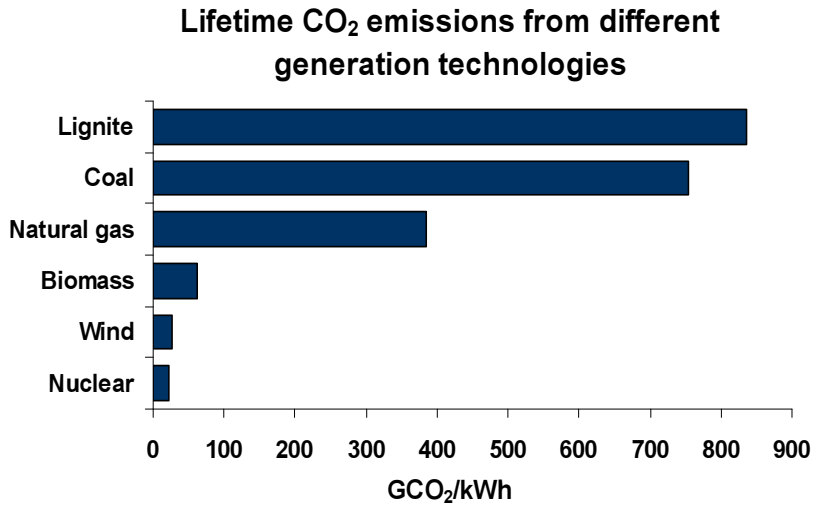
Source: DTI, 2007

Different ways of producing electricity create different amounts of CO_2.

Did you know? *Some methods of generating electricity are less damaging for the environment than others. Coal, gas and oil, for example, produce the vast majority of emissions coming from electricity generation. They produce far more CO_2 emissions than renewable electricity generation and nuclear power.*

What does this mean for the energy we use and where we get our energy from?
We need to think about our energy because the amount we use and the way it is produced has a significant impact on climate change.

The chart below shows how different types of electricity generation compare in terms of the amount of CO_2 they produce, taking into account the CO_2 emitted when the fuel for power stations is mined, when power stations or turbines are built and when they are dismantled at the end of their working life.



(Note: lignite is brown coal)

CO_2 emissions from nuclear power stations are about the same as those of wind power and substantially lower than those from fossil fuel power stations. (This information is based on research conducted by three separate independent organisations (OECD (Organisation for Economic Cooperation and Development) nuclear energy agency, the European Atomic Forum and the IAEA (International Atomic Energy Agency)) and backed up by a report from by the Sustainable Development Commission in 2006).

Do other countries have nuclear energy?

The United States produces the most nuclear energy, with nuclear power providing 20% of the electricity it consumes, while France produces the highest percentage of its electricity from nuclear reactors - 80% as of 2006. In the European Union as a whole, nuclear energy provides 30% of the electricity. Nuclear energy policy differs between European Union countries, and some, such as Austria and Ireland, have no nuclear power stations.

Some countries have decided to build new nuclear power stations (for example, Finland and France) whilst others have decided not to (for example, Germany and Belgium).

What about new technologies?

There are some new technologies currently being developed which could, in the future, make more of a contribution to reducing CO_2 emissions in the UK. These include Carbon Capture and Storage. You can find more information about this and Combined Heat and Power in Reference Sheet 6.

Points to bear in mind about nuclear materials:

- Nuclear power stations generate radioactive waste and used (or "spent") fuel (spent fuel is also radioactive).
- The UK already has nuclear waste.
- Not all waste is highly radioactive. Waste is considered to be higher or lower level depending on the amount of radioactivity it contains. The spent fuel that is produced when generating electricity is highly radioactive, but some waste is graded 'low-level' or 'intermediate level', such as building materials which could become contaminated in the processes related to the generation of electricity.
- Low level nuclear waste also comes from hospitals and laboratories and the military, as well as nuclear power stations.
- All radioactive waste requires safe transportation and secure storage, and some types (not just high level waste) will remain radioactive for thousands of years.
- Nuclear power plants and other facilities where radioactive material has been used, require cleaning up and dismantling when their life comes to an end (a process called 'decommissioning').

What happens to nuclear waste at the moment?

When nuclear power stations were first established, some over fifty years ago, there was more of a focus on how they would be built and how they would operate and less focus on what would happen to nuclear waste once the power station closed.

As mentioned earlier, many of our existing nuclear power stations have already reached or are nearing the end of their lifespan. These nuclear power stations already leave behind high, intermediate and low level nuclear waste. High and intermediate level waste is currently stored in secure interim storage, either at the relevant power station or at the Sellafield facility in West Cumbria

Did you know? *The process of taking a nuclear power station out of service and removing hazardous materials is called 'decommissioning'. The body which oversees decommissioning for our existing nuclear power stations is called The Nuclear Decommissioning Authority (NDA). It is a non-departmental public body which was set up by the Government in 2005 to ensure the safe, accelerated and affordable clean-up of the UK's nuclear legacy.*

Managing higher activity waste

In 2003, the Government established the Committee on Radioactive Waste Management (CoRWM) to provide independent advice to Government on the long-term management of the UK's *existing* higher activity radioactive waste from our current nuclear power stations and other sources.

Having considered the options, CoRWM advised that existing higher activity waste should be disposed of in a facility underground. This is known as a 'geological disposal facility'. CoRWM recommended that this should be preceded by safe and secure interim storage, and made a number of other recommendations on how a suitable site could be found and on what further research and development should be carried out. Geological disposal will involve transporting the waste to a prepared site, where it will be buried in containers in underground vaults or tunnels, deep within a carefully selected rock-type. Of the countries elsewhere in the world that have taken a decision on how to deal with the radioactive waste, all have decided to adopt geological disposal. A few, including Sweden and Finland, have started investigating the geology at their chosen sites.

The diagram below shows how a geological disposal facility would work.

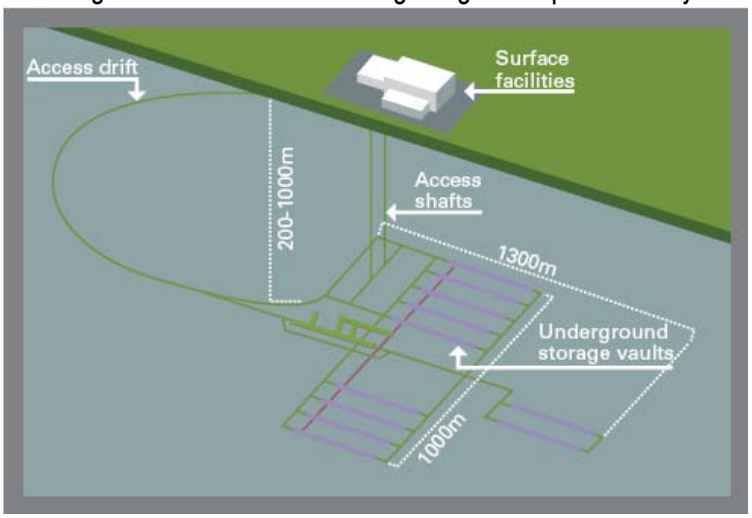


Figure 1: A facility for geological disposal uses a combination of engineering and the natural geology to contain the waste deep in the ground.

Implementing geological disposal is the goal of the Managing Radioactive Waste Safely programme and the Government has charged the Nuclear Decommissioning Authority to lead on this work. Finding a suitable site and building the geological disposal facility is likely to take many years to complete.

Managing low level waste

Most low level radioactive waste is currently disposed of at a store in West Cumbria. The store in West Cumbria only has a limited capacity. It is the role of the NDA to ensure there are sufficient low level waste disposal facilities. It is currently considering measures which could include: new facilities similar to the one in West Cumbria; disposal facilities on or near to where the waste was produced; and controlled burial of low level waste in conventional landfill sites.

What would happen to waste produced by new nuclear power stations?

The Government believes that new waste could be managed in the same way as outlined above for our existing or legacy waste. If the Government decides that new nuclear should be able to be part of the energy mix, then new build waste would need to be taken into account in the design and the size of the facilities.

Most spent fuel from our current reactors is currently reprocessed at the Sellafield facility in West Cumbria. Reprocessing involves separating out the high level radioactive waste in spent fuel from un-used uranium which can be turned into fresh fuel. The Government has reached the initial view that spent fuel resulting from possible new nuclear power stations in the future would not be reprocessed. Instead, it would be treated as waste and stored in a geological repository, as outlined above.

Currently, the Government is not proposing any cap on the number of nuclear power stations that could be built. However, if we wanted to just replace our current nuclear provision, we would be looking at about 6 or 7 nuclear power stations.

"What is spent fuel?"

The main nuclear fuel is uranium, a radioactive metal. After the fuel has been used for 12-18 months, it is considered to be 'spent' and needs to be replaced by new fuel. Spent fuel is heat generating and highly radioactive.

"Why does spent fuel have to be replaced?"

Spent fuel has to be replaced, even though it hasn't all been used up. In theory, it could be used for longer than 12-18 months but the longer it is used, the less efficient it becomes.

- How do you feel about the arrangements for disposal of proposed future nuclear waste?
- What do you think about the Government's views on managing and disposing of nuclear waste?

Nuclear waste in the UK

The UK already has nuclear power stations and nuclear waste. The Government and energy companies have both learned lessons about waste management, which have helped to shape and accelerate plans for dealing with waste in the future.

How much waste are we talking about?

New nuclear power stations will produce less waste than current nuclear power plants do because they are designed to be more efficient than most of our current nuclear power stations are. (The Sizewell B plant which began operating in the 1990s is much more efficient in terms of the amount of fuel it uses than those nuclear power stations which are due to be closed in the next few years.) However, the waste they produce is more concentrated and therefore more radioactive.

The independent committee (called the Committee on Radioactive Waste Management (CoRWM)) has estimated that 10 new nuclear reactors with an operating lifetime of 60 years each would produce around 8% of the waste that current nuclear power plants do, but could increase the total radioactivity content of the UK's waste inventory by a factor of nearly three.

The Government has calculated that this would add enough waste to fill about half the Royal Albert Hall. The amount of waste we will have to deal with in the UK anyway, from reactors already operating and from other sources, including the military, is about ten times that volume. However, to understand the impact that waste from new nuclear power stations would have on the size of a repository, it is important to consider the level of radioactivity of the new waste, as this is a factor in determining how far apart the waste must be placed.

What you have to think about in relation to new nuclear waste

On one hand, new nuclear build would increase the legacy of waste for future generations. On the other hand, not allowing new nuclear power stations could lead to higher CO_2 emissions which would contribute to climate change and this would also affect future generations.

What are the views on nuclear energy and waste?

Nuclear waste is clearly a very important issue to consider when thinking about the possibility of having new nuclear power stations in the future. There is a range of different views on the subject of producing more nuclear waste, which the Government is aware of and is listening to. Some stakeholders, such as **Greenpeace,** feel that producing more radioactive waste can never be justified on any grounds. Not everyone agrees; for instance, business representatives, such as the **Confederation of British Industry**, are supportive of the emerging plans for managing new waste and believe that producing new nuclear waste should not rule out the building of new nuclear power stations in the UK, given the benefits that nuclear would bring, of helping to tackle climate change and security of the UK's energy supply.

The **Government** recognises nuclear waste as a very serious and important issue. The Government has listened to others and come to the initial view that balancing the considerations does not require ruling out nuclear as an option.

Who would pay for managing nuclear waste?

Managing nuclear waste costs money. In the past, when nuclear power stations were first built, the cost of managing waste was not considered and, as a result, some of this cost has been borne by the tax payer. For new nuclear power stations, the private sector and not tax payers would pay these costs.

Environmental organisations, such as **Greenpeace**, point out that at the moment; there is no legally binding requirement on the energy companies who would build new nuclear power stations to cover the costs of managing nuclear waste. They fear that without a clear law, this cost would ultimately be picked up by the Government and the tax payer.

The **Government** agrees that the cost of managing nuclear waste should not be picked up by the tax payer. Therefore, the Government has decided that if new nuclear power stations are built, energy companies will be made responsible for these costs. The Government would do this by introducing new laws which will require the energy companies to put aside money to cover the costs involved in a safe and secure way.

The **potential operators** of any new nuclear power stations agree that they should be the ones to pay. These waste and decommissioning costs would make up only a small proportion of the total costs of building and operating nuclear power stations (less than 5%) provided that the fund for their decommissioning and waste disposal can be built up over the 40-60 year lifetime of the station – just like a pension plan.

"If the costs of managing new waste have to be covered by the energy companies, would consumers' energy bills not go up?"

The costs of waste and decommissioning aren't a very high proportion of total estimated nuclear generation costs. The Government believes that it is unlikely that there would be a significant impact on electricity bills.

Over to you:

- What do you think the issues are in considering the creation of nuclear waste?
- What do you think the issues are in not allowing new nuclear power stations to be built?
- How do the implications of committing future generations to nuclear waste balance out with the implications of not allowing them this option for their energy mix, in terms of:-
    - possibly committing them to higher CO_2 emissions
    - and/or insecurity of supply?

Handout 8: Managing security and safety risks

Nuclear energy poses a number of security and safety risks which the Government seeks to minimise and manage by working with regulators and the nuclear industry.

The five main risks associated with nuclear power are:

1. Exposure to radioactive materials
2. The threat of a major nuclear accident
3. The threat of terrorism and the potential for nuclear power to contribute to a growth of nuclear weapons (this is known as proliferation)
4. The potential impact of a natural disaster
5. The transport of nuclear materials

What measures are in place to deal with the security and safety risks of nuclear power?

1. Exposure to radioactive materials

We are exposed to low level radiation in our daily lives (e.g. X-rays and natural radon gas from the ground). Natural background radiation makes up more than 80% of average annual doses. The average exposure to radioactivity from the whole UK nuclear power industry is one thousandth (0.015%) of an individual's annual dose from such radiation sources.

Average annual doses of radiation for workers in the nuclear industry are well below the maximum dose set by legal limits and are falling as designs of power stations improve. By comparison, the crew on aeroplanes are exposed to more radiation than nuclear industry workers.

Did you know? *The Committee on Medical Aspects of Radiation in the Environment (COMARE), which is made up of independent expert advisors from the medical and scientific fields (not the nuclear or electrical power supply industries), has monitored this issue since 1986 and has published 11 reports on the impact of exposure to radiation. Their most recent report identified no evidence of adverse health effects in residents within 25 kilometre radius (about 15 miles) of a nuclear power station.*

There are strict limits set down by law for the safe maximum radiation dose for all of us. These are monitored continuously across all nuclear power sites.

2. The threat of a major nuclear accident

There have been no events relating to a civil nuclear power station (those being run for power generation as opposed to military purposes) in the UK which have had any consequences outside the nuclear power station itself, although many people will be aware of the incident at the military reactor known as the Windscale Pile One in 1957. This took place before the current strict safety regimes were in place.

Some well-known accidents have happened at nuclear installations elsewhere in the world such as at Three Mile Island in 1979 and Chernobyl in 1986. The worst of these – at Chernobyl - occurred in reactor designs that would not be allowed to be built in the UK today.

Did you know? *The Health and Safety Executive (HSE) regulates the nuclear industry through its Nuclear Directorate (ND). The Directorate's primary goal is to ensure that those it regulates have no major nuclear accidents. It is responsible for the UK safety regulation of nuclear power stations, nuclear safety research and strategy and since 02 April 2007 for civil nuclear operational security and safeguards matters.*

According to a recent report from the European Commission, a major nuclear accident in the UK is less likely than the chance of a meteorite over a kilometre wide hitting the earth.

3. The threat of terrorism and weapons proliferation

The risk of terrorism and the proliferation of nuclear weapons is clearly a very serious issue. Because of this, nuclear power stations are designed to be robust against damage to their safety equipment and systems, whether the cause is accidental or deliberate.

There are a number of specific measures in place to minimise the risks posed by terrorism. These include:

- A comprehensive assessment process for identifying risks at each nuclear facility
- An independent security regulator (The Office for Civil Nuclear Security – now part of the HSE) which carries out frequent inspections and requires operators of nuclear plant to carry out counter-terrorism exercises
- The Joint Terrorism Analysis Centre which monitors the terrorist threat levels to the UK (including the civil nuclear industry)
- Armed officers from a specialist police force, the Civil Nuclear Constabulary (CNC), as well as civilian security guard forces protecting all designated nuclear power stations. The CNC has national security protocols to follow if an incident occurs

The Office for Civil Nuclear Security is satisfied with arrangements to guard against terrorism and believes that allowing new nuclear power stations to be built would be unlikely to increase the risks of terrorist attack.

Designs most likely to be used for new nuclear power stations make proliferation very unlikely because the fuel is not immediately suitable to use for weapons, and it is difficult to access the fuel without shutting down the reactor.

4. The potential for natural disasters

Energy companies would be required to show that any sites proposed for nuclear power stations can withstand extreme weather, earthquakes and predicted sea level rises in order to get a licence to operate. Strict flood management measures would also be put in place at any new nuclear power stations.

5. The transportation of nuclear materials

The transport of radioactive material, including spent nuclear fuel, is governed by strict internationally-agreed standards, for instance through the International Atomic Energy Agency (IAEA), the agency appointed by the United Nations to promote safe, secure and peaceful nuclear technologies worldwide.

Nuclear materials have been transported in Europe for 40 years and there have been no accidents causing death, serious injury or significant environmental damage. According to the **European Parliament**, the risks associated with the transport of radioactive materials are low.

Over to you

- What are your initial thoughts about nuclear power and safety?
- What are your immediate concerns?
- How do you feel about the security precautions in place?

Handout 9: Views on security and safety risks and nuclear energy

There are a number of concerns about the security and safety risks nuclear energy poses.

Health risks and contamination

Greenpeace, **Friends of the Earth** and the **Green Alliance** say that, regardless of measures put in place, there are no guarantees that highly radioactive waste would never leak and cause a safety issue. They raise specific concerns about the potential for contamination by the transportation of nuclear fuel and waste.

Risk of terrorism

Greenpeace, Friends of the Earth and the **Green Alliance** are also concerned about the risk of terrorism. They believe that building new nuclear power stations would increase the risk of terrorism and threaten national security.

Risks of natural disaster

Greenpeace and **Friends of the Earth** raise specific concerns about the vulnerability of coastal sites to rising sea level, flooding and erosion.

However, whilst some interested parties raise concerns, others, such as the **Sustainable Development Commission**, the **Confederation of British Industry (CBI)**, **British Energy** and **Trade Unionists for Safe Nuclear Energy**, are all satisfied with the safety record of the nuclear industry in the UK. They highlight the rigorous safety and security regulatory regime that is in place. Infact the CBI and British Energy go as far as to say the safety record is exemplary. In addition, the International Atomic Energy Authority (IAEA) has also commented on the UK's mature and transparent regulatory system with highly trained, expert and experienced staff. These organisations also say that new designs and improved safety systems will make new nuclear power stations even safer, with fittings such as automatic shutdowns already being put in place.

The Government's view

The **Government** has considered the risks associated with nuclear energy mentioned above and agrees with others that they are important in considering the role of nuclear in the UK energy mix. Based on the advice of the independent nuclear regulators, and the advances in the designs of nuclear power stations, the **Government's** initial view is that the security and safety risks of new nuclear power stations are very small and that effective regulations will ensure that these risks are minimised and sensibly managed by the industry.

What do you think?

- On balance, do you think the security and safety risks should rule out nuclear power as an option?

Handout 10: Nuclear power and CO2 emissions

A key reason why the Government is considering nuclear power is that it is a low CO_2 electricity option which it believes will help to reduce our overall CO_2 emissions that contribute to climate change. This handout provides information on the CO_2 emissions of nuclear power and sets out the different views on the role nuclear power could play in reducing CO_2 emissions.

Points to remember on nuclear power and CO_2 emissions

- As you heard earlier, climate change is a significant risk to our environment and economy.
- All methods of generating electricity create some CO_2 which cause climate change (in building power stations, wind turbines, mining fuel and transporting it, for example).
- Overall, during the whole lifecycle of electricity generation, nuclear power stations produce about the same amount of CO_2 as wind generation electricity and much less than fossil fuel generation, in the absence of technologies to capture and store the CO_2.

Did you know? *If we didn't have our current nuclear power stations and these were all fossil fuel power stations instead, we would produce between 29 and 58 million more tonnes of CO_2 a year. A saving of 29 million tonnes of CO_2 is, for illustrative purposes, about the same as taking a third of the UK's 32 million cars off the road.*

What views are there about nuclear energy and CO_2 emissions?

As mentioned earlier, nuclear power currently makes up 18% of the electricity we use. This amounts to about 4% of our total energy consumed (electricity, energy for heat - mainly through gas - and energy for transport combined). Some environmental organisations, like **Greenpeace** and **Friends of the Earth** argue that because nuclear energy makes up a relatively small proportion of our total energy mix, building nuclear power stations would not lead to significant CO_2 reductions in the UK. They point to the fact that nuclear power would have no impact on CO_2 emissions from heating, most of which is powered by gas, not electricity and to the amount of CO_2 emissions that would continue to be produced by petrol and diesel.

Business representatives, including the Confederation of British Industry believe that not allowing nuclear power to be an option for the future would make it more difficult to reduce our overall Co2 emissions. Sir David King, the Government's Chief Scientific Advisor has also said that he is absolutely convinced that without nuclear we wont be able to meet our targets for cutting CO_2 emissions. On the other hand, the Sustainable Development Commission argue that it would be possible to develop a sustainable energy policy without nuclear.

The Government's view

The **Government** is aware that nuclear energy makes up a relatively small proportion of the total amount of energy we consume. However, the Government estimates that our current nuclear power stations save between 5 and 13% of the UK's total CO_2 emissions each year (assuming that the electricity would otherwise be generated from a mix of gas and coal-fired power stations). The Government believes that savings like this are significant in helping us achieve our ambitious climate change targets and make it worthwhile allowing energy companies to continue to invest in new nuclear power stations in the future, although nuclear is not the only low carbon option.

There are lots of uncertainties about the future in terms of energy demand, the technological advances in energy generation and the availability and cost of energy supplies. The Government believes that, to achieve the target to cut CO_2 emissions in the UK by 60%, we should not restrict our low carbon energy options. They think that we should have as many of these as possible available in our energy mix.

The Government does not believe that nuclear power alone is the solution to climate change but sees nuclear as one of the important options across the board which can to help to meet this challenge.

After taking on board the views of others the Government has reached the initial view that nuclear should be an option in our energy mix as it would help us, along with these other measures, to tackle climate change by reducing our CO_2 emissions.

Over to you

The Government has committed to reducing the UK's CO_2 emissions by at least 60% by 2050. Every contribution to cutting emissions counts and without the nuclear power stations we already have, the amount of carbon we emit today would be likely to be between 5 and 13% higher.

If investment in nuclear power was allowed to continue to save between 5 and 13% of the UK's total CO_2 emissions this would help towards achieving this 60% target. If nuclear power ceased to be part of our energy mix, we would need to save at least this amount of our total CO_2 emissions in some other way. This is equivalent to saving the CO_2 emissions of at least 3 million out of 26 million UK households, the CO_2 emissions of an area with a population bigger than Greater Manchester.

- If keeping nuclear power as part of our electricity mix continued to reduce the UK's overall carbon emissions by between 5 and 13%, do you think it is important that we keep nuclear as an option?

Handout 11: The role nuclear power could play in making the UK electricity supply more secure

Another key reason why the Government is considering nuclear power is that it believes it could play a role in making the UK energy supply more secure.

What is the current situation?

- Up to the present time, the UK has met most of its energy needs by using fuels available in the UK.
- But our own natural oil and gas supplies are running out.
- As a result, we are becoming increasingly dependent on fuel imports.
- During the next 20 years, many of our existing coal and oil plants will close or need to be replaced, and all but one of the UK's nuclear power stations are due to have closed by 2023.
- This could lead to the UK becoming increasingly dependent on fewer sources and types of fuel for electricity generation. We may find ourselves more dependent on imported gas from other countries, including regions which might be perceived as less stable.
- Nuclear power delivers a constant 'baseload' of electricity on a large scale, helping to provide predictability and security of UK electricity supplies. Others have a variable output (like renewables).

Why might nuclear energy help towards making the UK's energy supply more secure?

- The fuel which is used to produce nuclear power is called uranium. The International Energy Agency has said that sufficient supplies of nuclear fuel (uranium) can be found in a number of countries which the UK does not currently rely on for fossil fuels.
- At the moment, most of the UK's uranium supplies come from Australia. Canada is the world's leading supplier.
- Nuclear power stations use comparatively small amounts of fuel which can last in a reactor for a couple of years before it needs changing.
- Rises in the price of uranium are unlikely to increase the cost of electricity. Even a doubling of the price of uranium only leads to a small increase in the cost of generating nuclear electricity, unlike increases in the price of fossil fuels such as coal and gas.
- The wider the range of electricity generation options open to energy companies, the less customers are exposed to significant fluctuations in prices

What are the views on security of supply?

Is security of supply really an issue?

Some **environmental pressure groups** believe that the contribution nuclear could make to security of supply is overstated. They stress that nuclear power only produces electricity, which would not meet our needs for gas dependent services like hot water and central heating. This means that we would still depend on imported fuel for a large proportion of our energy.

However, other interested groups, including some Trades Unions, believe that if nuclear were part of our energy mix, our energy security would be strengthened. **British Energy** says that nuclear power has demonstrated it can deliver "baseload" electricity on a large scale, making a major contribution to the UK's secure supply of low carbon electricity. The Trade Union Congress (TUC) feels that there are clear consequences in terms of risk to security of supply from not allowing nuclear to be an option in our energy mix.

Would nuclear fuel run out?
The nuclear industry believes that accessible and affordable uranium from reserves we already know about in politically stable regions can be relied on for the full lifetime of a fleet of new UK power stations **(Nuclear Industry Association**). Other business representative bodies add that worldwide proven reserves of uranium have risen in the last 10 years and are expected to rise further if demand increases because it would be worthwhile for companies to look for new uranium reserves in the ground (**Confederation of Business Industry**).

The Government's view

There is a general consensus that security of supply could become a real issue for the UK in the future if we became more reliant on fewer ways of generating electricity or imported fossil fuels from less diverse, and potentially more politically unstable, regions. But there are various views about the importance of nuclear in addressing these energy security issues.

After listening to the views and concerns of many different interested organisations, the Government has come to the initial view that the best way to achieve secure supplies and reduce CO_2 emission is by encouraging the widest mix of ways of generating electricity possible, and this includes not ruling out nuclear power.

There are lots of uncertainties about the future in terms of energy demand, the technological advances in energy generation and the availability and cost of energy supplies. The Government believes that allowing nuclear power to continue to be part of the UK's energy mix would reduce the risk of reliance on fewer energy sources and the potential for reliance on fuel from regions that could be perceived as politically unstable.

Over to you

You've now heard a range of views on the subject of security of supply and why the Government has come to the initial view that nuclear could play a role in making the UK's energy supply more secure. What is your view?

- What do you think about the Government's view on the role nuclear power could play in providing energy security?

Handout 12: Bringing it all together

You have heard some of the facts and arguments, for and against allowing nuclear to continue to provide some of our electricity in the UK. You have also discussed the waste and safety implications of nuclear energy and the contribution it could make to reducing CO_2 emissions which contribute to climate change.

The Government has come to an initial view on this. You now need to weigh up the pros and cons of keeping nuclear power in our energy mix and think about how far you agree with the Government's view.

Why do we need to even consider a new generation of nuclear power stations in the UK?

- Nuclear energy currently provides 18% of our electricity. It is a low carbon energy source and therefore saves between 5-13% of the UK's carbon emissions. That is, if all of our current nuclear power stations were coal or gas power stations instead, we would produce more CO_2 than we currently do.
- By 2023 all but one of our nuclear power stations will be closed. In addition, a third of our coal power stations, which currently provide 37% of our electricity, are planned to close by 2016.
- Methods of generating electricity have a significant impact on the UK's CO_2 emissions. It is essential that we consider our future mix and the contribution this could make to climate change.
- As our own fossil fuels run out, we are becoming increasingly reliant on imported gas. In the future, this could mean that we become more reliant on gas imports from regions that could be perceived as politically volatile.

What about the waste, security and safety implications?
Nuclear energy produces radioactive waste which will remain potentially hazardous and needs to be handled carefully for thousands of years. The Government has sought independent advice on how existing waste should be dealt with and managed and it believes the approach for our existing waste could also apply to new waste. New nuclear power stations would not be built without clear plans and budgets for dealing with waste.

Nuclear power stations pose a number of security and safety questions. These are well understood and are currently managed by a number of independent regulating bodies, including organisations like the Health and Safety Executive.

The Government's overall view

There are lots of uncertainties about the future in terms of energy demand and the technological advances in energy generation. The Government thinks that the prudent thing to do is keep as many reliable low carbon options open as possible to provide the flexibility needed to respond to developments that we cannot predict.

The Government is committed to taking action on all fronts. It believes that, even alongside renewable methods, energy efficiency measures and the introduction of new technologies in the future, nuclear energy should be allowed to continue to provide some of our electricity. The Government's initial view is that this will help to tackle climate change and will improve the UK's energy security. **What do you think?**

Annex 6: Reference sheets

Note that these reference sheets were available to participants as supplementary information. They were given out by table facilitators in response to questions from participants.

Reference sheet 1: Who provides the energy?

Currently in the UK, the Government doesn't tell electricity companies how much electricity they should generate, or what method they should use to generate it. The Government's overall approach to meeting our energy challenge is to allow the private companies in the energy market to decide on the most cost effective energy mix. An important benefit has been greater competition between producers for customers' business which has spurred productivity and driven energy prices down.

This does not mean that the energy industry can behave as it wants. Instead, it is the Government's job to set a framework which allows producers and consumers to interact together in a way that promotes security of supply and CO_2 reduction, through measures such as long-term goals on CO_2 emissions, and targets on what proportion of electricity should come from renewable sources.

The only exception to this is the case of renewables where, because some of the technology is still new, the Government sets a target for the proportion of energy to come from renewables to make sure that they get the investment they need from private energy companies to develop.

The market is regulated by European and UK laws to ensure it conforms to agreed practices and standards with regards to everything from building a power station, to the health and safety of people who work there, to the management of radioactive waste.

The UK has had this approach since the 1990s.

So, how will the future energy mix will be determined?

Because we don't know what's going to happen in the future, e.g. how much energy are we going to need, **the Government believes that, in a competitive market with incentives for CO_2 reduction and energy security, allowing private companies to decide on how much energy to produce, is the approach that works best, especially for the benefit of customers.** The Government believes that this approach allows greater flexibility than a policy where the Government tries to micro-manage everything based on limited knowledge in a rapidly changing world.

Government does not feel that a centrally prescribed mix (i.e. nationalised power planning and generation) is feasible, as it would not give us the flexibility and responsiveness needed to overcome unpredictable developments in the future.

However, as discussed above, **the Government's role is to provide a regulatory framework for the market to ensure that it achieves long-term goals around climate change.** The international adoption of a Carbon Price, building on the EU Emissions Trading Scheme (which the Government is strongly advocating) will be a major component of this. It will help to ensure that the costs of generating electricity from fossil fuels include some element of the cost of the damage caused by the CO_2 emitted in the process. This will encourage more low carbon generation.

Reference sheet 2: Information on renewables

- There are 148 wind farms in the UK with a total of 1866 turbines. (Source: British Wind Energy Association).
- These wind farms (on and offshore) have a generating capacity of 2175.84MW. This is equivalent to the electricity supply to 1,206,154 homes or more than Birmingham, Sheffield and Leeds combined. (Source: BWEA)
- In 2005 wind supplied just under 1% of the UK's electricity supply.
- Onshore wind energy remains fastest growing technology with some 1872.84MW of installed capacity.
- UK Offshore wind farms have a generating capacity of just over 303MW.
- There is over 14,500MW of onshore and offshore wind capacity either consented or in the planning system which is more than enough to meet the 2020 renewables target.
- Construction has begun for a new 100MW hydroelectric power station at Glendoe in Scotland.
- Construction of E.ON UK's 44MW dedicated biomass power station, the largest UK plant of its kind, began in January 2006 and will help create over 300 jobs.
- Currently renewables generate around 8000 UK jobs. Theoretically up to a further 27,000 jobs could be generated from the investments required to reach our 20% renewables target by 2020.

Reference sheet 3: The main benefits and disadvantages of the different electricity sources

All electricity sources have both advantages and disadvantages which need to be considered when considering the energy mix. This handout provides an overview of some of the main advantages and disadvantages – it isn't intended to be a comprehensive list.

Wind

Advantages	Disadvantages
Wind, as a renewable, needs no fuel. This means that once built, apart from ongoing maintenance and the decommissioning, the power is free and produces no waste or greenhouse gases.	The wind is not always predictable – on some days the wind does not blow.
The land beneath can usually still be used for farming.	Some people feel that covering the landscape with these towers is unsightly.
Wind farms can be tourist attractions.	Can be noisy but aerodynamic designs have improved and modern wind farms are much quieter.
A good method of supplying energy to remote areas.	Often requires construction of expensive overhead/underground wires to transport electricity to rest of UK.

Solar

Advantages	Disadvantages
Solar, as a renewable, needs no fuel. This means that once built, apart from ongoing maintenance and the decommissioning, the power is free and produces no waste or greenhouse gases.	At present solar cells cost a great deal compared to the amount of electricity they'll produce in their lifetime.
In sunny countries, solar power can be used where there is no easy way to get electricity to a remote place.	Can be unreliable unless you're in a very sunny climate.
Handy for low-power uses such as solar powered garden lights and battery chargers.	Given difficulty in storing electricity, solar power cannot provide the electricity we need at night.

Tidal

Advantages	Disadvantages
Tidal, as a renewable, needs no fuel. This means that once built, apart from ongoing maintenance and the decommissioning, the power is free and produces no waste or greenhouse gases.	There are few suitable sites for tidal barrages and there could be a negative environmental impact.
It produces electricity reliably as tides are predictable	Only provides power for around 10 hours each day, when the tide is actually moving in or out.
Offshore turbines and vertical-axis turbines do not have a large environmental impact.	

Biomass

Advantages	Disadvantages
Uses waste materials or specially grown crops.	Collecting the waste in sufficient quantities can be difficult.
The fuel tends to be cheap.	Some waste materials are not available all year round.
Less demand on the Earth's resources.	

Geothermal

Advantages	Disadvantages
Geothermal energy does not produce any pollution, and does not contribute to the greenhouse effect.	There are not many places where you can build a geothermal power station.
The power stations do not take up much room, so there is not much impact on the environment.	Sometimes a geothermal site may "run out of steam", perhaps for decades.
No fuel is needed.	Hazardous gases and minerals may come up from underground, and can be difficult to safely dispose of.
Once you've built a geothermal power station, the energy is almost free.	
It may need a little energy to run a pump, but this can be taken from the energy being generated.	

Wave

Advantages	Disadvantages
Wave, as a renewable, needs no fuel. This means that once built, apart from ongoing maintenance and the decommissioning, the power is free and produces no waste or greenhouse gases.	Depends on the waves - sometimes a lot of energy is produced, sometimes nothing.
Not expensive to operate and maintain.	Needs a suitable site, where waves are consistently strong
Can produce a great deal of energy. Not expensive to operate and maintain.	Requires expensive sub-sea cables and onshore electricity network upgrades.

Fossil fuels e.g. gas, oil and coal

Benefits	Disadvantages
They are proven and widely used large-scale methods of generating electricity, limited to a relatively small number of sites.	There are questions about the future supply of oil and gas: as the UK's own supplies run out and we need to import these fuels from other countries.
They are currently the most cost effective means of producing electricity, though this is likely to change in the future with carbon pricing.	They produce relatively high levels of CO_2 (especially coal fired power stations). Burning any fossil fuel produces CO_2, which contributes to the "greenhouse effect", warming the Earth, which is widely believed to have long-term and potentially profound impacts.
They are flexible so can respond to short-term changes in electricity demand and contribute to meeting peak demand.	Coal also produces sulphur dioxide, a gas that contributes to acid rain.
A fossil-fuelled power station can be built almost anywhere, so long as you can get large quantities of fuel to it. Didcot power station, in Oxfordshire, has a dedicated rail link to supply the coal.	Coal-fired power stations need huge amounts of fuel, which means trainloads of coal almost constantly. In order to cope with changing demands for power, the station needs reserves. This means covering large areas next to the power station with piles of coal.

Nuclear power

Advantages	Disadvantages
Does not produce smoke or CO_2, so it does not contribute to the greenhouse effect during the operation of the plant (but there are emissions arising from the whole life-cycle, though these are very low in comparison to fossil fuel).	It creates long-lived radioactive waste, with associated security risks and storage challenges, as well as requiring power plants to be cleaned up (decommissioned) at the end of their lives.
Produces huge amounts of energy from small amounts of fuel.	It is seen by some people to be unsafe, following well-publicised nuclear incidents in the past, like Three Mile Island and Chernobyl, although the UK safety record is good and the designs for any future nuclear plants would provide further improvements.
It is substantially cheaper than wind generation (particularly off-shore) and can be more cost effective than fossil-fuel generation when the costs of CO_2 emissions are taken into account (see below for more details).	Visual impact can be negative, especially cooling towers, though this is not unique to nuclear power stations.
It uses uranium which is sourced from a wide variety of countries (most of the UK's current supplies come from Australia) and for which there are proven reserves for many decades to come.	Mining and production of uranium has some negative environmental impacts in the countries where it is produced.
It creates a 'base-load' energy supply i.e. a steady flow of power regardless of total power demand, with a limited number of sites.	

Reference sheet 4: Range of electricity generation costs for different technologies

Technology	Cost per megawatt hour of electricity produced
Offshore wind	Between £55 and £88
Onshore wind	Between £47 and £64
Nuclear (this includes decommissioning costs)	Between £31 and £44
Coal-fired generation	Between £27 and £29
Coal-fired generation with 25 carbon price*	Between £42 and £44
Gas-fired generation	£37
Gas-fired generation with 25 carbon price*	Between £37 and £44

*Currently, the 2008 carbon price is around 20 per tonne of CO_2 in phase 2 of the EU ETS

The Government has done some analysis of the cost per megawatt hour of electricity produced of the different electricity generating methods. As you can see, the expected cost of producing nuclear power is relatively lower than off or on shore wind power, but more expensive than coal or gas fired generation at the moment.

However, this picture is likely to change in the future, as the 'carbon price' will be incorporated. Carbon pricing is about attaching a cost to CO_2 emissions, which makes it more expensive to pollute, and more economical to reduce emissions either by greater energy efficiency, by investing in new low-carbon technologies or by switching to low-carbon energy sources. In terms of energy supply, it means that using fuels, such as coal and gas, which emit large amounts of CO_2, will become less profitable for energy companies.

The Government has also done some research in to the impacts of not allowing the private sector to invest in new nuclear power stations. It has concluded that this would potentially increase investment in gas and coal fired power stations in the short-term, as they would remain more economical than renewable energy, which would make it more difficult to achieve our short-term targets on cutting CO_2 emissions.

Reference sheet 5: What is nuclear power and how is electricity produced through nuclear energy?

The production of electricity through nuclear energy is similar to the production of electricity using coal, oil and natural gas.

There are 4 key stages to developing electricity from fuels (generating electricity from renewables may have different stages, depending on the type of renewable energy source). These are:

1. "Burning" of fuel – this heats water in boilers which is turned to steam
2. The steam powers turbines
3. The turbines spin the generators which create electricity
4. The electricity goes to transformers to produce the right voltage and is transmitted down power lines to homes and businesses.

Instead of fossil fuels, the main nuclear fuel is uranium. This is a radioactive metal. Nuclear fuels are not "burnt" in the conventional sense to release energy. Instead, nuclear power stations generate electricity from heat produced by the fission, or splitting, of uranium atoms, which takes place in a nuclear reactor.

Depending on a nuclear power station's fuel cycle, operators tend to replace fuel about every 12-18 months for efficient generation of electricity.

There are two options for what can be done with nuclear fuel which has been used up (or "spent"). One option is to recycle or 'reprocess' the material – separating out the un-used uranium (and plutonium) from the waste, or non-useful radioactive materials, for reuse. The other option is to simply store or dispose directly of the material in its entirety.

The radioactive waste or 'spent fuel' produced by nuclear generation can remain potentially hazardous for a considerable amount of time and therefore:

- Involves ethical considerations of whether it is right to create more waste from new nuclear power stations
- Has health, security and health implications
- Needs to be stored long-term
- Requires special cleaning up and dismantling processes when power stations reach the end of their working lives - this is called 'decommissioning'

There is a set of regulations in place in the UK which apply to existing facilities and would protect against risks arising from waste from any new nuclear power stations. These regulations are particularly strict around the waste that is most radioactive.

Reference sheet 6: Aren't there any other methods we can use to provide a secure, low carbon energy supply?

Carbon capture and storage

There is a new technology called carbon capture and storage (CCS). CCS involves "capturing" CO_2 emitted from burning fossil fuels in power stations and then permanently storing it in secure underground locations e.g. under the seabed. It can reduce CO_2 emissions from gas- and coal-fired power stations by as much as 90%.

The Government is committed to exploring the option of CCS and the role that it could play in tackling climate change and maintaining a low-carbon economy. However, CCS is still in very early stages of development and has not yet been proven in conjunction with large scale electricity generation. So the Government believes that relying on CCS alone to meet our CO_2 reduction targets from electricity generation would be risky, because at this stage we cannot say for sure that it will be possible to apply to power generation on a commercial scale, nor what the costs might be.

Combined heat and power (CHP)

Power plants, particularly those which burn fossil fuels, create large amounts of heat as part of the process of generating electricity. In conventional power stations this heat is treated as a waste product, and released into the atmosphere via cooling towers. Combined heat and power (CHP) is the process of capturing and using the heat generated as a by-product of electricity generation.

Good quality CHP plants are highly energy efficient because generating heat and power together provides energy savings compared with generating them separately. This is a process that can be used with both fossil and renewable fuels, and with all sizes of plant from a micro CHP unit for use in the home to a very large industrial plant.

Due to higher upfront costs, heat and power sourced from CHP are usually more expensive than from the national gas and electricity networks. However, as the price of carbon rises (with Carbon Pricing), the price will become more competitive. It is the Government's role to ensure that there are opportunities for CHP to be developed and it is taking a number of steps to help with this.

The Government believes whilst that the contribution that CHP can make to our energy challenges is important it cannot be the whole solution.

Reference sheet 7: How decisions about where to build any new nuclear power stations would be made

At this stage, the Government wants to get people's views on the principle of whether or not to allow energy companies to build new nuclear power stations in this country. The Government will then take a decision later this year on whether to give energy companies this option.

If the decision is taken to let energy companies have this option, this would not mean that they could simply go ahead and start building new nuclear power stations straight away. There would be a number of conditions that a power company which wanted to build a new nuclear power station would have to meet, including:

- The preparation of a Strategic Siting Assessment to identify high-level criteria for assessing potential locations which might be suitable and to assess any nominated sites against these criteria
- The preparation of a Strategic Environmental Assessment
- The preparation of an Environmental Impact Assessment
- Getting planning consent
- Getting permission from the independent regulators of the nuclear industry to ensure that the nuclear power station could be operated safely, securely and without detriment to public health
- A decision by Government that the proposed design meets regulations around use of radiation
- The legal establishment of arrangements to ensure that energy companies meet their full decommissioning costs and full share of waste management costs

The private sector could build the stations on new sites or existing sites, but the suitability of any site would be carefully evaluated and consulted on by the Government.

Getting through these processes and allowing proper consultation with the public takes time. Government currently thinks that the earliest that any new nuclear power station could be up and running in the UK would be 2020. However, some see this as a conservative estimate. For example, one potential developer of new nuclear power in the UK has offered a more optimistic perspective and suggested that it would be possible to develop the first new nuclear power station by 2017.

Reference sheet 8: The European Union Emission Trading Scheme (ETS)

The European Union's Emissions Trading Scheme (ETS) is one example of the policies being introduced across Europe to tackle emissions of CO_2 and other greenhouse gases and combat the serious threat of climate change.

The scheme works on a "Cap and Trade" basis. EU Member State governments are required to set an emission cap for all CO_2 emitting companies covered by the Scheme. Participating companies are then allocated CO_2 emission allowances. These companies can then trade these allowances with each other. So, if a company is emitting more than its allowance, it can buy additional allowances from a company that is not using its full allowance. Similarly, a company that emits less than its allocation of allowances can sell its surplus allowances.

In contrast to regulation which imposes emission limit values on particular facilities, emissions trading gives companies the flexibility to meet emission reduction targets according to their own strategy; for example by reducing emissions on site or by buying allowances from other companies who have excess allowances. The environmental outcome is not affected because the amount of allowances allocated is fixed.

The UK Government is committed to strengthening the EU ETS as it believes it will build investor confidence in the merits of either increasing energy efficiency and/or increasing investment in low carbon energy sources. However, the Government is keeping open the option of further measures to reinforce the operation of the EU ETS in the UK should this be necessary to provide greater certainty to investors.

Reference sheet 9: Does the UK have sufficient skills and supplies needed to build new nuclear power stations?

A concern related to energy security is whether energy companies will be able to get the parts and components needed for new nuclear power stations in the UK, and whether there are enough trained technicians to build and run them. This is a challenge because the nuclear power industry worldwide has not been used to regularly building lots of reactors for a long time, and in the future could need to meet a global demand of up to 20 new reactors a year.

Some believe that, because it is 13 years since the last nuclear power station was completed in the UK, we have lost the skills and supply chain we need to make it possible to build new power stations. Many of those who have the skills needed to build new nuclear power stations are older workers, who are likely to retire in the next few years, reducing the skills and experience available.

The Government believes that these issues should not prevent the building of new nuclear power stations for the following reasons:

- It takes a long time to plan and build a nuclear power station, so there is time to get ready
- Businesses - and people entering the labour market - will see the opportunities and may invest in training to meet the challenge
- Most skills and resources necessary to build new nuclear power stations are similar to those for large engineering projects in which the UK already has experience
- Other types of power stations have the same problems with getting parts and components. This is a situation that will have to be managed, whatever option we choose, for example by pre-booking manufacturing slots to make the parts needed
- Government and industry are already supporting skills development through a range of different initiatives

Business representatives encourage investment in national skills development and are confident about the UK nuclear industry's ability to meet the demands of new nuclear build. They believe that the existing skills base and supply chain needs sustained investment, which is crucial for its long-term competitiveness. Some also point out that should the need arise the required equipment and workforce could be sourced overseas from the global supply chain. However, others recognise that this may pose security risks and reduce investment in the training of local people.

Annex 7: Template for table facilitator notes

TALKING ENERGY

DATA CAPTURE FORMATFOR FACILITATORS

EVENT LOCATION	
TABLE NUMBER	
FACILITATOR NAME	

INSTRUCTIONS

- Text in a red box denotes that this session is led from the front
- Text in a green box denotes that this session is for table discussion and is led by you
- **You must take as many notes as possible. Do not worry about typos – you can quickly go back through and check this when there are plenary sessions, during breaks and at the end of the day before packing up.**
- **There are four key point summary boxes. These are highlighted in yellow. It is essential that you fill these in within the time of that particular discussion session. You must not leave this until afterwards. This text will be used to inform the end of day report which is being written in real time at the analysis Hub. The staff at the Hub and the Area Facilitator at your venue will be viewing the text you have written in this box in particular immediately after the session to which they refer.**
- **Please save your notes regularly**
- **Resist the temptation to moderate as you would a normal group. See yourself more as a chair of your table's discussion. Explain to them that you will often be looking down and taking notes whilst they are talking. You may not always be looking up but you are always LISTENING!**

9.00 – 9.45 (45 mins)

- **Participants will arrive at 9am for registration. You need to be read by 9am to have participants at your table. Depending on the venue, they may be shown into the main room for coffee and to find their table.**
- **Welcome people as they arrive and make polite conversation about their journey, etc. There will be an opportunity for the table to introduce themselves to each other after an initial welcome from the front.**

9.45 – 10.15 (30 mins)
Introductions, welcome and key pad training

This section is led entirely from the front

10.10 – 10.15 (30 mins)
Initial polling questions

10.15 – 10.35 (20 mins)
Introductions and warm up

Discussion session on spontaneous views on nuclear power to allow participants to express their views openly before any information is introduced

Part 1: introductions and ground rules – 5 MINS ONLY	
• Each person to introduce themselves to the group saying their name, where they are from and what the word 'nuclear' means to them. • Agree ground rules with your table – let them know that they should grab a cuppa, pop to the loo, have a cigarette, when they want rather than wait for breaks. TELL THEM THAT NO MORE THAT 2 PEOPLE CAN BE AWAY FROM THE TABLE AT ANY ONE TIME. EVERYONE MUST BE PRESENT FOR VOTING AND BRIEFING SESSIONS (VIDEOS AND PRESENTATIONS) • Do remind participants that you are not an expert on the subjects they will be discussing	
Part 2: This session is intended to provide a space for people to discuss spontaneous views on nuclear power to allow them to express their views opening before any information is introduced.	
Facilitator prompts • What are your top of mind views about nuclear energy? • What does 'nuclear energy conjure up for you? What do you associate with nuclear energy? • What kinds of issues do think is important when thinking about the production of nuclear energy?	Your notes here:
GIVE HANDOUT 1. EXPLAIN THIS IS A REMINDER OF WHAT THE CONSULTATION IS ABOUT AND WHY WE ARE HERE TODAY.	

10.35 – 11.00 (25 mins)
Background video

Pub quiz part 1

11.00 – 11.20 (20 mins)
Response to background information so far

Short discussion of initial reactions

Part 1: General awareness and perceived importance – 5 MINS ONLY	
Facilitator prompts • Are you aware of there being an energy issue? • What have you read/ heard about nuclear energy? *Probe around arguments for and against which they may have heard of (i.e. help to tackle climate change, associated risks)*	Your notes here:
• How important do you think this issue is? Why/ why not? • How concerned are you about it? Why/ why not?	
Part 2: Focusing on climate change	
GIVE OUT AND READ OUT (WORD FOR WORD) HANDOUT 2	
• What are your initial reactions to this?	
• Thinking about climate change, how much does this issue concern you? • What, in particular concerns you?	
• • What was new to you/ what were you already aware of? • Anything missing?	

11.20 – 11.40 (20 mins)
Pub quiz part 2

11.40 – 12.10 (30 mins)
Response to background further background information

GIVE OUT HANDOUT 3. READ OUT TEXT HIGHLIGHTED IN BLUE	
SAY:- "The Government is ultimately responsible for ensuring that our future energy demand is met through secure and safe sources of energy. As well as trying to meet targets on reducing harmful CO_2 emissions, the Government has a responsibility to ensure that we have a reliable source of energy that meets all of our energy needs, so that we can heat our homes, get from A to B and keep the lights on".	
Facilitator prompts • What are your initial reactions? • Were there any points/ facts that surprised you?	Your notes here:
GIVE OUT HANDOUT 4. READ OUT TEXT HIGHLIGHTED IN BLUE	
• What are your initial reactions?	
• Thinking about energy security, how much does this issue concern you? • What concerns you?	
• What was new to you/ what were you already aware of?	
GIVE OUT HANDOUT 5. READ OUT TEXT HIGHLIGHTED IN BLUE	
SAY:- "The Government's initial view is that it should give the private sector the option to invest in all low-carbon generating technologies, including nuclear power. The Government believes nuclear power is a proven cost effective low-carbon option. But, it is important to remember that it is not a choice of which one electricity generation technology we should go for, it is about considering how each method can play a role in the UK's energy mix".	
• What are your immediate reactions to this?	
• At this stage, what are your initial reactions to including nuclear power as part of our energy mix, based on what you have heard and discussed so far? • What makes you say that? *Probe around views expressed in the warm up session* *Probe for whether there are differences in points of view between older and younger people on the table.*	

• What do you think are the specific issues that need to be considered when thinking about nuclear energy and building new nuclear power stations? *Probe around specific issues/ concerns within environmental/ social/ economic considerations*	

KEY POINTS SUMMARY

INSTRUCTION – YOU MUST NOT WRITE MORE THAN ONE BULLET POINT UNDER EACH. YOU MAY RIGHT IN NOTE FORM RATHER THAN FULL SENTENCES

1. **WHAT ARE THE MAIN THINGS THAT YOUR TABLE HAVE LEARNED/ WERE SURPRISED BY?**

•

2. **WHAT IS YOUR TABLE'S INITIAL REACTION TO NUCLEAR ENERGY CONTINUING TO BE PART OF THE UK'S ENERGY MIX**

•

3. **WHAT KINDS OF ISSUES THAT WILL NEED TO BE CONSIDERED IN THINKING ABOUT THE FUTURE OF NUCLEAR ENERGY IN THE UK?**

•

12.10 – 12.15 (5 mins)
STAKEHOLDER VOICES VIDEO

LUNCH BREAK

ASK YOUR TABLE TO COME IN AROUND 40 MINS

1.05 – 1.15 (10 mins)
NUCLEAR WASTE AND SAFTEY VIDEO

1.15 – 2.15 (1 hour)
Discussion on waste, safety and security implications of nuclear energy

TELL YOUR TABLE THAT THEY MAY BE ASKED TO FEEDBACK SOME KEY POINTS FROM THEIR DISCUSSION AT THE END OF THIS SESSION

Part 1: 15 MINS	
GIVE OUT HANDOUT 6 READ OUT ALL TEXT MARKED IN BLUE	
SAY: "Nuclear materials and by-products are radioactive (although to differing degrees) and therefore potentially harmful to our health. Building more nuclear power plants means producing more nuclear waste; this will remain radioactive for many years and require careful management".	
Facilitator prompts • What are your initial thoughts about the consequences of nuclear power in terms of the waste produced?	Your notes here:
• How do you feel about the arrangements for storage of future nuclear waste?	
• Are you concerned about the number of nuclear power stations that would be built? why/ why not? • Would you be content if only the nuclear power stations we currently have (10 still in operation) were replaced? • Should there be a cap on the number of nuclear power stations built? What should this be?	
Part 2: 15 MINS ONLY	
GIVE OUT HANDOUT 7 READ OUT ALL TEXT MARKED IN BLUE	
• How do the implications of committing future generations to nuclear waste balance out with the implications of not allowing them this option for their energy mix, in terms of:- o possibly committing them to higher CO_2 emissions o and/or insecurity of supply?	
• Are you concerned about the challenges raised by others (stakeholder views covered in the video and on the handout)?	
• If you are concerned, what would you want Government to do/demonstrate in order to address your concerns? *If the cost of managing waste/ concern that this will be felt by consumers is a real issue for participants at your table, probe around what reassurances they would need and how much of a concern this is.*	

PART 3: 15 MINS ONLY	
GIVE OUT HANDOUT 8 READ OUT ALL TEXT MARKED IN BLUE	
SAY "The issues around the safety of nuclear power are extremely important. We have already seen that the nuclear power process involves using and producing potentially dangerous radioactive materials. Here we look at the safety considerations of nuclear materials and consider the different perspectives about these".	
• What are your initial thoughts about nuclear power and safety?	
• What, if any, are your concerns?	
• How do you feel about the security precautions in place?	
PART 4 15 MINS ONLY	
GIVE OUT HANDOUT 9 READ OUT ALL TEXT MARKED IN BLUE	
SAY Building more nuclear power plants requires careful consideration of the measures that would be put in place to protect against them. While everyone agrees that safety and security must be rigidly accounted for if new nuclear power plants are built, differences of opinion occur about the regulatory system that is in place and whether these risks can be managed effectively.	
• Are you concerned about the challenges raised by other (stakeholder views covered in the video and on the handout)?	
• If you are concerned, what would you want Government to do/demonstrate in order to address these issues?	
• On balance, do you think the safety and security risks should rule out nuclear power as an option?	
• PREPARE TABLE FEEDBACK – THIS SHOULD BE ESSENTIALLY THE SAME AS WHAT YOU ENTER IN THE SUMMARY BOX BELOW • ENSURE THAT SOMEONE FROM YOUR TABLE IS PREPARED TO SPEAK IF ASKED	

KEY POINTS SUMMARY

INSTRUCTION – YOU MUST NOT WRITE MORE THAN ONE BULLET POINT UNDER EACH. YOU MAY RIGHT IN NOTE FORM RATHER THAN FULL SENTENCES

1. **WHAT MAIN CONCERNS DO YOUR TABLE HAVE ABOUT WASTE AND ARRANGEMENTS FOR DISPOSAL?**

•

2. **WHAT REASSURANCES DOES YOUR TABLE NEED ABOUT WASTE?**

•

3. **WHAT MAIN CONCERNS DO YOUR TABLE HAVE ABOUT SAFETY AND SECURITY? WHICH RISKS CONCERN THEM THE MOST?**

-

4. **WHAT REASSURANCES DOES YOUR TABLE NEED ABOUT SAFETY AND SECURITY?**

-

2.15 – 2.25 (10 mins)

FEEDBACK SESSION

LEAD FACILITATOR TO PICK OUT 3-5 TABLES

2.25 – 2.30 (5 mins)

POLLING SESSION

AFTERNOON BREAK

TO BE ANNOUNCED FROM THE FRONT – FOLLOW LEAD FACILITATOR

2.45 – 2.55 (10 mins)
WHY THE GOVERNMENT IS CONSIDERING NUCLEAR

2.55 – 3.55 (1 hour)
Discussion on why the Government is considering nuclear

TELL YOUR TABLE THAT THEY MAY BE ASKED TO FEEDBACK SOME KEY POINTS FROM THEIR DISCUSSION AT THE END OF THIS SESSION

Part 1: climate change 20 MINS ONLY	
GIVE OUT HANDOUT 10 READ OUT ALL TEXT MARKED IN BLUE	
SAY: " OK, now were going to think about the Government's view that nuclear power has a role to play in the future electricity mix because it is a low-carbon energy source".	
Facilitator prompts • How important do you think nuclear power is for helping towards reducing our carbon emissions?	Your notes here:
• If keeping nuclear power as part of our electricity mix continued to reduce the UK's overall carbon emissions by at least 5%-13%, do you think it is important that we keep nuclear as an option?	
SAY: After taking on board the views of others the Government has reached the initial view that nuclear should be an option in our energy mix as it would help us, along with these other measures, to tackle climate change by reducing our CO_2 emissions.	
• Do you have any concerns about the Government's initial view on nuclear power and its contribution to reducing carbon emissions? What are these?	
• Are you concerned by the challenges raised by others (stakeholder views covered in the video and on the handout)? In what ways and why?	
• If you are concerned, what would you want Government to do/demonstrate in order to address these issues?	
Part 2: Security of supply 20 MINS ONLY	
GIVE OUT HANDOUT 11 READ OUT ALL TEXT MARKED IN BLUE	
• How important do you think nuclear power is for ensuring the security of our supply?	
• What do you think about the Government's view on the role nuclear power could play in providing energy security? What are these?	
• How concerned are you about the challenges raised by others?	
• If you are concerned, what would you want Government to do/demonstrate in order to address these issues?	
• PREPARE TABLE FEEDBACK – THIS SHOULD BE ESSENTIALLY THE SAME AS WHAT YOU ENTER IN THE SUMMARY BOX BELOW • ENSURE THAT SOMEONE FROM YOUR TABLE IS PREPARED TO SPEAK IF ASKED	

KEY POINTS SUMMARY

INSTRUCTION – YOU MUST NOT WRITE MORE THAN ONE BULLET POINT UNDER EACH. YOU MAY RIGHT IN NOTE FORM RATHER THAN FULL SENTENCES

1. **DO YOUR TABLE SEE ANY BENEFITS OF NUCLEAR ENERGY IN TERMS OF REDUCING CARBON EMISSIONS?**

-

2. **WHAT REASSURANCES, IF ANY, WOULD THEY LIKE FROM THE GOVERNMENT ON THE ROLE NUCLEAR COULD PLAY IN REDUCING THE UKS CARBON EMISSIONS?**

-

3. **DO YOUR TABLE SEE ANY BENEFITS OF NUCLEAR ENERGY IN TERMS THE ROLE NUCLEAR ENERGY COULD PLAY IN MAKING THE UK'S ELECTRICITY MORE SECURE?**

-

4. **WHAT REASSURANCES, IF ANY, WOULD THEY LIKE FROM THE GOVERNMENT ON THE ROLE NUCLEAR ENERGY COULD PLAY IN MAKING THE UK'S ELECTRICITY MORE SECURE?**

-

3.35 – 3.45 (10 mins)

FEEDBACK SESSION

LEAD FACILITATOR TO PICK OUT 3-5 TABLES

3.45 – 3.50 (5 mins)

POLLING SESSION

3.50 – 3.55 (10 mins)
BRINGING IT ALTOGETHER VIDEO

3.55 – 4.10 (15 MINS)
Discussion bringing it all together: Part 1

15 MINS ONLY	
GIVE OUT HANDOUT 12 AND READ ALL	
SAY: "Remember that if the Government doesn't give permission to energy companies to consider nuclear energy, then no new nuclear power stations would be built. If the Government does give permission, then it would be the start of a process which might lead to new nuclear power stations being built.".	
Facilitator prompts	Your notes here:
• Do you see any benefits? What are they?	
• And what about the main concerns you have? • Thinking back to earlier in the day, have any of these now been dealt with? How? • What, if any, concerns haven't been addressed throughout the day?	
Visualise scales, putting the benefits you see on one side and the implications on the other (note that some benefits might weigh more than others – so even if there are fewer benefits they may wish to give these more weight).	
• What makes the 'scales tip' and is this more in favour or against?	

4.10 – 4.15 (5 mins)

POLLING SESSION

4.15 – 4.30 (15 MINS)

Discussion bringing it all together: Part 2

15 MINS ONLY	
SAY: "In this final section, we will review the different concerns you have raised throughout the day and consider these again in light of the overall issues and implications of nuclear energy."	
Facilitator prompts • Are there any other conditions that you believe should be put in place before giving energy companies the option of investing in new nuclear power stations?	Your notes here:
• **[If they believe the benefits outweigh the risks],** does this come with conditions and what are these?	
• [If they think the risks outweigh the benefits,] would your view change if certain conditions were met? What would these conditions be?	

KEY POINTS SUMMARY

INSTRUCTION – YOU MUST NOT WRITE MORE THAN ONE BULLET POINT UNDER EACH. YOU MAY RIGHT IN NOTE FORM RATHER THAN FULL SENTENCES

1. **WHAT DO YOUR TABLE SEE AS BEING THE MAIN BENEFITS OF NUCLEAR**

•

2. **WHAT DO YOUR TABLE SEE AS BEING THE MAIN IMPLICATIONS OF NUCLEAR**

•

3. **WHAT IS THE BALANCE OF THE BENEFITS AND RISKS FOR YOUR TABLE?**

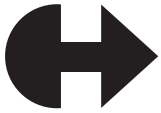
•

4. **WHAT CONDITIONS WOULD THEY PLACE ON NEW NUCLEAR BUILD/ WHAT REASSURANCES WOULD THEY LIKE TO SEE?**

•

4.30 – 5.00 (5 mins)

WRAP UP AND CLOSE



HenleyCentreHeadlightVision

Analysis of Outputs from the Nuclear Consultation Stakeholder Meetings

Prepared for The Department for Business, Enterprise and Regulatory Reform

December 2007

HenleyCentreHeadlightVision

Contents

Executive summary

Background

This document summarises the output of the Government's consultation with stakeholders and communities who live near existing nuclear power stations over the summer and autumn of 2007, as part of the Government's consultation on the 'Future of Nuclear Power', launched on 23 May.

The consultation focused on a set of structured questions which have been framed more simply for purposes of analysis in this report. They cover: should the Government allow new nuclear build as an option?'; does the capability exist to deliver new nuclear build?, and if so, who has the capacity and how should nuclear be delivered? The discussion at the events themselves focussed on some of the key questions in the consultation document. However for the purposes of this report, we have grouped the comments under the three headings above. The agenda is available in Appendix 1.

Should?

Under the arguments, for 'should', delegate discussions focused on what delegates saw as ethical issues, supply security, risks, international implications and other technologies in relation to nuclear.

- Conversations around ethics balanced the duty to reduce CO_2 emissions and the effect of climate change by moving to low carbon energy options such as nuclear, with the duty to avoid leaving legacy waste for future generations. On balance, the majority of stakeholders were more concerned with countering the effects of climate change.

- In reference to security of supply, stakeholders from a range of perspectives agreed that it is important for the Government to make a decision on the future of energy policy as soon as possible. This was either due to a concern about an impending 'capacity gap', or the belief that an immediate response to Climate Change is an imperative.
- There was also a range of opinions about the risks associated with building new nuclear power plants. While some participants emphasised the fact that new reactor designs are safer than those currently in operation, others pointed to the dangers posed to new and existing plants by rising sea levels. There was disagreement about the extent to which nuclear power plants pose a health risk to local communities.
- Many participants felt that any decision on the future of nuclear power should be taken in the context of a focus on reducing energy demand. The importance of continuing to invest in renewables was also emphasised repeatedly by participants of all viewpoints.

Capabilities?

Arguments around 'capability' covered capacity and resources, regulation and waste.

- There were a range of opinions around the extent to which the UK has the capacity to deliver a new nuclear programme. Concern about a skills gap developing in the nuclear industry was mentioned by a number as having the potential to undermine future nuclear new-build.
- A number of participants were comfortable with the safety restrictions in place on the nuclear industry, and the level of concern about a terrorist attack on UK nuclear facilities was relatively low. However, for many participants, an ongoing programme of independent scrutiny and inspection and a strong regulatory framework was a key condition associated with building new nuclear capacity.
- Successful management of nuclear waste was a significant issue for stakeholders. Many felt that without providing long term storage for the UK's existing nuclear waste, it was unacceptable to invest in new nuclear plants.
- A range of discussions on waste also questioned the extent to which it is possible to accurately calculate or account for the cost of storing nuclear waste for very long periods of time.

Who and how?

The final 'who and how' discussions centred around accounting for the full costs of nuclear, achieving the desired energy mix through the market, siting new build, communications and education, and other parallel activities.

- There were a range of views around whether nuclear new-build should be financed publicly or privately. An important condition of private sector investment put forward by some stakeholders was that the industry should not be directly subsidised by Government, and that the full costs of decommissioning and waste storage should be borne by the private sector.
- There was disagreement among stakeholders about the extent to which the private sector will provide a diversity of energy supply sources of their own accord. Some argued that the private sector will tend to invest in generation capacity which they view as most likely to provide the best return on capital, and around which they felt were too many uncertainties to make nuclear an attractive proposition. Others suggested that a greater clarity of the Government's position on nuclear power would lead to private sector investment.

Introduction

The Government has been consulting with communities who live near existing nuclear power stations and stakeholders over the summer and autumn of 2007, as part of a consultation on whether energy companies should be allowed the option of investing in new nuclear power stations. The consultation had three streams:

1. A written consultation document which was also made available online. The website was operated by Dialogue by Design who also collated and analysed the written and online responses
2. A series of stakeholder events and meetings with established local community groups, near existing nuclear sites, facilitated by officials from the Department of Business, Enterprise and Regulatory Reform (BERR), and the COI
3. A series of deliberative events with members of the public, facilitated by Opinion Leader Research.

In total, over 3300 people were invited to the stakeholder events, with approximately 400 attending. Invites to the meetings with established local community groups were sent to over 500 people, of which more than 200 attended. An attendance list for each meeting is contained within the meeting summary documents available from the 'consultation events' page of the consultation website (www.direct.gov.uk/nuclearpower2007).

Henley Centre HeadlightVision were invited to undertake an independent review of the outputs from the consultation with communities living near existing power stations and stakeholders. Our review is entirely independent from the consultation process. HCHLV did not feed into the design of the consultation process, attend any of the events, nor have contact with any of the stakeholders.

This stream of the consultation can be split into a number of parts:

- Thirteen stakeholder events (one of which was an additional meeting requested by faith groups in Carlisle);
- Nine site stakeholder meetings with established local community groups;
- One Ministerial roundtable meeting,

A calendar of events is provided in Appendix Four.

At all but the Ministerial roundtable, BERR officials presented the Government's preliminary view on nuclear power to delegates[1], who were then given an opportunity to comment on and respond to the Government position through small group and plenary discussion (see Appendix Three). Six different questions were posed to delegates for discussion. (See following section 'Format of Events' for further details).

HCHLV were asked to provide a review of the outputs from this consultation stream, and to summarise the key themes that emerged across the events. The analysis will be considered by Government alongside outputs from the other consultation streams, and will inform the decision the Government takes on the future of nuclear power. HCHLV did not attend any of the events, but reviewed the written outputs provided by BERR and COI.

The outputs from the stakeholder events consisted of:

- Notes based on the table discussions after each presentation, written by the event moderators from BERR and COI.

- Direct transcription of the plenary discussions which followed the table discussions (This was available at all of the stakeholder events and some of the meetings with local community groups at existing sites).

These data capture techniques are standard practice in recording these types of events with qualitative output.

[1] Malcolm Wicks MP, Minister for Energy, gave the presentation in Newcastle

Analysis approach

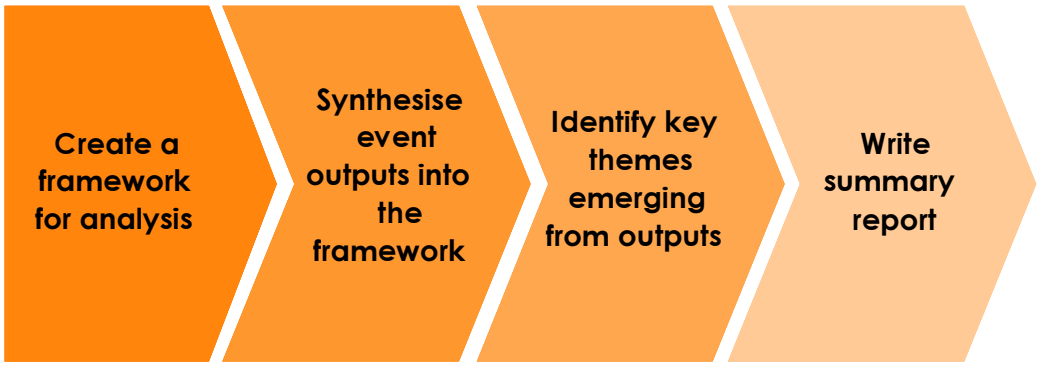


Figure 1: Analysis approach

The analysis was carried out by a team of four consultants at HCHLV. Topics from the consultation were identified as an initial framework for analysis; comments around the different topics made at each event were then recorded on a large spreadsheet. From this, the team drew out recurring themes of discussion, and less common issues, raised at the events, summarising the different arguments made by delegates. It is important to clarify the nature of the analysis undertaken as part of this project:

- The summaries of local community events did not have transcripts for all plenary sessions. The verbatim quotes included are designed to be illustrative of the range of opinions expressed, rather than fully representative across all the events.
- Where possible, we have indicated the extent to which there seems to have been consensus or diversity of opinion within the discussion of a particular issue, and where there were significant regional variations. However, the events were designed to make participants feel comfortable about expressing their views, so comments were made non-attributable. This means that it is not possible to fully assess the balance of opinion, since the anonymous transcripts did not identify specific participants or silent voices. Any reference to 'most' or 'some' therefore refers to the balance of opinion within the recorded discourse, and can not be presumed to always reflect the true balance of opinion amongst the stakeholders present.
- It is important to be aware that these events represented a range of nuanced, qualitative conversations. The analysis reflects this, and is designed to qualitatively reflect the scope of debate.
- Because of this, the analysis presented here focuses on the range of opinions expressed in response to the Government's initial view as presented.

A copy of the proforma and agenda for each meeting is included in Appendix One and Two.

Format of events

The format of the consultation events was as follows:

- Firstly, a BERR official gave an overview of the consultation process, followed by an opportunity to ask questions.

- The second presentation was about the future energy mix and whether new nuclear should be an option. The presentation was based on the material in the consultation document. This was followed by table discussions, the main points of which were captured at the majority of events by facilitators. After these discussions participants fed back in a plenary session which was recorded and transcribed at the majority of the events. Where recording facilities were not available the main points were captured by facilitators. The following questions were put to participants at this stage:

    - *'Do you agree or disagree with the Government's view on carbon emissions from nuclear power stations? Are there any other aspects of carbon emissions associated with nuclear power that should be considered?'*

    - *'Do you agree or disagree with the Government's view on the security of supply impact of nuclear power stations? Why do you say that?'*

    - *'Do you agree or disagree with the Government's view on the value of having nuclear power as an option? Why do you say that? Are there any other considerations that we have not discussed?'*

- The third presentation was again based on the material in the consultation document and looked at nuclear safety and waste issues. This was followed by the same opportunity for table discussion and plenary feedback as described above. The following questions were asked to participants:

    - *'Do you agree or disagree with the Government's views on safety, health, transport and security issues? Why do you say that?'*

    - *'What do you think are the ethical considerations related to a decision to allow new nuclear power stations to be built? '*

- Finally, there was some discussion on whether the Government should take its preliminary view forward, and if so, what conditions should be applied. The following questions were put forward for consideration:

    - *'Having considered all the issues, and in the context of tackling climate change and energy security do you agree or disagree*

that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?'

- *'Are there any other conditions that you would like to be in place?'*

All presentations were given by BERR officials, except at Newcastle where the Energy Minister, Malcolm Wicks, gave the presentations.

After an initial review of the outputs, we (HCLV) identified three broad areas of debate within the stakeholder discussions, which simplifies the format of the events for the purposes structuring our analysis more clearly and simply. The three areas considered are:

- firstly, should the Government allow new nuclear build as an option?
- secondly, does the capability exist to deliver new nuclear build?
- and finally, if so, who has the capability to deliver it and how should it be delivered?

Challenges and responses to the consultation process

The majority of delegates did not voice an opinion on the matter of the consultation process. However, some expressed explicit vocal support for the Government's consultation process and others raised a number of questions and concerns. On the whole, there was more support of the consultation at community based events held at nuclear sites than at the stakeholder events.

Concerns focused around the nature of the consultation, the materials and evidence being used, and who was being consulted. These typically surfaced during the first stage of each of the events, the "Q and A" session, which allowed participants to voice their queries.

There was a questioning of whether a wholly open question was being posed, given the Government's preliminary, pro-nuclear view. This prompted concerns as to whether the decision was pre-determined and questions as to how serious an objection needed to be made for this pre-disposition to be changed. One participant at Cambridge, Newcastle, Bristol, Hartlepool, Hinkley Point, Sizewell, Cardiff and Glasgow raised this issue.

"[I]f the preliminary view is that [nuclear power] is essential, it almost cuts short any genuine discussion… it has prejudiced the whole consultation against being genuine." Participant, Hinkley Point

"[The] presentation at the start of this section seemed to be very presumptuous from the Government's point of view in arguing the case for nuclear power. That to me seems quite out of place in a consultation on such a wide

embracing subject as this. I find that offensive, in that it forces me into a confrontational position, so if I am confrontational, you asked for it! The other aspect that seems worrying about this consultation is that the lip service paid in the document to demand reduction is entirely inappropriate." Participant Cambridge

At Leeds and Manchester, there was also substantial debate that the consultation had been too narrowly defined. A delegate at each of these events vocalised a belief that the questions posed were too specific, even leading, and that this prevented discussion about the alternatives to nuclear and about the energy crisis more broadly.

Many delegates raised questions about the materials and evidence being used within the consultation, such as in Cambridge and Dungeness. The relative carbon emission figures for different electricity generation sources were a source of much debate; some queried whether the whole lifecycle carbon costs of nuclear had been included; some were concerned that the figures had been provided by the nuclear industry; others asked why renewable technologies other than wind power had not been included. There was a feeling amongst some delegates that the materials presented in general had a pro-nuclear slant. This was raised in Nottingham and Carlisle.

Finally, there was some unease about which stakeholders were participating in the events. In London and Reading, delegates were worried about the absence of many environmental groups, although it was recognised that Government had little control over who decided to attend. At earlier events in July , a number of delegates thought that invitations had been sent out too late, and that the events were too close to the holiday period. Finally, one participant thought that the devolved administrations should have been consulted directly.

Conversely, it should be noted that there were a number of stakeholders who expressed their satisfaction with how the consultation was carried out. For example, in Heysham the consultation was widely welcomed and was seen to have been well published; a participant in Birmingham commented that the consultation had been conducted well, and a participant in Hunterson found the approach refreshing. Elsewhere in London and Glasgow, the consultation was praised for its thoroughness and more general approval was voiced in Cardiff.

"I think considerable congratulation is due to both the Government and to officials for the thoroughness of this consultation." Participant, London

"I would like personally to congratulate your department on the action it has taken to hear the widest possible views and invite comment." Participant, Glasgow

"I am quite impressed by the comprehensive nature of the consultation process that is taking place." Participant, Cardiff

Some participants at the Ministerial round table event also expressed their satisfaction with how the consultation had been carried out. Several had attended prior events (at a variety of locations) themselves or had members of staff who had done so. The general consensus was that people seemed pleased to have had the opportunity to have a full, open and frank discussion around the issues and that in general, levels of engagement and enthusiasm for the events were high. However, there was also some sentiment that the opportunity to discuss alternative energy options and to have a broader debate about energy issues was an opportunity which had been missed.

Should?

This section outlines the range of arguments used by participants regarding the development of new nuclear power stations. Because the question of 'should?' includes a very wide range of implications, the discussions were broad in scope, and included questions around what delegates considered to be the ethics of nuclear power, risk and safety issues, international implications and whether nuclear will allow the UK to maintain security of energy supply.

Subsequent sections in this report consider some of the more detailed implications of the decision to invest in nuclear generation.

Ethical issues

The issue of ethics was initially raised in the consultation in the context of how to balance the ethical considerations related to a decision to allow new nuclear power stations to be built, and the need to address climate change. However, participants tended to interpret issues associated with ethics more broadly.

Discussions of the ethical issues associated with nuclear power tended to be focussed on three broad themes – the legacy that our contemporary choices will leave for future generations; the potential impact that new nuclear capacity will have on renewable and supply side solutions; and the relationship between the civilian and military nuclear industries.

Legacy

The most common ethical debate was around the legacy left by new nuclear investment. For a minority of stakeholders, the waste inevitably created by new nuclear capacity, and the costs and dangers of storage and processing passed on to future generation, represented an unacceptable trade-off. Those arguing this position felt strongly that no new nuclear power stations should be built until the issue of waste management and storage had been fully addressed.

"*We are bequeathing to our future generation a lack of choice.*" Participant, London

"*We should confront the ethical question because it would be totally unacceptable for future generations to inherit this problem which we should be solving.*" Participant, Wyfla

Climate Change

The counterargument here, which was discussed for a greater proportion of time, concerned the ethics of leaving future generations with a legacy of higher CO_2 emissions and the more extreme effects of Climate Change.

"*In view of climate change, is it ethical not to go with nuclear?*" Participant, Newcastle

"*I simply do not see how it is mathematically possible to achieve the carbon reductions the country would like without nuclear energy.*" Participant, Ministerial round table

Proponents of this view emphasised the urgency of reducing our CO_2 emissions, and suggested that nuclear generation represented the 'least bad' option in the context of climate change. Unlike emissions from coal or gas power stations, advocates argued it is possible to contain the waste and to store it safely, and some suggested that nuclear power provides the potential to securely generate electricity and reduce CO_2 emissions, using proven and reliable technologies.

"*There is a sense that if not nuclear waste, it will be CO_2 waste; the ethical balance is between pumping your waste out invisibly with no control over where it goes or knowledge about its undiscovered impacts, or having it contained in a steel box where you know where and what it does, and have some degree of control over it.*" Participant, Cambridge

A corollary argument here concerned the fact that strongest effects of climate change were likely to be on the Third World, and it is crucial for those living in wealthy countries to use whatever technology they have at their disposal to reduce their carbon emissions.

"*What effect will that have on those people in the third world who need energy as much as we do?*" Participant, Carlisle

Wider 'green issues'

Another set of ethical issues concerned the extent to which increased investment in nuclear power represented too much of a focus on supply-side solutions to energy consumption. New nuclear capacity, in this context, was seen by some as actually *reducing* the incentive for individuals to reduce their energy consumption, and for Government to actively invest in renewable energy supplies. Stakeholders advocating this position argue that the policy focus should be more on the importance of decreasing the amount of energy that we use, rather than increasing our capacity for electricity generation.

'*The best power stations are the ones you don't have to build.*" Participant, Manchester

Some participants felt it is important not to assume, or to let the public assume, that any new nuclear programme will 'solve' the issue of carbon emissions. As participants noted, there are many other sources of CO_2 – not least of which are emissions transport and industry – which would be unaffected by new nuclear capacity.

In a related argument, a minority of stakeholders questioned the extent to which it is ethical to assume that the main focus of Government policy should be continued economic growth, with associated increased consumption. These stakeholders tended to emphasise the importance of questioning policies which advocate economic growth above issues of sustainability.

The Ministerial round table spent a significant amount of time discussing the role the UK should play in tackling climate change. Many participants felt that the UK needed to adopt a stance of leadership and best practice in this area and that the UK was well placed to do so:

"The country should behave in certain ways, in ways that will model and demonstrate to the developing world how it should go."

"The three biggest contributors to global emissions are North America, China and Europe. From that group you would expect Europe to be taking a lead, if you then look at which are the major economies in Europe and where is there a focus on energy policy at the moment then the UK moves into the spotlight." Participant, Ministerial round table

Local economic benefits

On a number of occasions, the economic and employment benefits associated with nuclear energy were highlighted. For example, when addressing ethical considerations, participants at Reading noted the significant economic impact on the local community in areas where new nuclear plants have been built. Elsewhere, a participant in Belfast understood the benefits to the local economy to be the main reason why so many people in Cumbria and France are pro-nuclear.

Glasgow and Hartlepool underlined the employment opportunities that a new nuclear power station provides.

"…to agree with my colleague regarding the social and economic opportunities that rebuild will bring to the locales at the end of the distribution lines in Midlothian and North Ayrshire, they do bring blue chip jobs and skills in abundance, which should not be forgotten, as should the supply chain." Participant, Glasgow

Conversely, it was commented in Glasgow that the closure of existing sites has negative impacts on the local economy; it was remarked that sites at Hinkley Point and Hunterson are due to close in 2011 which would cause the loss of many jobs.

Military link

A final set of ethical debates concerned the dangers of links between civilian and nuclear weapon programmes. Some stakeholders argued against civilian nuclear power because they felt it was likely to develop (or maintain) a close

relationship with nuclear arms – an ethical choice which they found unacceptable.

"We have a stockpile of nuclear arms. This is an ethical issue but we are not addressing this." Participant, Belfast

Others, however, pointed to Canada and Germany as countries which maintain civilian but not nuclear programmes – suggesting that the link between the two is not necessarily inevitable.

As well as the broad ethical arguments outlined above, a number of other viewpoints were put forward. Stakeholders in Newcastle and Belfast, for example, argued that it was ethically problematic to leave nuclear generation to the private sector, and that the Government should act as the major guarantor of ethical standards in the industry.

"To leave ethical issues to market forces is not only a bad idea; it is a seriously bad idea." Participant, Newcastle

Others argued that it is not unethical to leave some of the cost of decommissioning and processing of nuclear waste to future generations, since disposing of the created waste 50 or 60 years in the future will be more affordable. The point was made that by then we will have derived the economic benefits from the energy generated, which should put us in a stronger financial position to absorb the costs of permanently disposing of the waste.

It should be emphasised that throughout these discussions, there was little consensus within the groups around the definition of ethics or ethical behaviour, or what constituted an ethical stance on nuclear power. Rather, most participants simply used their own definition of ethical behaviour, and discussion of the extent to which these definitions coincided with others was very limited. Because of this ambiguity, participants with a broad range of viewpoints were able to describe their preferred options as the 'ethical' choice, and neither the 'pro' or 'anti' nuclear advocates were able to claim a monopoly on ethical issues.

Supply security

Maintaining energy security is recognised by the Government as one of the most important goals of UK energy policy. Stakeholders concurred with this view, and furthermore most agreed that a diverse supply of energy was crucial for future energy security.

Urgency

The need to make a quick decision and take prompt action on the future of the country's energy supply was mentioned at a number of events. There was also broad frustration conveyed over the length of time of decision making and

commissioning. One participant in Cambridge commented that the length of time between commissioning and building was too long. Others in Glasgow and the Ministerial round table were more emphatic about the need for a swift decision. One participant at Glasgow noted that there had already been grid warnings for availability of energy supply and their clear desire was to make the best use of time available, by moving forward quickly on the energy issue:

"The lights will go out if the Government does not move, and we should be pressing on that."

"Does the Government have a real sense of urgency about this matter?"

"I honestly think we need to make a decision and get on with it." Participant, Glasgow

"I agree with what seems to be a very clear consensus that the Government now needs to make a decision as quickly as it possibly can because every day we delay there is not only a risk to the nation's energy security, quite obviously so, but every day we pump more CO_2 into the atmosphere too."

"We have to get a move on, we are going to be faced with an energy gap very soon." Participant, Ministerial round table

Reliance on foreign countries

The main rationale for maintaining diversity of energy supply was that many participants were uneasy about the prospect of the UK becoming too reliant on foreign sources of energy, and the potential influence it might give to other countries. This concern was particularly acute in light of the decline of North Sea oil and gas supplies and the resultant increase in dependency on foreign imports.

"We have nuclear in the mix for generation to ensure that really, in terms of electricity we minimise the risk to competitive supplies of electricity, and we also minimise the risks to competitive supplies of gas." Participant, Ministerial round table

"Russia could turn off their taps at any time." Participant, Newcastle

Similar concerns were raised about the appropriate response if a foreign company were to invest in the British nuclear sector. Should the Government put safeguards in place to protect the industry from coming under foreign ownership?

While the importance of supply security was not in doubt, a major area of discussion was the extent to which the nuclear option contributes to future energy security. Again, a range of opinions were expressed around this issue, and as with the 'ethical' debate, both advocates and critics of nuclear power argued that their favoured options would maintain supply security.

Uranium supplies

Stakeholders who opposed the nuclear option argued that supply security can be achieved in other ways – particularly through greater investment in renewables. They also questioned the security of uranium supplies, arguing that ultimately supplies are also finite and if other countries decide to invest in nuclear power, the price is likely to rise, and that the research and policy focus should be more on developing longer term sustainable solutions.

"*Ultimately we know that coal, gas, oil and uranium are all going to run out, so we need to get on and look towards the long-term sustainable solutions.*" Participant, Hunterston

"*On the security of supply, the supply of uranium is not infinite. We are still dependent upon other countries, albeit a fairly small number.*" Participant, Birmingham

Those in favour of nuclear argued that the sources of uranium – Australia or Canada – offer greater stability than other energy sources. Moreover, they argued that fuel is a very small proportion of total cost of supply for nuclear power, and compared to gas, fluctuations in the price of uranium will likely have a smaller impact on the supply of energy.

"*One of the biggest selling points of nuclear power and one of the things that make it most attractive to Governments is the fact of the certainties that it brings into the energy supply equation.*" Participant, Cardiff

Despite these objections, the overall balance of opinion within the stakeholder discourse suggests that that most were in favour of keeping the nuclear option open. In particular, given that most stakeholders suggested that diversity of supply is key to supply security, many felt it would be counterproductive to remove the nuclear option at this stage.

"*It's like a pension - you invest in a range of things.*" Participant, London

Risks

Risk, and techniques for risk minimisation, was another strong underlying theme throughout the discussions, which was discussed in a range of different contexts throughout the groups. One set of concerns was around the danger associated with *overarching* risks – significant human or mechanical failure in power plants or waste transport, or the dangers of nuclear terrorism. A second set described *infrastructure* risks – can we ensure the safety of newly constructed power stations?

Another set of risks could be classified as more *acute*, and included the potential for increased levels of cancer around power stations raised at two events, or the risk of the greater CO_2 emissions from not building power stations. Finally, the fourth set of risks were viewed as *reputational* risks – the dangers that

public misunderstanding of the risks posed by nuclear power could prevent the implementation of any new-build programme. These headings were developed by HCHLV to illustrate the range of debate.

Overarching risks

Of the overarching risks discussed, dangers associated with the transport and storage of nuclear waste were perhaps the most frequently discussed. Due to its highly toxic nature, safe storage and management of nuclear waste was a crucial condition attached to building new nuclear capacity, and concerns around the ability to effectively store the waste one of the most significant objections to nuclear new-build.

"*However well [waste management] is engineered, it is going to come back: these containers are going to leak and, as far as we know, this stuff will come back.*" Participant, Bristol

Another risk closely related to the safe storage of nuclear waste was the danger of a terrorist incident at a nuclear station or nuclear waste facilities. One risk discussed was that terrorists might view nuclear power stations as targets in their own right, with devastating results. There was also a feeling among some stakeholders that the past few years have seen an escalation in the scale and scope of terrorist attacks, and that this should lead to a recalculation of the associated dangers.

"*Following 9/11, you cannot imagine what might happen.*" Participant, Manchester

"*To me, the overwhelming ethical consideration against nuclear power is the risks and dangers; for example, on the risks of terrorist attack, very little has been mentioned here ... if there was a terrorist attack on the 21 tanks at Sellafield, it would result, worldwide, in about 180,000 cancer-related deaths per tank. That is a huge risk.*" Participant, Manchester

Another concern was that a terrorist could get hold of nuclear material to use in terrorist attacks in other population centres. In particular, stakeholders in Dungeness noted that there have been a number of security failures, including inappropriate people gaining entry to the plant dressed as engineers.

"*If a terrorist group wanted to get hold of materials, who would be responsible for stopping it?*" Participant, Leeds

Notably however, many stakeholders rated the risk of a terrorist attack on a nuclear power station as low, explaining that they are built away from urban centres, and relatively well protected. Many considered that the safety procedures in UK power stations were effective enough to reduce the risk of a terrorist attack to an acceptable level.

Infrastructure risks

Much of the concern tended to be centred on the infrastructure risks associated with building new power stations. For example, some stakeholders suggested that nuclear power stations, stationed near to the sea for ready access to the vast amount of water they require for cooling, are particularly vulnerable to any future rises in sea level associated with global warming.

"In Suffolk at least two of the stations are vulnerable to the sea level risk. Although we have been discussing it and have agreed that the engineering cost of a wall around the Sizewell power station is manageable and doable, if you have to defend a large part of the coastline, as you would have to in Suffolk to keep Sizewell part of the United Kingdom and allow transport in and out, you might have a much bigger public purse commitment than the Government has recognised as of now." Participant, Birmingham

Other stakeholders suggested that new reactor designs offer improved safety features and reduce the risk of human error causing a collapse or meltdown. Others suggested that the UK should follow the example of South Africa and build new power stations underground, thus potentially reducing the dangers of terrorist attack.

Acute risks

Alongside the discussions about the dangers of overarching and infrastructure risk, stakeholders also discussed other more acute risks associated with new-build. There were some concerns that areas near nuclear power stations had higher than average rates of cancer, and perceptions that this is the case would likely lead to significant local opposition to new-build power stations. This was raised at Bristol and Hinkley Point:

"Perhaps Hinkley Point is unique, but not according to the leukaemia study just published, which has found that around all nuclear installations in Europe and other parts of the world you get the same thing. We have a doubling of breast cancer; we have increasing incidents of men with prostate cancer. There are other illnesses as well that you do not get if you do not have chronic exposure to radiation." Participant, Bristol

Other participants mentioned the long-term health effects of the fallout from the Chernobyl disaster, as an example of how the health effects from nuclear waste can continue to impact health and wellbeing for decades.

Reputational risks

A fourth set of potential risks are more reputational, and relate to the need to educate the public about the risks and benefits of nuclear power. Those of the stakeholders who worked in the nuclear industry were very aware of some of the public relations difficulties that the industry suffers from. Some suggested that, contrary to public opinion, the nuclear industry has a strong safety record

– both when compared to other methods of energy generation such as coal, and when compared to other industries (such as chemical processing) which handle dangerous substances.

Without broader acceptance of nuclear energy generation, many stakeholders were concerned that public opposition to new stations poses a significant threat to further investment. Moreover, stakeholders argued that the risk of significant public opposition to new-build is also highly uncertain. The point was made that public fears after Chernobyl have resulted in a growing public association of nuclear and safety risks.

As with discussions over ethics, both pro and anti-nuclear stakeholders argued that their respective positions were the most likely to counter future risks. For example, those opposed to nuclear development often argued that the risks of storage and processing of waste were so significant that the less risky course of action would be to refrain from building new nuclear plants. In contrast, those in favour of new-build emphasised that it was most important to tackle the risks associated with greater CO_2 emissions, and the ability of nuclear generation to provide electricity with significantly reduced carbon emissions.

"What needs to be weighed up in my mind is the balance of reduction of carbon emissions against the potential issues of creation of new waste. The question to me is what are the chances and consequences of events. If we look at global warming, therefore, what are the chances of that happening and what are the consequences, in particular, on a global scale? Now compare that with the issues that concern people around the creation of waste and what are the chances of an accident or such like and what are the consequences of that?" Participant, Birmingham

International implications

The international implications of any UK decision to build new nuclear stations were another area considered by stakeholders – though in less detail than considerations of ethics and risks.

The most commonly argued overarching international implication cited was that it would be difficult for the UK to strongly oppose new nuclear capacity in certain other countries, while simultaneously building new nuclear plants ourselves: more nuclear capacity in the UK would to a certain extent represent a cessation of the moral high ground.

"What message will [new build] give to the rest of the world?" Participant, Bradwell

Moreover, some argued that any new nuclear stations will inevitably lead to an increase in the dangers associated with proliferation, as they add to the already large global stockpile of nuclear waste.

"In terms of the foreign policy, Oxford Research Group has published a recent study saying with increased nuclear comes increased proliferation and that is a clear ethical issue in terms of the potential for use in a military sense." – Participant, Birmingham

A counter argument proposed by stakeholders here is that if we accept that the UK is not in a position to oppose or prevent nuclear capacity being developed in other countries, the UK should aim to develop internationally recognised Governmental best practice in nuclear management, and share this information with other countries.

Another strand of international arguments emphasized the fact that any actions taken by the UK in isolation will have little effect globally. People felt that because the UK produces only 2% of global CO_2, and it seems likely that the country will have little impact on broader global proliferation and environmental issues. In this context, achieving supply security alongside reduced CO_2 emissions will inevitably have to include cooperation with other countries and international institutions.

Other technologies

There was some considerable discussion among stakeholders about the impact that nuclear new-build could have on other technologies for generating energy.

The most common concern here was that redeveloping nuclear power will result in a reduction in resources spent on developing other renewable energy sources, such as wave energy, carbon capture and wind power.

"I would love to see the Government giving as much attention to promoting carbon capture and storage as it devotes to promoting nuclear." Participant, Leeds

"A key concern here is that further investment in nuclear will result in reduced investment in renewable energy sources." Participant, Bristol

"I feel strongly that if the massive sums of money available in Government are all put into nuclear, other developments on the renewables side are sidelined" Participant, Carlisle

"The main thing is making sure that nuclear does not inhibit development of other technologies. I'm obviously very pro nuclear, but I really want to see renewables given the environment and investment." Participant, Glasgow

In this context, many felt that any decision to build greater nuclear capacity could be viewed as actively mitigating against developing a range of diversity of energy sources. They felt it would inevitably mean a reduction in the scale of investment in alternative technologies. This concern was shared by both those in favour and those opposed to nuclear power, and those in favour frequently

caveated their support with an emphasis on the importance of continued parallel investment in renewables.

"While I personally support the development of nuclear, I think it needs to be alongside a lot of other solutions." Participant, Leeds

A second strand of argument around alternative technologies concerned the extent to which renewables can provide a secure source of energy, reducing the need for new nuclear stations. A number of stakeholders noted that the UK has the best wind resources in Europe, and energy policy should be more focused on using wind as a major source of energy. Others suggested harnessing tidal power as a way of producing clean renewable energy.

Related to this debate were discussions around the extent to which renewables have the potential to provide a continual 'base load' of energy generation. Those who favour nuclear generation argue that nuclear has the potential to provide a consistent base load, supplemented by renewable energy sources to provide flexibility for fluctuating power demands.

"Nuclear can provide a reliable base load in a way that renewables cannot." Participant, London

Other stakeholders argued that it would be possible to develop a sufficiently reliable base load from renewable energy sources alone, reducing the need for new nuclear stations. A number also pointed to Denmark as an example of a country which managed to maintain a renewable base load supply sourced from renewable energy.

Capabilities

Capacity and resources

A key theme emerging from discussions across the majority of workshops was the issue of technology and skills capabilities. Put more simply, participants addressed the question: *'Is it possible?'*.

A number of meetings raised the issue of skills shortage within the UK. The first dimension of concern was whether we have the skills needed to build and manage nuclear power stations; in Heysham it was suggested that expertise in designing nuclear power has diminished because it has been so long since the last nuclear power stations were built. Participants in Manchester echoed this, noting that the number of engineers training in the field has dropped since the closure of older power stations.

The more general point was made that there is a lack of people with the relevant science and engineering skills.

"The industry has been fragmented; we are a Third World nation when it comes to engineering because of delays." Participant, Wylfa

"I think we face very similar concerns around both engineering capability in the UK and maintenance and operations capability." Participant, Ministerial round table

There was also a concern that the specialist workforce would be insufficient to maintain the necessary levels of regulation and inspection – a view clearly voiced in London and Bristol. Whilst competent regulatory ability was seen as crucial to the question of accepting nuclear in the future, there were concerns as to whether the regulators would have a workforce large enough:

"When I look at the competence and ability in the Environment Agency and the problems they are having retaining sufficiently experienced staff, who quite quickly move on to the nuclear industry once they have been employed by the regulators, part of the confidence issue is to ensure that that is resourced properly, particularly when you are moving into the full scale private operation of nuclear facilities." Participant, London

The other dimension to skills was the time needed to build up the necessary expertise. It was noted that skills and knowledge to build and operate power stations take time to develop and it was therefore seen as essential to invest in human resources now to ensure a skills gap does not develop.

One final issue was how the challenge of accessing sufficient skills could become a growing pressure. One participant commented that as more countries turn to nuclear or expand their existing operations, there will be a

global drain on the skills resource, making the market for those with engineering or technological capabilities increasingly competitive.

There were also a small number of doubts expressed as to whether the UK would be able to access the equipment and materials needed for building new nuclear power stations. A participant in Manchester underlined the issue, commenting that there is only limited global capacity for building components, and many US companies have 'booked space' for new reactors. It was therefore seen as questionable as to whether we would be able to build new stations in the UK, since the components are not readily available.

There were also questions raised about the quality and efficiency of the technology that would be used for any new stations. A participant in Reading referred to technical problems encountered in the past:

"*…it is almost an unsaid thing that the UK nuclear industry has not been all that successful. Our fleet of nuclear power stations has not been that reliable or economic.*" Participant, Reading

In Reading, it was suggested that reprocessing technologies needed to be improved and that, if we have a nuclear future, we would need to adopt a PWR (Pressurised Water Reactor) model, like the system adopted in the United States. The focus on international expertise, technology and design specification was also raised as important considerations for any new nuclear development during the Ministerial round table event:

"*If we are to move forward with new nuclear in the UK it isn't simply doing it in the insular way in which we developed the technology before but, but it is in building on European and global experience in terms of design and in terms of operation.*"

"*It takes about 1,000 man years to certify a design and several hundred million pounds and I suspect some of the suppliers of reactors would not want to be here if they had to build something special for the UK.*" Participants, Ministerial round table

However, there were those who expressed significant confidence in the technological capacity of nuclear in the UK. One participant made the following comment about the technology for nuclear, in comparison with that of alternative energy sources:

"*We know the technology is there for nuclear and can give us the base level of security we need, so would support it.*" Participant, Leeds

Time

Another consistent theme emerging from across the consultation exercises was whether there is sufficient time to build new power stations to achieve the desired aims.

The first issue was whether the new power stations would arrive in time to realise aims in carbon emission reduction targets. For example, in Birmingham, participants were concerned that nuclear power may arrive too late to help mitigate climate change given the duration of the construction process and skills gap.

The need to move quickly on a decision on how to manage waste was also stressed as an imperative. Overall, there was a sense that the decision to act on waste was also taking too long:

"We know we need to put it in an underground repository - let us start digging the hole." Participant, Belfast

Impatience with the duration of the waste consultation was also conveyed:

"There is a duty here for the Government to conclude the consultation and make a decision." Participant, Bristol

Finally, the concern was expressed that any delay in action over nuclear power will risk the loss of UK nuclear skills to retirement and to other countries that will begin looking for skills in nuclear power.

Regulation

Effective regulation, ensuring the right safeguards and environmental and social outcomes was seen as a crucial pre-requisite for any future nuclear industry in the UK.

Health and Safety

There were frequent expressions of confidence in the regulatory frameworks for health and safety. Across most of the sites, the UK's regulatory environment was considered good, with an expression of confidence in on-site safety levels, including high levels of trust in the regulation of design. It was stressed that the UK operates within IAEA (International Atomic Energy Agency) guidelines and has a much better safety record than in other industries such as coal.

"The Chernobyl-type accident…is physically impossible in reactors built in accordance with the international regulation for the design of reactors." Participant, Glasgow

"With regard to safety, I don't believe there is an industry in the world, other than the nuclear industry, that has a focus on safety as tight as the nuclear industry does." Participant, Ministerial round table

A number of participants also believed strongly in high levels of safety around handling nuclear materials; one Reading participant emphasised how heavily regulated the industry has become since Chernobyl.

"I can assure you that we are very heavily regulated and, in fact, week by week we have to do an inventory….Since Chernobyl, we have the International Nuclear Power Operators Association (IMPOA), the World Association of Nuclear Operators (WANO) all linked." Participant, Reading

Indeed, some felt that health and safety controls were excessive. There was one suggestion in Leeds that a reduction in safety criteria would be an advantage as it would make the market more attractive to investment. Meanwhile, in Bristol, expenditure on mitigating risks to human life was considered disproportionately high for nuclear, compared with other areas requiring significant risk mitigation, such as road safety.

However, these views were countered with concerns that there were insufficient inspection powers in the current regime and that the regulatory framework for health and safety was not foolproof:

"How do we prevent them being persuaded by operator interests [sic]. *Human fallibility may lead to shortcuts being taken."* Participant, Leeds

"The history of regulation of multinational companies is not actually very reassuring because regulations and inspections can be circumvented." Participant, Nottingham

Moreover, participants at the Ministerial round table discussed potential, future, regulatory body requirements relating to the needs of the nuclear industry:

"Ofgem has got to be reformed to take a longer term future, it has probably also got to take into account heat, not just gas and electricity"

"There should be an energy agency because there are concerns still that different political parties have different views about things." Participant, Ministerial round table

Overall the majority view was that, whilst the regulatory environment in the UK is currently of a high quality, any future nuclear industry would need to operate under the most stringent regulatory criteria:

"Nuclear power can be made safe but needs strong Health and Safety framework", Participant, Leeds

Meeting environmental objectives

Regulation was also seen to play a key role in ensuring that progress with renewables and other clean energy sources is not compromised by pursuing a nuclear path.

As has been discussed in the previous chapter, there was a high level of support for renewables and concerns that investment and relevant skills would be diverted away from research and investment in this area, if new nuclear

plants are built. There was therefore the suggestion that regulation should have a role of redressing the balance between energy options by legislating for companies in the nuclear industry to invest a certain percentage of their profits in renewables.

There was also a desire that, if the use of nuclear generation is increased, it would not encourage undesirable behaviour such as high levels of consumption and inefficient energy use.

"Once we get an option like nuclear on the table, everyone sits back and relaxes and thinks we have solved the carbon problem and that we can keep the lights on all night..." Participant, Belfast

There was therefore a desire for regulation outside of nuclear that promoted reduction in consumption and greater energy efficiency.

Ownership

In a few instances the question of ownership of power stations was raised, with one participant urging for clear policy on ownership. There was a view that:

"The Government ought to impose tight conditions on ownership, both initial and thereafter, of all nuclear power stations - a very tight selective list". Participant, Leeds

However, this was not a unanimous view; another participant felt that if a company passes normal planning considerations, they should not be stopped.

Part of these discussions centred on how possible it was to control private companies through regulation. One participant in Cardiff felt that international private companies would be difficult to regulate, whereas in Nottingham an alternative view was offered: it was seen to make no difference whether companies are national or international, if controlled by stringent local regulations.

Social responsibility

The final area where participants expressed an interest in regulation, was in achieving desirable social outcomes in relation to the introduction of new nuclear power stations.

At Hinkley Point, for example, one participant expressed the need for change to the planning regulations to give local people more of a say. Moreover, a participant at Heysham was worried that future planning may take place more behind closed doors due to increased security threats.

Waste

Waste emerged as a key concern for many participants. Discussions ranged from the immediate need to manage existing waste, the long term solutions for waste and the waste conditions under which new power stations would be acceptable.

"The Government has got an enormous task on its hands to convince people that the waste disposal issue is being progressed properly and is not going to be left hanging around for another couple of decades." Participant, Ministerial round table

Immediate solutions

A number of participants believed the current waste storage situation to be inadequate. One participant commented that there may be twenty existing sites with intermediate waste:

"This does not give the public confidence that we have the complete cycle or complete solution." Participant, Reading

There was therefore a desire for a swift action on addressing the need for a long term depository for storage:

"Any attempt to fob off with temporary storage being satisfactory is a no-no." Participant, London

Much of the discussion around finding a more secure long term solution focused around building a repository, which many were in favour of. However, at Heysham one participant suggested that local communities want waste stored on the surface, so it can be monitored more easily.

Future management

Participants at a number of different locations highlighted the level of uncertainty surrounding the issue. First, it will last for more than 1000 years; a timescale difficult for many to grasp:

"Beyond human comprehension." Participant, Sizewell.

Secondly, questions remain as to its future impact, location, lifespan and how it may be used.

Some participants believed technology would be able to solve the issue of waste by either reprocessing or disposing of it safely. It was suggested that the waste could be used to make more energy in breeder reactors or if advances are made in nuclear fusion, it could lead to neutron bombardment that could be used to make waste safe. In this scenario, caution was urged for those who assumed waste would be around for thousands of years:

"The idea is you store it until such a time that technology can allow you to deal with it.", Participant, Reading

However, others were less comfortable about relying on technological advances that had yet to be realised, presenting the difficulty of radioactive waste that would require long-term management.

"…one of the major reasons why it is such a controversial technology is that no one has yet produced a safe way of managing the waste, which we know does not break down within any sensible period of time..." Participant, Manchester

This argument overlapped with another one as to whether waste should be retrievable – some felt that the waste must be made retrievable, so it could either be reprocessed or effectively disposed of if the technology becomes available.

"What is critically important for future generations is the ability at some point to retrieve that waste, to retrieve that fuel."

"When you recycle spent fuel, not only do you enormously increase the future energy supplies but you reduce the storage volumes and costs by something like a factor of four, so there are strong arguments for recycling in the longer term." Participants, Ministerial round table

However, this was considered a risk as much as potential benefit; if retrievable it would also be more vulnerable to a terrorist attack.

For others, the long term management of waste was a less weighty part of the argument. In Belfast and Torness it was mentioned that we are already dealing with the legacy of the whole industrial revolution and we have legacy waste from existing stations. Moreover, it was commented that second generation reactors would produce less waste than existing reactors and would therefore only increase the waste burden by 7%. For these few participants, future waste was seen as less of a consideration.

Conditions for waste

Given waste was such a key area of debate, participants were very keen that legislation around the issue was tight and clear.

One condition that recurred a number of times was that any new nuclear power stations should not be built until there is a safe way of dealing with waste. In Nottingham, it was suggested that the policy decision is being made backwards – that a resolution on waste should come before a decision to open new power stations. Elsewhere, it was considered a crucial pre-requisite for any new nuclear plants being built:

"We generally came to the conclusion that construction of new nuclear power plants should be conditional on the Government getting moving on building a deep geological depository." Participant, Leeds

Others suggested softer conditions; they would accept new power stations, so long as there was clear policy on waste management. This was echoed at Leeds, although it was felt standards for waste management would need to be made on a global scale.

Who and How?

While a few delegates felt that that energy security is too important and nuclear too risky to be left to the market (both in security and diversity of supply terms), there was a majority view that given the extent of investment required, new nuclear build should be financed privately.

With this, many stakeholders expressed considerable concern that investors must cover the full costs of power generation, including decommissioning, long term waste management, and contingency for unforeseen risks. There was widespread agreement that costs should not be passed on to the tax payer, present or future. This said, many recognised that such costs are difficult to assess and allocate. Some thought that public subsidy at some stage of the nuclear cycle was inevitable.

There was some discussion about whether issues of safety and security should be left to the market, and whether the private sector can be trusted to manage radioactive waste effectively in the long term. Regulating international investors was a particular concern, which some perceived to be more challenging than regulating national companies. A view was expressed that there should be tight conditions on ownership, and a restricted list of potential investors for nuclear new build. Investor transparency was a key concern for several delegates, who felt that the public would need to know who owns and controls the companies involved.

Finally, aside from the new plants themselves, there was a common view that the deep geological depositary solution under discussion should be managed by a public body rather than the private sector.

Accounting for the full costs of nuclear power generation

Whilst a considerable degree of consensus was reached about the 'polluter pays' principle, there was little agreement about what exactly the 'full costs' of nuclear power generation are, and how the costs of new build should be allocated to industry. Several delegates argued that the there are numerous hidden costs, and that importantly, the long term costs of nuclear are fundamentally unknown.

"*How can we know how much it will cost over the thousands of years that waste needs to be managed?*" Participant, Belfast

"*Nuclear is astronomically expensive*." Participant, Bristol

Nevertheless, the principal costs discussed were decommissioning procedures, long term waste management and dealing with unforeseen hazards in the future. Establishing a mechanism for industry to meet these costs, if permitted to construct new nuclear generation facilities, was a priority for many. There was

considerable debate about how this would be achieved in practice, particularly given the long legacy of radioactive waste. Several participants believed that the current regulatory structure for nuclear power generators in the UK is working well, and that as a result, the nuclear industry is in fact the only power generation industry that does cover all of its costs.

"It is a disingenuous argument to say that nuclear is not paying its costs. It is the only power that internalises and pays for its clean-up costs, because it is made to do so by legislation." Participant, Bristol

Other participants disagreed, arguing that many of the long term costs of nuclear power generation are insufficiently accounted for at present.

Discussions about systems for establishing future costs focused around decommissioning, and establishing some kind of "ring-fenced", publicly controlled decommissioning fund or bond. Some proposed that investors should be required to pay into such a fund in proportion to the amount of electricity generated. Several analogies were made with pension funds. The eventual size of this fund was debated; concern was raised that the amount set aside for existing nuclear facilities was insufficient.

"We have a major decommissioning programme running through the UK and the money is starting to dry up." Participant, Glasgow

Delegates discussed whether such a mechanism will work in practice in the long term, and there was a considerable amount of cynicism that the tax payer is sure to pick up the bill eventually. There was also concern about whether the Government can be trusted not to 'plunder' the fund; again pension funds were cited as an example.

"I cannot believe that the private sector will pick up this bill for such a length of time." Participant, Belfast

"Is the private sector really prepared to take on the open-ended responsibility for maintaining and looking after nuclear power sites once they have been decommissioned, or will that be a responsibility that will fall back on the taxpayers?" Participant, Cardiff

A mechanism for insuring against future risks was also thought to be important. Whilst some accepted that certain risks (such as early closure) will have to be underwritten by the Government, many felt that Government indemnity and get out clauses are unacceptable. The particular concern at many events was that the taxpayer would take the impact of any bankruptcies. There was an additional comment that an entirely separate debate is needed about the role of the insurance industry.

Several argued for the pressing need for potential investors in relation to financing future costs and risks and clarity from the Government at the outset about when and how it does intend to intervene, and when it does not.

Achieving the desired energy mix through the market

Various concerns were raised by delegates about whether and how the desired energy mix would be achieved through the market. First, there were a number of challenges to the assumption that companies will automatically invest in nuclear if given the option – how attractive an option is it? What are the incentives? There was a fear that forcing companies to pay the full decommissioning and long term waste management costs could be off-putting. Others remarked conversely that there are already several investors waiting for the green light from the Government. Nevertheless, further information about the future price of carbon would provide more certainty for potential investors.

Assuming that companies do come forward and that new build goes ahead, participants were divided about whether the private sector can be left to deliver a sufficiently diverse energy mix. Some were fully confident that setting up the market and letting industry get on with it is the best way to achieve an appropriate supply mix.

"*We [suppliers] all have drivers to develop a balanced portfolio and I do not think any of them would swing [us] completely nuclear.*" Participant, Cardiff

However, others felt that assuming the private sector will produce a diverse supply without public sector intervention is naive, believing that companies will simply invest in solutions that provide the maximum short term return.

"*Ever since privatisation, when we lost the planning concept for the industry, investors have been able to respond only to short term signals.*" Participant, Reading

In particular, there was concern that investment in nuclear would take investment away from renewables; continued Government support for this sector was felt important by many. Some delegates believed that the Government is shying away from its responsibility to ensure a diverse energy mix. They argued that it is unethical to leave such an important issue to market outcomes, and, at a minimum, the Government needs to send more long term signals to the market. Participants pointed to ongoing state involvement in the energy industry in countries like France.

The ministerial round table acknowledged the need for Government involvement, stressing that it should play a key role to play in any future carbon pricing mechanism.

Siting new build

While a separate consultation for the issue of siting ran in parallel to this consultation, there was some discussion about the issue. There was fairly extensive support for giving a preference (though not a requirement) to building on existing sites, especially from stakeholder groups at existing sites.

Nevertheless, a few queries were raised about the way in which future decisions about siting would be made. As already mentioned, at one on-site event, it was commented that the planning regulations need to change in order to give local people more of a say in decisions relating to their community. It was also remarked that there would be likely to be opposition from the Welsh Assembly Government to further nuclear sites in Wales.

"There is a lot in the field of ethics to discuss about siting, whether or not a decision would be imposed one way or another." Participant, Cardiff

Finally, there was concern that any new build should take into account the consequences of future climate change, in particular sea level rise, as many existing coastal sites are considered to be very vulnerable.

Communications & education

Many participants believed that nuclear's poor image is a problem, but that public buy-in is essential for a pro-nuclear decision.

"If the public does not own the policies, it does not really matter what this consultation comes out with." Participant, Glasgow

Some were concerned about the lack of transparency and honesty in the Government's communications about new build to date. Others felt that the media has unfairly demonised the industry.

"There is growing distrust in the population of, not just politicians, but of people who peddle information." Participant, Cardiff

Nevertheless, it was largely agreed that communications with the public about new build must be carefully managed. There is a need to be as open as possible, and importantly to avoid defensiveness. Some believed that 'over-egging' nuclear's role in 'solving' climate change risked stirring up further cynicism.

A proactive education strategy amongst the general public about the real risks of nuclear was thought to be an essential parallel activity alongside any new build for many, including specific efforts to rebuild trust amongst the media. British Energy's site visits in the past were put forward as good practice. It was also recognised that there is a need for education about energy supply more generally, including renewables, and importantly about energy conservation. There was a suggestion that education initiatives should be funded by industry itself. However, many participants at the ministerial round table agreed that there was an important role for Government to play in terms of facilitating debate, ensuring the provision of adequate safety procedures and addressing issues of waste and decommissioning.

"I used to be totally against nuclear, however through being educated about the challenges that we face, our energy requirements, carbon dioxide goals

and the real truth about nuclear plants – I am very clear we need to move forward on the nuclear issue and the more people that get educated the better." Participant, Wylfa

The above speaker suggested consultation plays a key role in this sort of education.

Other parallel activities

A number of activities in parallel to new nuclear build were thought essential by different participants. First, many felt that the highest health and safety standards should be maintained, although a minority believed that these are in fact already prohibitively strict. Progress on waste was key for many, although opinion was divided about whether a long term solution should be in place before new build commences, or whether plans for one to be built are sufficient.

More extensive and effective demand side initiatives were a crucial aspect of any justification of new nuclear build for a significant number of delegates. Similarly, ensuring that further nuclear provision does not discourage people's efforts to change their behaviour in relation to energy use was a considerable concern. There was a fear that presenting nuclear as a 'solution' to climate change could set back demand reduction efforts. Ongoing investment in renewables, and ensuring that funds are not diverted by nuclear, was also a vital condition for many. However, several participants believed that maintaining the renewables obligation for power suppliers will guarantee future investment in renewables supply solutions, and therefore that it should stay in place.

Those in the 'reluctant supporters' camp were essentially keen that nuclear be seen and presented as a "regrettable" interim. Therefore it was important for them that the Government defines the maximum proportion of electricity that can be generated through this means.

Key Emerging Themes

As the discussions above illustrate, participants expressed a broad range of opinions around the advantages and disadvantages of nuclear new-build. We have identified the key themes emerging from this analysis, outlined below, which reflect the most commonly articulated perspectives from stakeholders.

We note, as explained in the introduction and as is common with reporting of events of this kind, that it is not possible to assess the overall balance of opinion amongst participants from the written outputs. The events were designed to enable people to express un-attributed view points, and to ensure they could speak as openly as possible. This does mean that we are unable to identify who is speaking, and who, on the other hand, is choosing not to speak. Below we outline what we believe to be the most salient points from the nuanced conversations that we studied.

Overall, most stakeholders who contributed to the discussions appear to agree with the first two questions discussed at the events – that tackling climate change by reducing carbon dioxide emissions both within the UK and abroad, and ensuring secure, clean and affordable energy as we become increasingly dependent on imported fuel are the key issues that energy policy should focus on.

However, agreement with the long term energy challenges does not equate to advocacy of new nuclear investment for all stakeholders. Indeed opponents of expanding UK nuclear capacity often argued that it is possible to achieve energy security and reduced CO_2 emissions using other technologies – particularly via further investment in renewables. While there was considerable (though sometimes reluctant) support for allowing private companies to invest in new nuclear new build, it is clear that stakeholders are by no means entirely aligned on the issue. For some, nuclear new build was an obvious and straightforward solution. Others saw numerous potential problems with further nuclear build, but accepted that it is a necessary interim solution.

In the following, we outline key areas where there was alignment amongst stakeholders, and key areas where debates were not resolved.

Key areas of stakeholder alignment

- Stakeholders from a range of perspectives agreed that the Government needs to make a decision on the future of energy policy as soon as possible. A number of stakeholders were concerned about an impending 'capacity gap', fearing that the amount of energy generated will not be able to keep up with demand. Many stakeholders made the point that uncertainty around the direction of future policy and regulation creates ambiguities and challenges for the different bodies and organisations involved.

- The importance of continuing to invest in renewables was emphasised by participants of all viewpoints. There was a clear sentiment at events that any further investment in nuclear should not result in a decrease in investment in renewable energy sources.
- Many participants felt that any decision on the future of nuclear power should be taken in the context of an increasing focus on reducing energy demand. Investment in nuclear power should not divert attention from the importance of actively reducing our energy demands.
- Many participants were comfortable with the safety restrictions in place on the nuclear industry, and the level of concern about a terrorist attack on UK nuclear facilities was relatively low. Nevertheless, an ongoing programme of independent scrutiny and inspection was for most participants a condition associated with building new nuclear capacity.
- While there was not full consensus about how nuclear new-build could be financed (see below), an important condition for all if the private sector were to go ahead was that the industry should not be subsidised by Government in any way, and that the full costs of decommissioning and waste storage should be borne by the private sector.

Key areas of stakeholder non-alignment

- Whilst a majority believed that nuclear new-build should be financed privately, there were a range of views about whether this should fundamentally be a private or public endeavour. There were also lengthy discussions around the extent to which it is possible to accurately calculate the cost of storing nuclear waste for very long periods of time, and disagreement about whether companies would be accountable in the long term.
- There was disagreement among stakeholders about the extent to which the private sector will provide the diverse energy mix required without Government intervention. Some argued that the private sector will tend to invest in generation capacity which they view as most likely to provide the best return on capital, and currently there are too many uncertainties surrounding nuclear investment to make it an attractive proposition. Others suggested that a greater clarity of the Government's position on nuclear power would lead to further private sector investment.
- There were a range of opinions around the extent to which the UK has the capacity to deliver a new nuclear programme. Concern about a skills gap developing in the nuclear industry was mentioned by a number as having the potential to undermine future nuclear new-build.
- Successful management of nuclear waste was a significant issue for stakeholders. Many felt that without a long term depositary for the UK's existing nuclear waste in place, it was unacceptable to invest in new nuclear plants. Others argued that temporary storage of nuclear waste has proved to be safe to date, and so there is less urgency about the need to find a permanent solution to nuclear waste disposal.

- There were also a range of opinions about the risks associated with building new plants. While some participants emphasised the fact that new reactor designs are safer than those currently in operation with less changes for critical failures, others pointed to the dangers posed to new and existing plants by rising sea levels.
- There was disagreement about the extent to which nuclear power plants present a health risk to local communities. Some argued this is an area which merits more investigation, while were adamant that nuclear power plants pose no health threat.
- Finally, the ethical differences between stakeholders varied considerably; both in terms of the definition of 'ethics', as well as what constituted ethical behaviour in relation to nuclear. This meant that both proponents and those opposed to nuclear claimed their position was the most moral one, arguing in each case from their own definitions of morality.

Appendix 1 - Agenda

09:30 Arrival, registration and coffee

10:00 Welcome, introductions and why we are here

10:10 Nuclear consultation – a presentation on the nuclear consultation process followed by Q&A

10:25 Considering whether new nuclear build should be an option as part of the future energy mix - introductory presentation followed by discussion

11:20 Nuclear safety and waste – introductory presentation followed by discussion

12.15 Final considerations

12:30 End of meeting, informal buffet lunch

Appendix 2 - Proforma

BERR Nuclear Consultation
Table facilitator proforma
July 2007

Timing	Facilitator notes	Comments
09:30-10:00am	Confirm table layout, computer set-up Introduce yourself to participants and your role as table facilitator Confirm that you will be keeping a note of the comments and key themes that are raised as part of the table discussions – this will be reviewed as part of the analysis of the day	*No comments needed*
10:00-10:10am	Welcome Hergen Haye, Director of Public Engagement, New Nuclear *Hergen will ask participants to briefly introduce themselves to each other on tables during this period*	*No comments needed*
10:10-10:25am	Presentation – Overview of	*No comments needed*

Timing	Facilitator notes	Comments
	consultation process Hergen Haye *Plenary discussion on overall process, facilitated by Hergen*	
10:25-10:35am	Presentation – Considering whether new nuclear build should be an option as part of the future energy mix	*No comments needed*
10:35-11:00am	Table discussion **25 mins (3 questions)** Explain that we have 25 minutes to cover all three questions that have been posed, and that you will ensure that the table spends some time on each. *Read the first question* – Do you agree or disagree with the Government's view on carbon emissions from nuclear power stations? Please ask each participant to explain their response *Prompt - Are there any other aspects of carbon emissions associated with nuclear power that should be considered?*	

Timing	Facilitator notes	Comments
	Read the 2nd question – Do you agree or disagree with the Government's view on the security of supply impact of nuclear power stations? Why do you say that?	

Timing	Facilitator notes	Comments
	Read the 3rd question – Do you agree or disagree with the Government's view on the value of having nuclear power as an option? Why do you say that? *Prompt - Are there any other considerations that we have not discussed?*	

Timing	Facilitator notes	Comments
11:00-11:20am	Plenary feedback and discussion **20 mins** *Facilitated by Hergen Haye* *Comments recorded*	*No comments needed*
11:20-11:30am	Presentation – Nuclear safety and waste	*No comments needed*

Timing	Facilitator notes	Comments
11:30-11:55am	Table discussion **25 mins (2 questions)** *Read the 4th question* – Do you agree or disagree with the Government's views on safety, health, transport and security issues? Why do you say that?	

Timing	Facilitator notes	Comments
	Read the 5th question – What do you think are the ethical considerations related to a decision to allow new nuclear power stations to be built?	
11:55-12:15pm	Plenary feedback and discussion **20 mins** *Facilitated by Hergen Haye*	*No comments needed*

Timing	Facilitator notes	Comments
	Comments recorded	
12:15 -12:30pm	Summary and conclusion **15mins** Led by Hergen Haye *Read the 6th question:* Having considered all the issues, and in the context of tackling climate change and energy security do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations? *Ask each participant for their response to this question and note the answer* Probe – are there any other conditions that you would like to be in place? For example: • Yes, if……	

Timing	Facilitator notes	Comments
	• No, unless….. Possible conditions include: Restricting build to the vicinity of existing sites, or restricting build to approximately that of replacing existing capacity, etc	
12:30	Please ask participants to complete the evaluation questionnaire. *Collect forms and return to lead contact at event* Thank you and close	*No comments needed*

Appendix 3 – Presentation

Objectives

- To enable and facilitate a consultation which meets the commitment of the 2003 Energy White Paper of the fullest public consultation.
- To place the consultation firmly within the wider context of UK energy policy and the challenges of climate change and energy security
- For each strand of activity, to listen to and consider the views of those participating, and to be transparent in the reporting back process

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The nature of the invitation

- The Government has a preliminary view on the future role of nuclear power within the UK energy mix but has not yet decided; this view is that it would be in the public interest to give energy companies the option of investing in new nuclear power stations
- The Government wishes to consult citizens and interested parties for their views and concerns relating to the arguments it has presented
- The Government will consider the views expressed as part of the policy development process and then make a decision

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Consultation Components (1)

- A written consultation document (Welsh, Braille, large print and audio)
- Consultation Website (Dialogue by Design)
- 12 Regional Stakeholder events including the Devolved Administrations

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Consultation Components (3)

- To raise awareness:
  - copy of consultation document & poster to all public libraries
  - Letter and e-mail to five thousand grassroots and community organisations
  - Web search optimisation

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Evaluation

- Independent evaluation of the consultation process - Shared Practice (Diane Warburton)
- Evaluation Report post consultation

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Other work being taken forward

- Government is also carrying out consultations on:
  - Justification Process (closes 10 October)
  - Strategic Siting Assessment (closes 10 October)
  - Managing Radioactive Waste Safely (closes 2 November)
  - Reforms to the planning regime (closes 17 August)
- And is taking work forward on a contingent basis, some further "facilitative" work on:
  - Generic Design Assessment (HSE work on reactor design)
  - Preparation of possible clauses on nuclear waste and decommissioning for the Energy Bill

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Post Consultation

- All responses published after consultation closes
- Government will consider all responses before taking a final decision on the future of nuclear power in the UK

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The energy challenge

The challenge is two fold:

1. Problem of climate change
   …and what has this got to do with energy?

2. Energy security
   …so why is this changing?
   …and what does this mean?

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Meeting the energy challenge

May 2007 Energy White Paper

- White Paper includes:
  - How to use less energy
  - More local energy production
  - Central role for renewables
  - Invest in new technologies
  - Consultation on nuclear
- Policy in a nut shell: energy mix
  We need as wide a choice of low-carbon options as possible…

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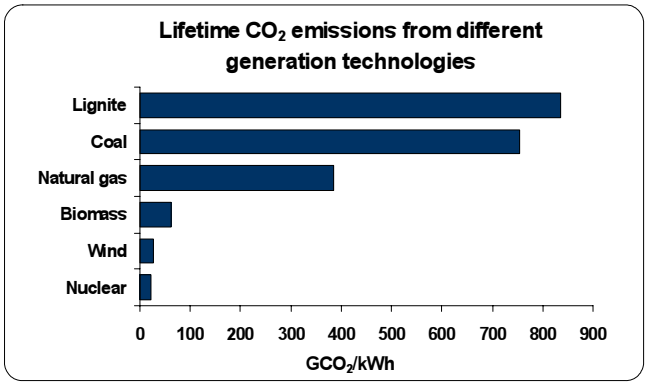
Nuclear power and carbon emissions

- All methods of generating energy create some carbon emissions



- The contribution nuclear could make to tackle climate change depends on a number of factors, but is potentially substantial

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Nuclear power and energy security

- Government objective: secure, reliable energy supply
- **Uncertainty** means we need **diversity**
- Characteristics of nuclear
  - Fuel supplies
  - Construction and operation (baseload)
  - Proven, mature technology that can be deployed on a large scale
- Not allowing energy companies to invest in new nuclear would increase our dependence on fewer technologies and expose the UK to security of supply risks

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So, is there an alternative?

- Context – climate change, energy security and inherent uncertainty
- Government view is that there is no single solution to meeting the UK's energy goals.

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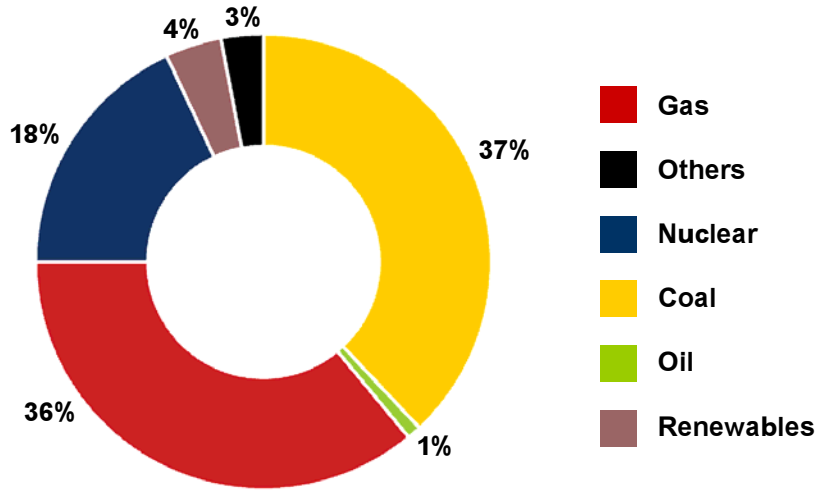
Current UK electricity generation mix



Source: DTI, 2007

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What are the options?

- Energy efficiency and demand reduction
- Low carbon electricity generation technologies

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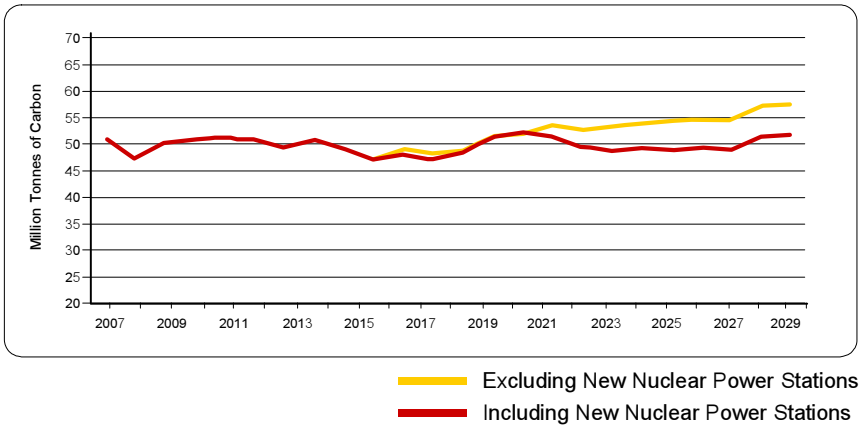
Scenarios

Chart 5.5 - Carbon Emissions from the Power Sector including and excluding new nuclear power stations



Source: Redpoint Energy, 2007

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Over to you… we are listening

- Do you agree or disagree with the Government view on carbon emissions from nuclear power stations?
  Why?
- Do you agree or disagree with the Government's views on the security of supply impact of new nuclear power stations?
  Why?
- Do you agree or disagree with the Government's views on the value of having nuclear power as an option?
  Why?

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Nuclear Safety and Waste

Nuclear Safety

There are five main safety issues:

- Exposure to radioactive materials
- The threat of a major nuclear accident
- The threat of terrorism, sabotage and/or weapons proliferation
- The potential impact of a natural disaster
- The transport of nuclear materials

Nuclear Waste

A decision to build new nuclear power stations would result in new nuclear waste being produced. Government needs to consider:

- Whether the creation of new nuclear waste can be ethically justified?
- How does Government reduce the risk that the taxpayer is called upon to cover the costs of waste and decommissioning in future?
- How does Government ensure that managing and disposing of new waste would not pose significant problems in future?

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Ethical Considerations

- Government need to strike a balance between the creation of new nuclear waste against the risk of failing to meet the challenges of climate change and energy security
- The Government has taken a preliminary view that the balance of ethical considerations does not require ruling out the option of new nuclear power

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Financial Protection

- Many of the UK's existing nuclear facilities were built with a focus on construction and operation rather than on waste management and decommissioning
- The Government is planning to impose responsibility for the cost of waste management and decommissioning on the energy companies that invest in new nuclear build
- To do this, it would introduce legislation to ensure that the private sector set aside funds to cover the costs

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Managing & Disposing of New Waste

How is the government planning to manage new waste?

- The Government has accepted the recommendation of the Committee on Radioactive Waste Management that existing higher activity waste should be safely stored and then disposed of in a geological repository
- The Government believes that spent fuel from any new nuclear power stations could be dealt with in the same way

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Over to you… we are listening

- Do you agree or disagree with the Government's views on safety, health, transport and security issues?
  Why?

- What do you think are the ethical considerations related to a decision to allow new nuclear power stations to be built?
  Why?

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...And finally

- In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations?
- Are there any conditions that you believe should be put in place before giving energy companies the option of investing in new nuclear power stations?
  (For example restricting build to the vicinity of sites, or restricting build to approximately replacing the existing capacity?)

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Appendix 4 - Diary of Events

July

Mon 23	Regional stakeholder meeting	Newcastle (NE)
Tues 24	Regional stakeholder meeting	Leeds (Yorkshire)
Wed 25	Regional stakeholder meeting	Manchester (NW)
Thurs 26	Regional stakeholder meeting	Birmingham (East Mids)
Fri 27	Regional stakeholder meeting	Cambridge (East of Eng)
Mon 30	Regional stakeholder meeting	Bristol (SW)

August

Wed 15	Meeting with existing community groups: Hinkley Point Opportunity to hear from those who live and work near existing sites
Fri 17	Meeting with existing community groups: Heysham Opportunity to hear from those who live and work near existing sites
Mon 20	Meeting with existing community groups: Dungeness Opportunity to hear from those who live and work near existing sites
Thurs 30	Meeting with existing community groups: Hartlepool Opportunity to hear from those who live and work near existing sites
Fri 31	Meeting with existing community groups: Sizewell Opportunity to hear from those who live and work near existing sites

September

Wed 12	Regional stakeholder meeting	Nottingham (East Mids)
Thurs13	Regional stakeholder meeting	London
Fri 14	Regional stakeholder meeting	Reading
Mon 17	John Hutton: Ministerial roundtable meeting Opportunity for Ministers to speak at a high level to key stakeholders on the consultation	
Mon 17	Regional stakeholder meeting	Belfast (Northern Ireland)

Wed19 Regional stakeholder meeting Cardiff (Wales)

Thurs 20 Stakeholder meeting Carlisle (at the invitation of local faith groups)

Fri 21 Regional stakeholder meeting Glasgow (Scotland)

Tues 25 Meeting with existing community groups: Hunterston
Opportunity to hear from those who live and work near existing sites

Wed 26 Meeting with existing community groups: Torness
Opportunity to hear from those who live and work near existing sites

Thurs 27 Meeting with existing community groups: Wylfa
Opportunity to hear from those who live and work near existing sites

October

Wed 03 Meeting with existing community groups: Bradwell
Opportunity to hear from those who live and work near existing sites

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