

# **Public Opinion on Energy Research: A Desk Study for the Research Councils**

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## **1 Introduction**

This study was commissioned by EPSRC on behalf of the UK Research Councils to inform the development of their funding strategy in the area of energy technology research. Accordingly, the study investigated recent surveys on public attitudes to energy technologies in the UK. These surveys constituted the principal mechanism for exploring public attitudes - other techniques such as focus groups were used but to a more limited extent (and are the subject of other studies for the Research Councils). This study relies mainly on the quantitative results of the available research, seeking to provide an overview of the characteristics and evolution of British public attitudes in this area.

The study is based on surveys and opinion polls from 2000 to 2005 covering the UK public as well as various articles and presentations which draw upon such research. The main source for data gathering was a thorough internet search. In the case of insufficient information in the internet some institutions were contacted and asked to provide more information or the full set of data of unpublished surveys. In this respect the authors contacted BNFL, Greenpeace, MORI, RSPB and BWEA.

The study is structured as follows. First we briefly discuss some of the concepts and debates concerning the political and policy significance of public attitudes and opinion. Our aim here is to provide some context which we believe is useful for interpreting and understanding the results of the various surveys. We then provide some general information on the range of studies consulted and some of the general characteristics of those studies (methodologies, samples, scope, etc). The following substantive analysis of the surveys proceeds by first examining evidence on general levels of understanding about energy issues amongst the UK public, then outlining attitudes to different electricity generation sources, preferences for future energy generation and trends in these attitudes over recent years. The next section discusses potential explanations for differences in public attitude and opinion towards energy technologies such as proximity to energy generation technologies, national and regional surveys, political background, age, gender or social class. We conclude by providing a summary of the results, by drawing upon some of the earlier conceptual discussion to interpret their significance and by considering the implications of our findings for future research.

## **2 Theoretical Context**

In order to put into context the results of our analysis we begin by reviewing some of the concepts and debates which have emerged regarding public attitudes and opinion and their relationship to politics and policy making, particularly in apparently “technical” areas such as energy policy, research and technology. Ascertaining the public’s attitudes to energy technology through such methods as surveys and opinion polls can be regarded as an example of consultation which is itself part of a broader process of political communication.

Political communication - by which we mean the dynamics of communication between politicians and policy makers on the one side and the public on the other with

other participants such as interest groups, NGOs and the media involved - is arguably as old as political engagement but it has become more substantive and nuanced with the advent of representative democracy in the late 19th century. In the 20th century opinion polls emerged as a key mechanism of political communication (though they had their origins in the development of market research techniques). Gauging public opinion on matters of politics and policy has developed as an apparently significant political factor, being used both as a mechanism of political intelligence gathering (feedback) and as a strategic instrument to reinforce or shift public attitudes. (Parsons 1995)

The use of opinion polls and their role in political communications and the policy process more generally have been contested issues and raise important questions about the relationship between public opinion and public policy (Page and Shapiro 1983; Burstein 2003). Some advocates of polls saw them as playing a valuable role in democratic societies by feeding back public attitudes on the performance of governments and the policies they pursue. However this essentially pluralist view was also criticised from a variety of vantage points. For some, opinion polls - particularly if viewed as an active technique for informing policy - could be a dangerous mechanism giving too much weight to what they regarded as a self interested, short termist and poorly informed general public. Others saw them as manipulative mechanisms to be deployed by the political and economic elite to sway the public and legitimate the status quo, thereby limiting the possibilities of political or policy change (Henn 1998).

Without necessarily adhering to any of these positions it is possible to say that each raises important questions about the role of opinion polls and the significance of their findings. What are the biases inherent in the process? Who commissions them and for what purposes? How knowledgeable and engaged are the polled? How are opinions formed and shaped by campaigns, media etc? How reflective are those views of public opinion? Should such expressions of public opinion feed back into policy making? Such questions should be borne in mind in any interpretation of opinion polls. In order to make sense of these issues, and to put the results of polls into perspective, it is useful to draw on some of the concepts developed by students of political science and public policy. Amongst these, the concepts of agenda setting and salience are of use in putting the results of polls into perspective.

Agenda setting refers to the way in which different players in a particular policy area seek to shape or shift priorities. At the core of the idea are the issues of "venue" and "image", in other words the contexts within which policy is made and the status of particular policy options. (Baumgartner and Jones 1991; Parsons 1995). Agenda setting will involve the use of a variety of techniques to raise the profile and acceptability of particular policy options through a variety of political strategies (lobbying, the use of the media, public campaigns, etc).

Agenda setting to some extent is concerned with raising the political salience of particular issues and options in the perceptions of the public. Salience effectively refers to the importance which voters attach to an issue, and how far it will determine how they vote. Thus public opinion polls may reveal particularly strong responses for or against an issue but the issue itself may not rank very high in the voters' own political priorities (Wleizen, forthcoming). The extent to which issues acquire

salience will in part depend on their “proximity” to the public or parts of the public, i.e. how far citizens are directly affected by the issue.

Where public opinion does not rate an issue as salient (or where there are marked divergences in the extent to which issues are regarded as salient) it might be questioned whether polls are the best way to explore public attitudes. Moreover, respondents to polls might lack a sufficient level of understanding and knowledge to provide well-founded public attitudes that constitute valuable input to public policy processes. In such circumstances more in-depth techniques such as focus groups, citizens’ juries or other deliberative mechanisms may be better at getting an informed public opinion (though this of course begs the question of how representative such opinions might be).

Thus in considering the results and potential usage of polls it is worth taking into account both the factors which may shape particular responses and the relative significance which should be attached to those responses. In this light it is important to bear in mind the way in which polls are framed particularly in terms of question wordings, background information, etc and to consider whether such polls are the most appropriate approach to adopt.

### **3 General Overview**

This desk research is based on a review of over 30 studies which have been conducted since 2000 (see Table 1). All of these studies deal in part or in whole with public attitudes to energy technologies and their acceptability. A number also deal with perceptions of energy technologies and how they contribute to energy policy objectives as well as with public understandings of those technology and policy issues. We also deal with these latter factors given their relevance to the shaping of public opinion on future energy technologies.

The amount and quality of the material available varied considerably. In some cases we were able to draw upon detailed survey results with disaggregated data on issues of age, gender, location etc. In other cases we were able only to draw upon aggregate data or even headline results. In some cases, however, what such data lacks in depth is at least partly compensated for by an element of trend analysis (Section 4.4).

In terms of the individual surveys and presentations, almost all were carried out by the various polling organisations (MORI, ICM, NOP, Populus). In terms of who commissioned the surveys, the media accounted for 6 (4 TV, 2 Newspapers), government accounted for 11 (2 EU, 4 national, 7 regional/local), NGOs / academia accounted for 6 and industry groups accounted for 10 (see Table 1).

**Table 1: Overview: Surveys/Polls on UK Public Attitudes to Energy Technologies**

<b>Title of surveys/polls</b>	<b>Year</b>	<b>Commissioned by</b>	<b>Prepared by</b>	<b>Covered energy technologies</b>	<b>Level</b>	<b>Info available</b>
<b><i>NGOs / academia</i></b>						
RSPB Market research project 0136: The GB public's views on energy issues	2001	RSPB Market Research	BMRB	all	national	full report
Hartlepool Nuclear Power Station	2002	Greenpeace	ICM Research	nuclear renewables	local	full report
(no title)	2002	Greenpeace	MORI Social Research Institute	renewables nuclear	national	summary
Public attitudes to wind energy in Wales	2002	Friends of the Earth	Market Research Wales Ltd	wind	regional	full report
Wind Farms Survey	2004	Greenpeace	ICM Research	renewables	national	yes
A Survey of Public Attitudes towards Energy & Environment in Great Britain	2005	MIT	YouGov	all including carbon capture and storage	national	full report
<b><i>Industry groups</i></b>						
Lambrigg Wind Farm - Public Attitude Survey	2002	National Wind Power	RBA	wind energy	local	summary
(not title)	2003	BWEA	Ipsos	wind	national	full report
Wind Power Research	2003	BWEA	Capibus	wind	national	details
The Wind Tracker	2005	BWEA	NOP World	wind	national	summary
Wind Farms Wales	2005	BWEA	NOP World	wind	regional	summary
Renewable Energy Survey	2005	Scottish Renewables Forum	NOP World	renewables	regional	summary
BNFL survey	various	BNFL	MORI	energy	national	Knight (2004)
General Public Corporate Image	2003	BNFL	MORI	focus on nuclear	national	Knight (2004)
General Public Corporate Image	2004	BNFL	MORI	focus on nuclear	national	Knight (2004)
<b><i>Government</i></b>						
Public Attitudes towards Wind Farms in Scotland	2001	Scottish Executive	System Three Social Research	wind	Scotland	summary

Public Attitudes to the Environment in Scotland 2002	2002	Scottish Executive	Social Research/George St Research	energy	Scotland	summary
Public Attitudes Towards Renewable Energy in the South West	2003	Regen SW	MORI	renewables	regional	full report
Attitudes and Knowledge of Renewable Energy amongst the General Public	2003	Department of Trade and Industry Scottish Executive National Assembly for Wales Department of Enterprise, Trade and Investment	TNS	renewables	national	full report
Public Attitudes to Windfarms, A Survey of Local Residents in Scotland	2003	Scottish Executive Energy Policy Unit	MORI Scotland	focus on wind	regional	full report
Attitudes to Renewable Energy - Northern Ireland. Final Report (qualitative)	2003	DTI	COI Communications	renewables	regional	full report
Attitudes to Renewable Energy. Final Report (qualitative)	2003	DTI	COI Communications	renewables	regional	full report
Attitudes to renewable energy in London: public and stakeholder opinion and the scope for progress	2003	London Renewables	Brook Lyndhurst Ltd in association with MORI and Upstream	renewables		full report
Renewable Energy Survey 2004	2004	London Assembly	ORC International (Gavin Ellison)	micro-renewables	local	extensive summary
Attitudes to Renewable Energy in Devon	2004	Regen SW	MORI	renewables	regional	full report
Somerset Environment & Quality of Life Questionnaire 2004	2004	Somerset County Council		environment related issues	local	full report
Energy: Issues, Options and Technologies	2002	European Commission	Eurobarometer	energy	national	summary
Social Values, Science and Technology	2005	European Commission	Eurobarometer	nuclear, solar, conservation	national	summary
<b>Media</b>						



The Ecologist/ICM Poll	2001	The Ecologist	ICM Research	nuclear and renewables	national	summary
Nuclear Power Survey	2005	BBC Newsnight	ICM Research	nuclear	national	full report
BBC Scotland Poll	2005	BBC Scotland	ICM Research	nuclear and wind (not central issue)	regional	full report
Hebridean Windfarm Plans	2005	BBC Scotland	MORI Scotland	wind	local	full report
"Energy Balance of Power" Poll	2005	The Times Newspaper	Populus	energy	national	yes
Opinion Poll	2005	The Guardian	ICM	wind/nuclear	national	details but limited questions

The overwhelming bulk of surveys were concerned with two technologies: renewables (in particular wind energy) and, to a lesser extent, nuclear power. In some cases (Greenpeace 2002, Guardian 2005) attitudes to both technologies were surveyed. Only a few surveys dealt with the more general question of technologies for electricity generation (RSPB 2001 and Scottish Environmental Attitudes 2002) and only a few looked into broader energy policy issues such as energy dependence, energy research and energy efficiency (Eurobarometer 2003 and Times 2005), though many surveys asked general questions on global warming (Guardian 2005).

Some surveys were run before the General Elections in 2001 and 2005 and covered also energy issues (ICM Research for The Ecologist, 2001; ICM Research for BBC Scotland, 2005).

Of the more general "energy" and "electricity" surveys, a national approach was adopted with samples of around 1000 (the exception was the Scottish Environmental Attitudes survey where a sample of 2000 was used - however, this survey had a much wider remit and energy issues comprised a rather small component of the total).

The most comprehensive study on public attitudes to *renewable* energy technologies was jointly commissioned by the Department of Trade and Industry (DTI), the Scottish Executive, the National Assembly for Wales and the Department of Enterprise, Trade and Investment in 2003 (DTI, Scottish Executive et al., 2003). The two broad objectives included attitudes and knowledge about renewable energy sources amongst the general public, on the one hand, and the exploration of perceptions and reactions in areas with renewable energy projects (planned or in operation) within a distance of 5 km, on the other hand.

While a number of national polls addressed the question of wind energy (ICM for Greenpeace 2004, Guardian 2005, Populus 2005) most of the more detailed surveys of this technology were predominantly commissioned at the regional level. The Scottish Executive commissioned a poll in 2002 examining the attitudes close to existing wind farms in Scotland (Braunholtz, 2003), while a number of surveys on wind energy focused on Wales (Market Research Wales Ltd. for FoE, 2002; NOP World Consumer, 2005).

Furthermore there is a considerable number of local studies on planned wind farms available (e.g. Hill, 2001; RBA for National Wind Power, 2002; MORI Scotland for BBC Scotland, 2005). Most of the wind surveys were commissioned by the wind industry (BWEA or individual firms) or environmental NGOs.

Besides wind surveys some general environment/energy studies have been conducted at regional and local level in the South-West (MORI Social Research Institute for Regen SW, 2003; MORI Social Research Institute for Regen SW, 2004). Two surveys on micro-renewables have been conducted in London (London Renewables, 2003; Ellison, 2004)

Nuclear surveys tended to be carried out by the nuclear industry or by NGOs with an antinuclear position (in addition there was a survey commissioned by the BBC/Newsnight with a primarily nuclear focus). Our knowledge of nuclear surveys commissioned by the industry tends to be more limited as it mainly derives from

presentations rather than the original data. However they adhere to the pattern of national representative samples of c.1000 and c.2000. In contrast to many of the surveys on wind energy (where the focus was often on the acceptability of the technology in its own right, almost all of the nuclear surveys consider it in the context of other energy technologies.

### **3.1 Methodology of the Surveys**

Most of the studies were quantitative surveys by professional pollsters of a representative sample of the population either on a face to face or telephone basis (one of the most recent – MIT – used a survey organisation – YouGov - which specialises in internet polling). Only a few studies adopted a more qualitative approach (DTI, 2002; Barker and Riddington, 2003a; Barker and Riddington, 2003b). The first London survey was based on a qualitative survey involving 4 focus groups which was followed by a quantitative MORI survey on public attitudes (London Renewables, 2003).

Most of the quantitative surveys appeared to have adopted quite an explicit approach. For the most part these tended to ask a relatively limited number of questions, often starting from general energy or environmental issues and then focusing in on more specific issues related to a technology. Whether the questions were as limited as often appears to be the case or whether a wider range of questions and responses were covered is not always clear. In some cases (e.g. the Greenpeace "Hartlepool" and "2002" surveys and the BNFL/MORI surveys) it appears that a wider set was addressed but not all the information was made public (though in the BNFL case the unreported questions concerned particular corporate issues about the sponsoring firm rather than about nuclear or energy issues).

As noted above the extent to which the responses are disaggregated varies: almost all have at least some age, gender, income/social class, and regional breakdown while some also address lifestyle and political cleavages. However, a fuller understanding of the methodologies would require more detailed discussions with the commissioners and/or the polling organisations themselves.

Given the varied nature of the data and approaches (e.g. questions, structure of questionnaire) and the resources available for this desk study it was not possible to apply a systematic methodology (e.g. meta-analysis) to the comparison of the material. Instead we have extracted the information from the surveys according to the study's lead questions and to compare them as far as is possible on a qualitative basis. We have also included a number of figures and tables from various studies as appropriate.

## **4 Knowledge of and Attitudes towards Energy Issues and Technology**

In this section we provide an overview of the results of the various polls surveyed. We start by looking at what the polls indicate about the general levels of understanding amongst the public regarding energy issues. We then explore the attitudes towards particular technologies and future generation preferences. Finally we review what the polls have indicated about changing attitudes over time.

## 4.1 Knowledge of Energy Issues

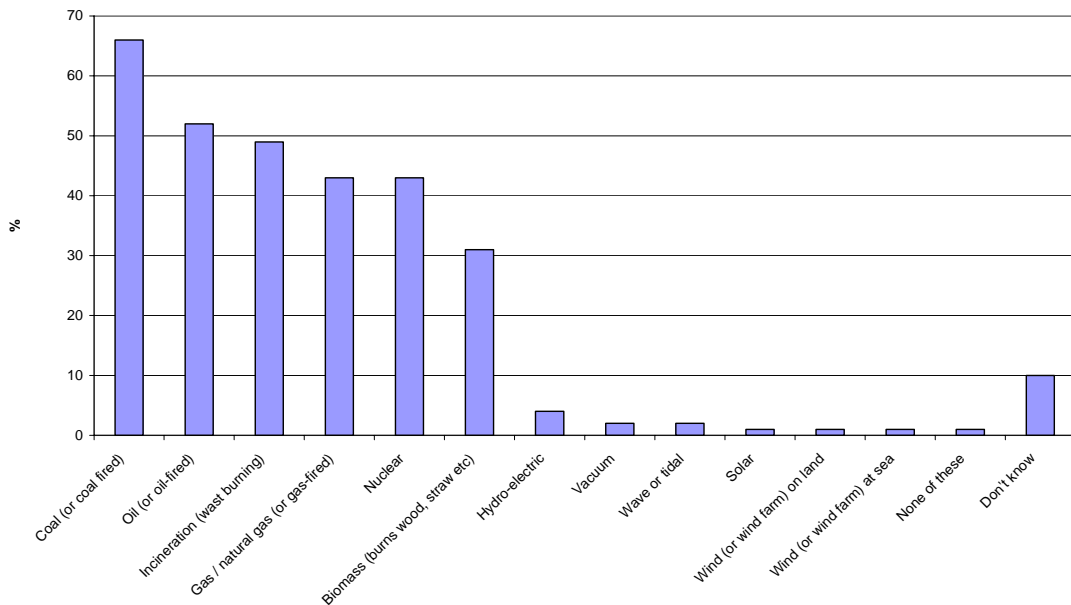
Only a few of the polls sought to establish general levels of public knowledge and understanding of energy balances, energy policies and energy technologies.

The Eurobarometer polls for the UK (and most other member states) indicate rather mixed levels of understanding about the way in which energy is used and which sources are used: respondents tended to have only a vague idea of where energy was used but a rather better sense of the sources of energy and general energy balances. The Eurobarometer survey demonstrated a clearer perception of rising energy use in the UK and the EU as a whole and of the possibilities for energy saving. The more recent Populus survey for The Times also indicated a general recognition of energy imports and the broad contributions of different energy sources. On energy policy priorities, very large majorities supported the need to address environmental protection, supply security and low cost supply (though interestingly the percentages regarding supply security and low cost as very important were at 57% and 43% respectively much lower than for the environmental objectives).

The 2003 Eurobarometer survey reveals a general recognition that global warming is a serious problem: 88% of respondents (in both the UK and the EU as a whole) agreed with the proposition that global warming was a serious issue. The perception of global warming is backed up by more recent research - a 2005 poll for the Guardian found that 89% regarded it as either a current or a future threat. Furthermore a survey by the MIT laboratory for energy and the environment showed that 70% of UK respondents think that action needs to be taken to address global warming (Curry, Reiner et al., 2005: 6).

In terms of the impact of different technologies on global warming, 75% of UK respondents in the Eurobarometer agreed that fossil fuels were a major contributor. Surprisingly, different studies show that nuclear power is not perceived as low carbon technology. In the Eurobarometer survey 45/47% believed nuclear power contributed to global warming and in the MIT survey over half were not aware that nuclear power is a low carbon technology while almost a quarter believes that it emits carbon dioxide. An earlier study by the RSPB found that 66% of respondents considered coal fired power stations increased the risk of climate change and 43% for nuclear (see Figure 1).

**Q: In your view, which if any of these sorts of power station generate electricity in ways which significantly increase the risk of climate change?**



**Base: All general public (1055)**

**Figure 1: Energy technologies and global warming (RSPB Market Research, 2001: 5)**

Different studies showed that the term renewable energy is not always recognised or understood by the public. The RSPB survey found that only 55% of respondents had encountered the term. Most of the studies did not further investigate on the knowledge about renewable energy sources. However, the results from the studies considering this aspect (DTI, Scottish Executive et al., 2003; London Renewables, 2003; MORI Social Research Institute for Regen SW, 2004) indicate that this seems to be very important with respect to the low level of knowledge.

In general the public refers less to the abstract term ‘renewable energy’, but to a specific renewable energy source. When asked generally about any kind of electricity generation source, over 75% of the general public and 90% of a sample with basic knowledge about renewable energy in the DTI study (2003) knew of at least one renewable energy source with wind as the leading technology. But only 4% of the general public and 3% of the informed sample used the term “renewable energy”.

When asked ‘off the top of their head’ what they associated with ‘renewable energy’, 17% responded ‘recycling’ and a further 17% associated it to re-use of energy. This confirmed previous research that the public refers to ‘renewable energy’ rather in terms of specific renewable energy sources such as wind, solar etc. (DTI, Scottish Executive et al., 2003: 8).

Knowledge about specific renewable energy technologies varies considerably. Solar, hydro and wind are rather well known, while biomass is widely ignored. The DTI study revealed high knowledge for solar, hydro and on-shore wind (around 70%) and low knowledge for biomass/-gas (around 20%). Similar results emerged from the

survey in Devon where 85% knew at least a little about wind power, but only around 20% had basic knowledge of biomass (MORI Social Research Institute for Regen SW, 2004: 4f). The MIT study confirms this overall picture (Curry, Reiner et al., 2005: 11). The MORI London survey showed also that 95% and 94% of respondents have heard about solar and wind power respectively, whereas 43% have never heard of CHP and 30% have never heard of 'incineration of organic waste' (London Renewables, 2003: 13f).

While knowledge about energy generation technologies is widely covered in different studies, we are aware of only one study considering carbon capture and storage technologies. The MIT survey showed that most people in the UK are not aware of these technologies (Curry, Reiner et al., 2005: 11).

An interesting point with respect to knowledge about energy technologies is the source of information people have used to build their knowledge in this area. The main source of information was largely TV, but also from having seen or even visited wind farms. However, particularly in rural areas (local) newspapers played a very important role as source of information (DTI, Scottish Executive et al., 2003: 9; MORI Social Research Institute for Regen SW, 2004: 5, 14). In Scottish wind farm areas local newspapers were by far the most important source of information about wind energy (Braunholtz, 2003).

The knowledge about renewable energy sources is considerably higher in populations with a renewable energy project nearby (DTI, Scottish Executive et al., 2003: 4f). This awareness is, however, closely linked to the exposure of the renewable energy source installed. While 87% of people living near to an onshore wind farm were aware of it, only 8% were aware of a small hydro power plant.

The DTI survey shows a rather strong correlation between knowledge of a specific technology and a positive opinion/general approval (DTI, Scottish Executive et al., 2003: 13, 44, 65). This correlation is supported by positive attitudes in areas with wind farms and the Devon study where lower levels of support for biomass power can be explained by lower levels of awareness rather than actual opposition (MORI Social Research Institute for Regen SW, 2004: 4).

The MORI London survey, however, questions a positive correlation between awareness and acceptability since the support remains almost at the same level in spite of higher awareness (London Renewables, 2003: 22). Moreover even where there is awareness this does not necessarily translate into a willingness to adapt behaviour: a DTI commentary on public attitudes to energy and the environment quotes DEFRA research that shows that "information does not necessarily lead to awareness or awareness lead to action" (DTI 2005 p.2) Research on public responses to energy efficiency and green tariffs - discussed in the same report - also highlights commitment problems on the part of individual consumers. Such results could be regarded as a proxy for a greater degree of commitment and engagement overall (i.e. attitudes which translate into action are likely to reflect a more robust understanding and commitment to particular technologies).

The polls' rather mixed picture regarding public knowledge and understanding of energy issues might indicate the need for more deliberative techniques. The DTI-

commissioned exercise involved an elaborate procedure for consulting a relatively small group of people (in the low hundreds overall rather than the 1-2000 characteristic of most polls) on a much more intensive level, involving small focus groups, deliberative workshops and online consultations. The exercise revealed a general consensus on the need to address environmental problems as a main priority in energy policy with cost reduction the next priority and supply security somewhere further down. However, no consensus was possible on issues such as nuclear power, quotas for new energy technologies and increasing energy costs to stimulate changes in consumption behaviour (DTI 2002).

## **4.2 Attitudes to Electricity Generation Sources**

Most surveys are interested in attitudes towards specific energy technologies or preferences for the future UK energy mix. Only the DTI study asked an open question about the awareness of electricity generation sources and revealed a higher awareness of renewable energy sources (76% out of it 50% wind) as compared to fossil fuels (60% with coal (46%) ahead to nuclear power (42%)) (DTI, Scottish Executive et al., 2003: 7f). The following sub-sections give an overview about attitudes to particular energy technologies (fossil fuels, nuclear, renewable energies and microgeneration).

### *4.2.1 Fossil fuels*

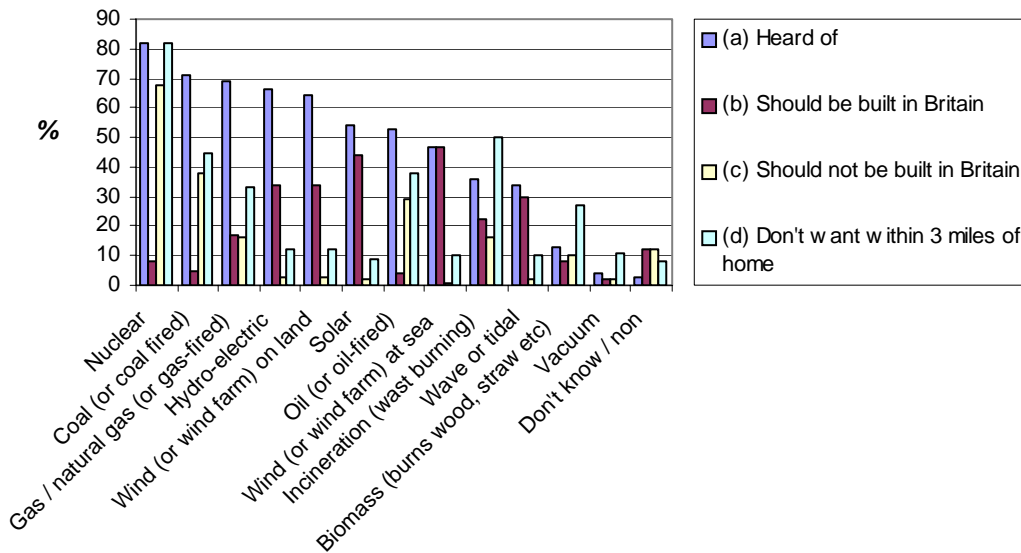
The main coverage of fossil fuels in the polls surveyed was in terms of knowledge about their contribution to current energy balances and/or to global warming. Some surveys (for example the BNFL/MORI and Populus polls) noted fossil fuels in terms of the likelihood of increasing import dependency and the implications for the use of alternative sources of power generation. The RSPB poll looked in greater detail at the environmental impacts of fossil fuel generation (along with nuclear and renewables) and also sought to establish the acceptability of new construction (again along with nuclear and renewables). According to this survey, 38% considered that coal fired stations should not be built in the UK (45% opposed construction within 3 miles of their home) while 16% considered that gas fired stations should not be built in the UK (33% within 3 miles). By contrast the figures for nuclear were 68% and 82% respectively and for wind 3% and 14% (see Figure 2).

**Q: (a) Now I'd like you to think about electricity power stations. As you may know, some power stations generate electricity by burning fuel, while others generate electricity in other ways. Which, if any, of these sorts of power station have you heard of before?**

**(b) In your opinion which, if any, of these sorts of electricity power station should be built in Britain during the next 10 years?**

**(c) In your opinion, which if any of these sorts of electricity power station should definitely NOT be built in Britain during the next 10 years?**

**(d) Assume that it is possible to build all these sorts of electricity power station within three miles of your home. Which if any of these sorts of electricity power station would you NOT like to be built within three miles of your home?**



**Base: Sample size (1055)**

**Figure 2: Knowledge and attitudes to electricity power stations in the UK (RSPB Market Research, 2001: 3)**

#### 4.2.2 Nuclear

Questions on nuclear ranged from general acceptability to the question of new construction and the question of closure.

By comparison with other technologies, the levels of public support for nuclear have been relatively low: polls for BNFL – the main organisation commissioning and publishing work on nuclear – show support at 28% at the end of last year, marginally ahead of opposition. According to the same BNFL MORI poll, the disadvantages of nuclear power were attributed to waste 58%, accidents 55% and radiation 50%. The benefits were seen as reliable supply of energy (36%) cleaner air (27%) and mitigating global warming (25%). The Times Populus survey also found nuclear waste to be the principal obstacle for nuclear development (highlighted by 59% of those surveyed).

Opinion on future nuclear construction varied considerably. According to the recent Times/Populus survey only 18% thought that new nuclear power stations should



replace old ones while the BNFL survey found support from 30% of those polled. More general questions about the future of nuclear power, however, elicited more positive responses. According to the 2005 Eurobarometer survey on science and technology UK opinion appears to be relatively more positive about future nuclear investments than that in the rest of the EU: 62% regard new nuclear technologies as having a positive effect over the next 20 years compared to 52% in EU25.

An earlier report found relatively modest support for nuclear phase-out: in 2001, only 35% agreed with closing down the nuclear industry, while 50% wanted to keep it running (ICM Research for The Ecologist, 2001). More generally there appears to be higher degrees of acceptance that nuclear power will continue to contribute to energy needs than there is support for the technology.

#### *4.2.3 Renewable energy sources*

Most of the studies reveal that a clear majority of the respondents is in favour of renewable energy sources in general. As outlined above, the public opinion in general is not linked to renewable energy as an aggregate term, but to specific renewable energy technologies. Solar is the most popular renewable source of energy in the UK.

In the DTI study over 90% responded that renewable energy was a 'very good' or 'fairly good' idea whereas only 1% judged it as a 'bad' idea. Around 87% preferred renewables to fossil fuels (66% 'much better', 21% 'a little better') (DTI, Scottish Executive et al., 2003: 10). Similarly, one London survey revealed that two-thirds of Londoners thought that renewable energy is 'a very good idea' and a further 25% a 'fairly good idea' (Ellison, 2004: 2) and a second one showed that 48% agreed that renewable energy is in principle a 'very good idea' and 33% a 'fairly good idea' (London Renewables, 2003: 15). In 2001 49% said that the 10% UK renewables target was 'about right', while 34% said it was not high enough (ICM Research for The Ecologist, 2001).

As major benefits Londoners mentioned: 'protect the environment' (60%) and 'better than alternatives', 'won't run out' as well as 'clean/non-polluting' with around 25% each (London Renewables, 2003). Testing different statements on renewable energy technologies, the majority in the DTI survey agreed on statements that renewable energies constituted an investment in our children's future and that there were more advantages than disadvantages in investing in renewables.

With respect to wind farms in their local area the DTI survey showed that one fifth of the general public were against it, while 28% would strongly approve it. A regional survey in the South West showed even a strong support of 54%, while 30% tend to support extension of wind power in the South West. Only 4% would oppose it (including 3% 'tend to oppose') (MORI Social Research Institute for Regen SW, 2003: 4).

The main reasons for support of renewables were the perceived general environmental benefits. At the regional level, the most important reasons for supporting wind farms were the hope for new jobs (45%) and the pollution free electricity generation (42%). Interestingly, the opposition on the Hebridean wind farm plans decreased from 55%

to 44% while the support increased from 29% to 39% if the rent for the land went to the community under community ownership of the land (MORI Scotland for BBC Scotland, 2005).

Wind farms are in particular rejected for the visual impact (DTI, Scottish Executive et al., 2003; MORI Scotland for BBC Scotland, 2005). However, in the Scotland survey 43% would accept it within three miles of their community. Less than 20% of the General Public in the DTI study were opposed to an onshore wind farm in 'their area' and around 10% to an onshore wind farm within three miles (5 km) (DTI, Scottish Executive et al., 2003: 75). The wind survey in Wales showed that respondents having already seen a wind farm disagree that wind farms are 'ugly and a blot on the landscape' (60% as compared to 45% not having seen a wind farm) (NOP World Consumer, 2005).

As different surveys show, solar is one of the best known and most popular energy source (DTI, Scottish Executive et al., 2003; London Renewables, 2003). Concerns are mainly linked to cost (19%) and 'not reliable source/not enough sun' (19%) (London Renewables, 2003: 19).

Other types of renewables received lower levels of support mainly because of lack of awareness. Biomass shows the lowest rate of awareness in public opinion which is linked to its lack of visibility as compared to wind or solar energy, on the one hand, and the considerably low knowledge about this technology in the general public, on the other hand. Wave and tidal energy technologies have a positive image for those respondents who were of this technology.

The relative popularity of renewables can also be seen in the poll results. When asked about the disadvantages of energy generation technologies, respondents in the 2001 RSPB survey attributed more disadvantages to fossil fuels and nuclear power than renewable energy technologies (with biomass close to fossil fuels). The main disadvantages mentioned were air pollution and contribution to climate change as well as – particularly for oil and gas fired technologies – the security of future fuel supply. Although the negative impact on the landscape was seen as highest for wind (40% of the respondents said this about wind farms on land), this aspect was also surprisingly high for other energy technologies such as coal or oil fired (36%), incineration (35%) and nuclear power (33%) (see Table 1).

**Q: In your view, which if any of the things on this list do you think are significant disadvantages of generating electricity from... [Sample was split in two – A1 and A2; each half of the sample was presented with five power generation methods in turn**

	Burning coal or oil	Incineration (burning waste)	Burning gas, also known as natural gas)	Burning wood, straw or other biomass	Nuclear power	Hydro-electric power	Tidal power	Wind farms on land	Wind farms at sea	Solar power
<b>Pollutes the air</b>	74	74	54	64	35	7	3	3	4	2
<b>Contributes to climate change / global warming</b>	57	51	42	42	30	7	5	2	2	2
<b>Uses fuel which will eventually run out</b>	55	8	44	24	10	2	2	1	1	2
<b>Ugly to look at/spoil the landscape</b>	36	35	21	19	33	18	13	40	19	13
<b>Harms birds, other wildlife or their habitats</b>	35	34	18	32	30	16	14	12	12	3
<b>Risk of a major explosion</b>	20	15	40	7	64	5	2	2	2	4
<b>Very expensive</b>	20	11	12	10	30	23	27	15	30	29
<b>Takes up large amounts of land</b>	18	18	8	16	16	23	6	38	7	19
<b>Produces radioactive waste</b>	7	9	5	3	72	5	2	2	1	1
<b>Othera</b>	-	-	-	-	-	-	-	2	-	<1
<b>(NOT ON PROMPT) None of these</b>	2	3	3	5	1	21	29	20	30	31
<b>(NOT ON PROMPT) Don't know</b>	10	11	13	15	9	27	26	15	20	20
<i>(Sample size – indicates sample A1 or A2)</i>	564	564	490	490	490	490	564	490	564	564

**Table 2: Disadvantages of electricity generation technologies (RSPB Market Research, 2001: 6)**

#### 4.2.4 Microgeneration

In London two surveys were conducted on opinions and attitudes towards microgeneration technologies that could potentially be installed by Londoners to contribute to London's climate change policy targets (London Renewables, 2003; Ellison, 2004). As opposed to 'central' power projects, microgeneration technologies require not only acceptance by the public opinion, but active support and the willingness to install them in their own dwelling.

While a vast majority of the survey sample were in favour of microgeneration technologies (solar water heating, PV, micro-wind, and micro combined heat-and-power production), main barriers to install one of these technologies in the own home were too high costs and to a lesser extent aesthetic reasons (Ellison, 2004: 5).

Interestingly, the London survey shows that a considerable part of the population has the wrong impression about specific technologies with respect to both costs (37% estimated the costs of a solar water heating system at £5,000 as compared to realistic costs of about £2,500 and 59% estimated the costs for a PV system at under £5,000 as compared to actual costs of around £10,000) and actual energy generation (Ellison, 2004: 8-11).

Concerns about micro-wind are mainly linked to lack of space (25%) and aesthetics (16%), while noise was only mentioned by 9% (London Renewables, 2003: 20).

With respect to specific renewable technologies for electricity generation in London 81% were in favour of solar ('good idea') (75% wind, 56% CHP, 52% incineration, 46% anaerobic digestion) (London Renewables, 2003: 17).

Furthermore the 'Wind Farms Wales' survey asked respondents if they would personally consider installing a micro wind turbine on their home. 57% considered it, while 32% were not willing to consider it. However, of those having already seen a wind farm, 62% considered it as compared to only 46% of those not having seen a wind farm. Generally, 77% of the respondents support the idea of producing electricity in individual Welsh homes using wind power (NOP World Consumer, 2005).

#### *4.2.5 Energy efficiency*

Almost all the surveys examined dealt only with the supply side of energy balances – questions on energy conservation were largely absent (though the DTI 2005, Guardian 2005 surveys dealt with the issue of how consumers might alter their own behaviour to reduce energy consumption while the Eurobarometer 2003 survey also dealt with this issue and the more general question of public knowledge about energy efficiency). The only survey to deal directly with energy efficiency was the 2005 Eurobarometer survey: as part of their question on “which new technologies will have a positive, negative or no effect in the next 20 years”, “energy saving measures in the home” delivered a 95% positive response from the UK (92% in EU25).

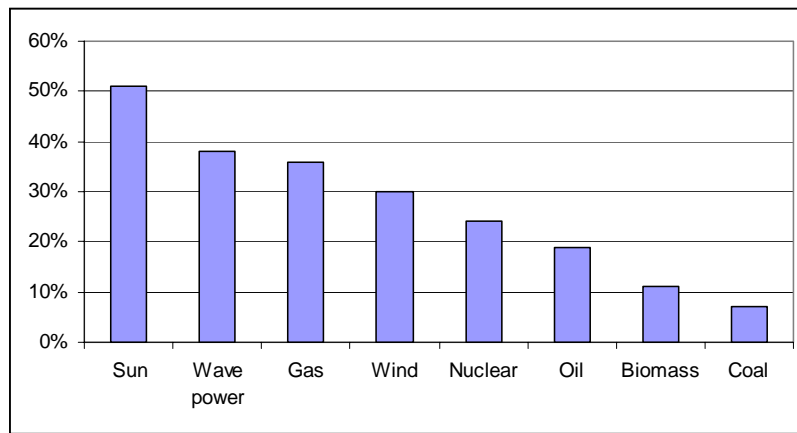
### **4.3 Attitudes to Future Energy Generation**

The general principle of future energy needs and future technologies was addressed by various surveys in various ways. However, the only survey to ask about the general principle of future energy research was the Eurobarometer 2003 survey. The 2003 survey questioned whether large scale investment into long term energy research projects (such as nuclear fusion and renewables) should be conducted. British responses were in line with the rest of the EU in supporting this principle subject to careful monitoring of costs and progress (46% compared with 41% for the EU as a whole). Asked which technologies would be least expensive, produce the most energy and be best for the environment on a 50 year time horizon, British respondents highlighted renewables in each respect (42% least expensive, 29% most energy and 63% best for the environment, compared with 40%, 27% and 67% for the EU 15).

Generally other surveys indicated similar degrees of support for renewables over other technologies such as fossil fuels and nuclear (although the trend has slightly changed in favour of nuclear energy in recent years, as discussed below). However, as the following examples show the questions and categories about future energy supply are rather different and therefore difficult to compare.

Figure 3 shows the results from the 2003 MORI BNFL survey about public preferences for future energy supply in the UK. Stressing the need to have ‘reliable secure supplies of energy’ solar power is by far the most popular future energy source, followed by wave power and gas.

**Q: Which of these energy sources do you think can do most to help ensure we have reliable secure supplies of energy in the future?**

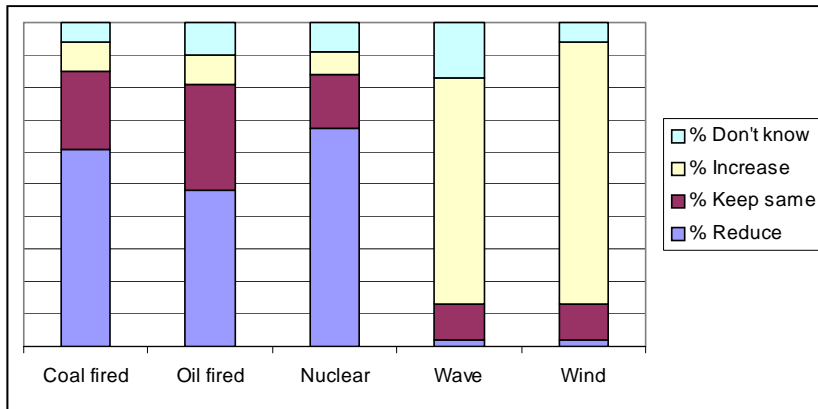


**Base: All general public (948) December 2003 BNFL Survey**

**Figure 3: Attitudes to future energy generation (MORI BNFL 2003 in Knight, 2004: 18)**

In Scotland respondents were asked about their preferences to increase or reduce certain energy generation options in Scotland. Figure 4 shows that wave and wind power are the preferred future energy options, while a big part of the Scottish population wants coal and oil fired as well as nuclear power stations to be reduced in the future.

**Q: I am going to read out some different ways of generating electricity. For each one I would like you to tell me whether the proportion of electricity generated in Scotland should increase, reduce or stay at about current levels over the next 15 years?**

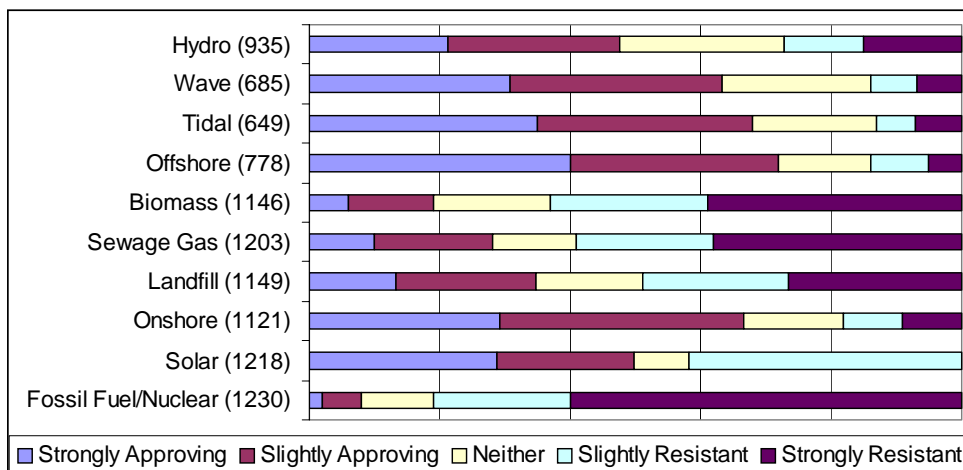


**Base: Residents living within 20 km of a Scottish windfarm site (1,810)**

**Figure 4: Attitudes to future energy generation (MORI/Braunholtz 2003: 12)**

The DTI 2003 study was interested in future energy options to be built in the respondents' area. Fossil fuel/nuclear installations were 'strongly rejected' by 60% and 'rejected' by 21%. Strongest opposition towards renewable technologies was with biomass (39% 'strongly resistant'), sewage gas (38%) and landfill (26%). Interestingly, only 9% were strongly opposed to onshore wind farms, while welcomed by 68% ('strongly agree' and 'agree') with similar attitudes to offshore wind, tidal and wave technology. As with the MORI/BNFL study, the technology with the highest approval ratings was solar (76% out of 44% 'strongly agree' and 32% 'agree') (DTI, Scottish Executive et al., 2003: 61).

**Q: Which of the following describes what your reaction would be if a ... was developed in your area?**



**Base: General Public excluding those responding don't know/not applicable/coastal**

**Figure 5: Attitudes to future energy generation (DTI 2003: 61)**

Given the choice between renewable energy sources and nuclear, renewables are clearly ahead. The BBC Scotland Survey before the General Election 2005 showed that 73% of respondents preferred more wind farms to more nuclear power (17%) (ICM Research for BBC Scotland, 2005). Commissioned by Greenpeace UK the MORI Social Research Institute asked about the preferred energy sources between renewable energy sources and nuclear power assuming the same costs. 72% were in favour of renewable energy sources and 6% for nuclear power (MORI Social Research Institute for Greenpeace, 2002).

BBC's 'Nuclear Power Survey' from May 2005 showed that only 21% of total UK population believed that nuclear power is 'the most feasible way of meeting the UK's future energy demands while reducing Carbon Dioxide emissions' as compared to 57% for renewable sources. However, 39% think that the government should consider nuclear power 'as an energy source for the future', while 52% think this is wrong (ICM Research for BBC Newsnight, 2005).

The 'Wind Farms Wales' survey showed that around 80% of respondents think that wind farms are necessary to meet current and future energy needs (NOP World Consumer, 2005).

In the recent Times/Populus survey 79% of respondents are in favour of investments in renewable energy technologies to face the shortfall due to the phase out of nuclear power stations in the UK (Populus, 2005: 14).

In the MIT study half of the respondents were provided with some information about electricity production costs and told that nuclear power was carbon free. The future costs for nuclear and carbon capture were estimated at 3-4p/kWh as compared to 5 p/kWh for renewables. In both samples, however, renewables remain the first preference (46% of uninformed, 40% with information), while carbon capture and storage increases from 1% without information to 10% with information and nuclear doubles from 9% to 18% (Curry, Reiner et al., 2005: 30).

Overall, however, there seems to be a low willingness to pay more for the preferred energy future. The Capibus survey asked how much household bill payers would be willing to pay more for an increase of wind power in the UK. The majority would not be willing to pay more, around 20% would accept an increase of less than 5% (Capibus: 16). Only half of the respondents in the DTI study agreed that households should contribute to the costs of increased renewable energy deployment (DTI, Scottish Executive et al., 2003: 12). But if asked which factors are most important when deciding about future types of energy generation a MORI BNFL 2003 survey showed that the 'effect on the environment' (44%) is more important than 'cost to the domestic customer' (35%) (Knight 2004: 21).

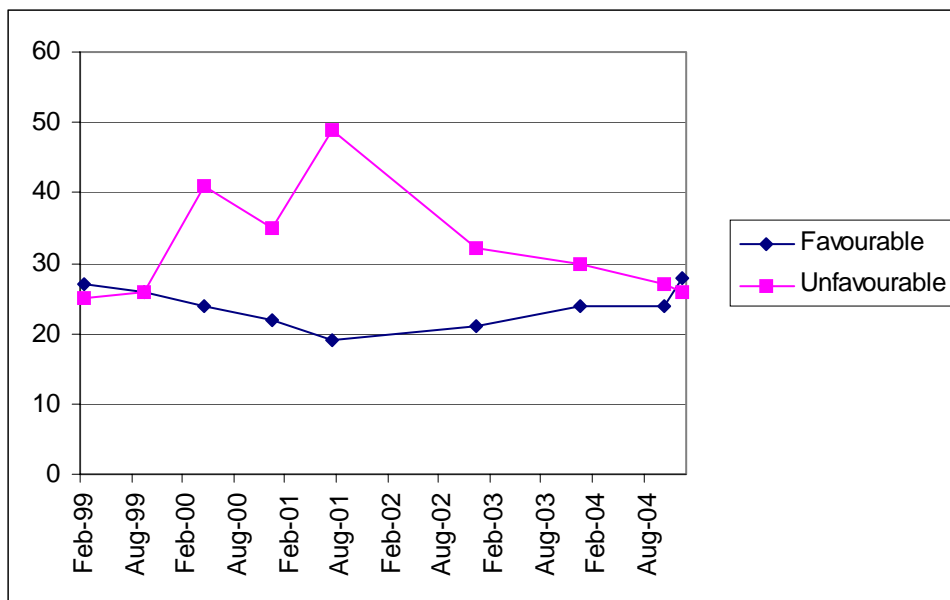
#### **4.4 Trends in Attitudes to Energy Technologies**

As noted earlier there is some information available on how public attitudes towards energy technologies have changed since 2000. In both cases the "trend" is based on a summary of existing surveys and does not involve a consistent sample over the period examined. It goes without saying moreover that both cases are presented in support

of the technology under examination. Nonetheless, they do provide some sense of the changing fortunes of the technologies and raise the issue of why changes have taken place where a clear shift is observable.

#### 4.4.1 Nuclear

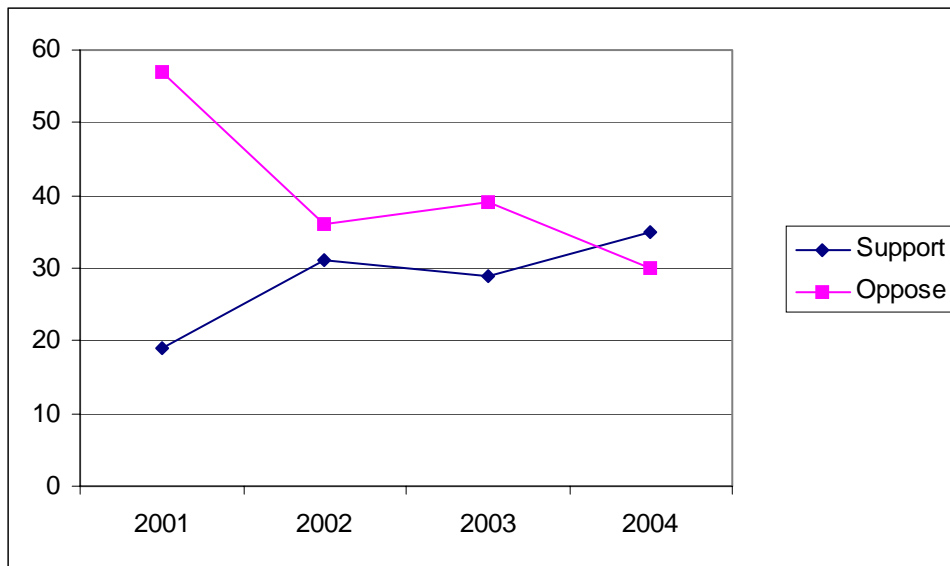
MORI has conducted regular surveys on nuclear power (mostly for BNFL) and as part of a presentation to a conference on Nuclear Energy, summarised the trend in public attitudes. Comparing responses to the question “How favourable or unfavourable are your overall opinions or impressions of the nuclear industry/nuclear energy?” over a number of years, MORI’s research indicated that attitudes were relatively more favourable than unfavourable in 2004 for the first time since 1999 (28% favourable and 26% unfavourable in 2004). Moreover this outcome marked a long recovery from 2001 when 49% of respondents were unfavourable to nuclear power and only 19% favourable.



**Figure 6: Trend in attitudes towards nuclear power (Source: MORI)**

A similar and if anything stronger trend can be seen in relation to the construction of new nuclear power stations (as replacements for old ones). Whereas in 2001 only 19% supported and 57% opposed such investments, by 2004 35% supported and 30% opposed.





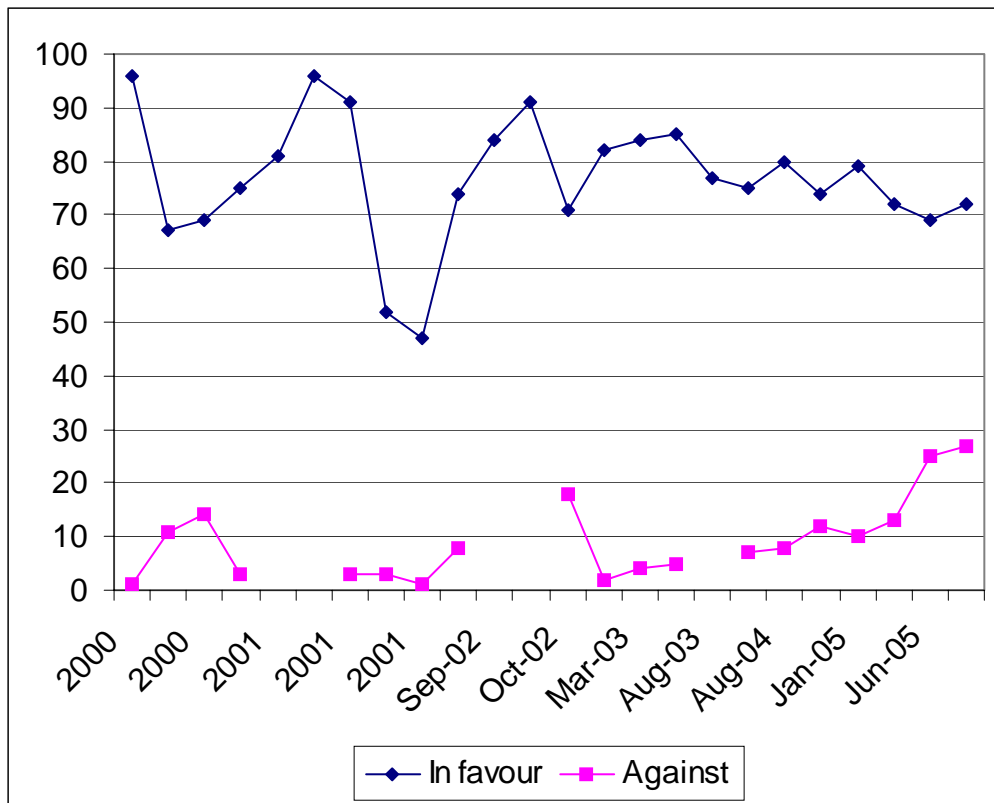
**Figure 7: Trend in attitudes towards new building of “replacement” nuclear power stations (source: MORI presentations)**

Why these changes should have taken place is debateable. One argument might be that the extent to which the issue is under greater debate (and relatively positive treatment in parts of the media) raises its profile in the public domain and renders it more acceptable. In both 2001 and 2004/5 the need for new nuclear was under debate. However, visibility seems to have led to very different outcomes in the two periods.

A closer look at the trend for nuclear power over recent years shows the influence of events on the image of nuclear power and the nuclear industry as a whole (as argued by Robert Knight from MORI). The false safety data about a Mox fuel supply to Japan in 1999 has led to a confidence crisis in the nuclear industry and to a peak in negative public opinion (Knight, 2004).

#### 4.4.2 *Wind*

The wind industry association the BWEA has compiled a survey of the numerous opinion polls which have included a question on attitudes to wind power (summarised as “in favour” or “against” ). We have drawn upon this data and supplemented it with data from a number of more recent surveys (which covered wind but not as the sole issue). As the figure shows there is a much higher degree of support for wind power throughout the period since 2000 (and the same pattern is apparent for earlier periods - the data includes surveys back to the early 1990s). However while the overall average of the polls is 77%, in recent surveys there has been a slight decline in support and a slight increase in opposition (this may however reflect the different context in which questions about wind were asked in the later surveys). Moreover while there was considerable fluctuation in earlier years (from a low of 47% in to a high of 96%, both in 2001) there is much less since 2002. This may suggest that opinions are becoming more settled.



**Figure 8: “Trends” in support for wind energy (based on data collected by BWEA – to 2005 – and augmented by Times and Guardian Surveys).**

In general there is a consistent disparity in various studies and in recent years between the high levels of support for renewable energy technologies and the lower levels of support for nuclear and fossil fuel technologies. It remains to be seen if the results of the most recent studies signify a narrowing of that gap

## 5 Potential Explanations for Differences in Attitudes

This section discusses further potential aspects that may help to understand different attitudes to energy technologies in the UK. It will first discuss the influence of the proximity to energy generation site, potential differences between regions, political differences and statistical categories such as age, gender and social class.

### 5.1 Proximity to Energy Generation Sites and Attitudes

Since opposition to wind energy is primarily based upon its negative impact on the landscape and upon its noise emissions, it is interesting to have a closer look at how people living nearby a wind power plant react to this technology.

Respondents living near to a wind farm are generally more supportive of wind farms than the general public. The opinion that onshore wind farms are ‘not unsightly’ was strongest among people living near them (55%) (DTI, Scottish Executive et al., 2003: 70). The survey between people close to Scottish wind farms showed that anticipated

problems linked to a planned wind farm have not materialised. While only 54% anticipated no problems, 82% responded that actually no problems have turned out (Braunholtz, 2003: 10). With respect to the expansion of existing wind sites the support was strongest from respondents living closest to existing ones (ibid.: 14).

The Guardian 2005 survey asked whether respondents would support or oppose the building of wind farms and nuclear power stations within 20 miles of their homes. 69% supported the construction of wind farms and 25% opposed while 19% supported the construction of nuclear power stations and 79% opposed.

## **5.2 National and Regional Level**

Some surveys give indications about differences between regions, and between certain regions as compared to the national average. Two surveys by MORI in 2003 and 2004 in the South West showed that nationally and regionally the strong support for renewable energy in general were rather similar (51% nationally, 47% in Devon and 61% in the South West) (MORI Social Research Institute for Regen SW, 2003: 3; MORI Social Research Institute for Regen SW, 2004: 7).

The Guardian survey shows some regional divergence: respondents in the South were relatively more opposed to wind power plants than those in the North (29% against 23%) and relatively less opposed to nuclear power plants than those in the North (74% against 83%).

## **5.3 Political Differences**

Only a few of the surveys examined attempt to gauge the relative importance which the public attach to their views both in terms of the firmness of the opinion or the extent to which such views would shape their decision to vote. The Greenpeace 2002 survey asked whether respondents would be more or less likely to vote for parties advocating nuclear or renewable energy: 50% indicated that they would be more likely to vote for a party supporting renewable energy and 41% indicated that they would be less likely to vote for a party supporting nuclear energy.

Many surveys record the political backgrounds of respondents. The principal finding from these surveys is a relatively greater acceptance of nuclear power and opposition to renewables amongst Conservatives than amongst supporters of other political parties: according to the Populus poll, 37% of Conservative supporters favoured new nuclear compared with 12% of Labour supporters and 14% of Liberal Democrats; renewables were favoured by 62% of Conservatives as against 86% of Labour and 84% of Liberal supporters.

## **5.4 Differences according to Statistical Segmentation**

A number of studies provide disaggregated data on attitudes according to various social categories. In this section we draw together some of the findings according to factors such as age, gender and social class.

### 5.4.1 Age

The studies show a partially contradictory picture, particularly with respect to old people. The DTI study showed that the lack of interest was higher under elderly people and people working part-time, being unemployed or retired (DTI, Scottish Executive et al., 2003: 31f).

Considering the age of the respondents the DTI study showed that young (16-24) and elderly (65+) people were less aware of renewable energy in particular as compared to 35-44 and 55-64 (DTI, Scottish Executive et al., 2003: 8). This is also reflected in the resistance to renewable energy developments and wind farm developments in these age groups.

As opposed to these results the regional study in Devon comes to the conclusion that those aged over 60 years are better informed about wind power than the general public (MORI Social Research Institute for Regen SW, 2004: 5), albeit with an above average level of opposition. A local survey in Somerset showed a positive correlation between increasing age of respondents and stronger opposition to wind power (Somerset County Council, 2004).

A London survey showed that the older the respondent the higher the knowledge about micro-renewables (solar water heating, PV). At the same time the younger population was more likely to install a micro-generation system in their homes – independently of having children or not (London Renewables, 2003).

In the BBC Nuclear Power Survey respondents over 65 were most convinced (29%) that nuclear is the best source of energy to secure a low carbon energy supply as compared to 21% in general and the lowest share in the group of 25-34 (17%) (ICM Research for BBC Newsnight, 2005). Respondents in the age of 18-24 were very undecided (45% yes, 47% no) if nuclear power should generally be considered as future energy source in the UK (similar to 65+: 42% yes, 48% no), while again the 25-34 group was most opposed against nuclear (59%) similar to 35-44.

The Guardian Survey found a similar pattern albeit within a narrower range (perhaps reflecting the nature of the question): 21% of 65+ would support construction of a nuclear power plant against 17% of 16-25 and 16% of 25-34. In the case of wind farms a rather different pattern emerged: while 72% of 25-64 group would support it this went down to the low 60s for both 16-25 and 65+. The Times/Populus poll also found that levels of support for nuclear energy as a future energy option increased amongst older age cohorts (Populus, 2005: 14).

### 5.4.2 Gender

While there is a certain tendency that men have a higher knowledge of energy issues, the influence of gender on the choice of future energy options is very ambiguous. Some studies reveal that men are more supportive for nuclear.

The DTI study 2003 revealed that men were more aware of renewable energy sources than women (85% as compared to 67%) (DTI, Scottish Executive et al., 2003: 8).

Regarding the general support of renewable energy sources different studies show an inconsistent picture. In the MORI study in the South West more men strongly supported renewable energies (68%) as compared to women (54%) (MORI Social Research Institute for Regen SW, 2003: 8).

The DTI study showed that men were more resistant to renewable energy development in their area than women (31% against 23%) in general (DTI, Scottish Executive et al., 2003: 66). Female respondents are, however, more opposed to wind farms (21% as compared to 16%) (ibid.: 73). This was also confirmed in Devon where 82% of men supported wind power as compared to 70% of women (MORI Social Research Institute for Regen SW, 2004: 9) and in the South West in general with 86% of men supportive to wind power (60% strongly supportive) as compared to 81% support of women (48% strong support)(MORI Social Research Institute for Regen SW, 2003: 10).

Giving the choice between nuclear and wind power the BBC Scotland Poll showed that 70% of men (75% of women) were in favour of wind and 20% (15% of women) preferred nuclear (ICM Research for BBC Scotland, 2005). The BBC Nuclear Power Survey showed similar results. 33% of male respondents considered nuclear as the most feasible option for the UK to secure future energy supply, while only 11% of the female respondents supported nuclear. At the same time 14% of women answered that they did not know (only 4% of men) (ICM Research for BBC Newsnight, 2005).

In the Guardian survey there was also a significant gap between men and women: 75% of men supported wind power station but only 64% of women; 28% of men supported the construction of nuclear power plants but only 10% of women. The Capibus survey showed also a higher support for renewable energy from men (79%) than from women (66%) and for wind power in particular (men: 80%, women: 67%) (Capibus: 4, 10). In contradiction to this the Times/Populus survey showed that an overwhelming proportion (90%) of women favoured new renewable capacity compared with 66% of men.

#### 5.4.3 *Social class*

Nationally, higher social classes (AB) with an income above £30,000 and working full-time were more likely to support renewable energy (MORI Social Research Institute for Regen SW, 2004: 7). This was confirmed in MORI's survey in the South West (Somerset County Council, 2004). Higher knowledge under ABC1-groups was also confirmed in London (London Renewables, 2003). For example, Capibus' survey on wind power showed an increasing support for the government's 20% renewables target under higher social classes, starting at a support level 63% in DE going up to 83% under AB (Capibus: 4). Similar results were shown for wind power alone (ibid.: 10).

The same pattern was apparent in attitudes towards nuclear power. In the BBC Nuclear Power Survey respondents being part of the higher social-economic (AB) were the only social group – together with total male participants – being rather in

favour that the government considers nuclear power as future energy source in the UK (50% in favour, 44% opposed) (ICM Research for BBC Newsnight, 2005).

Differences in class were also apparent in the Guardian survey: AB respondents were more likely to support wind and nuclear than those from lower income groups (72% for wind and 22% for nuclear as against 60% for wind and 16% for nuclear).

## **6 Conclusions and Further Research**

This study reviewed over 30 surveys and opinion polls with information about UK public attitudes and opinion to energy technologies. The aim of this study is to feed into the Research Councils' future funding strategy on energy technologies.

Attitudes to future energy generation technologies are strongly in favour of renewable energy technologies. Around two thirds of the UK public is in favour of further investments in renewable energies (or wind energy in particular) as compared to one third or less for nuclear power. This relation is more or less stable over the last five years (though there appears to have been some reduction of the disparity in recent surveys).

Global warming and therefore the reduction of CO<sub>2</sub> emissions is widely perceived as central issue for future UK energy policy. Although nuclear energy may be seen as one technology to contribute to this policy goal by some, for a majority in the UK negative aspects of nuclear such as waste disposal seem to outweigh this advantage. In general the willingness to pay for a preferred energy future is, however, low.

Some studies have revealed that knowledge about energy issues plays a central role in explaining or at least influencing attitudes to energy technologies. For example, the lack of knowledge about biomass may explain very low levels of approval for this technology in the public opinion and a considerable number of respondents were not aware of the low carbon emissions of nuclear energy. With respect to microgeneration technologies the London survey showed how the lack of knowledge about costs may prevent people from considering the installation of microgeneration technologies in their dwellings.

This lack about knowledge has implications in the formulation of survey questions and consequently on the framing of a specific issue. Since the abstract term 'renewable energy' is not clear to some of the respondents it has to be linked to some specific renewable energy technologies. The fact that solar is the most popular and well known technology and biomass the least popular and rather ignored technology in the general public, may explain why biomass is normally not mentioned to further explain the term 'renewable energy' but gives at the same time a certain direction to the question. The same is valid for nuclear. The fact that people do not know that nuclear is a low carbon emission technology may justify mentioning this in questions related to global warming. Since climate change is a major issue in the UK general public, this may influence the opinion poll's results.

Returning to the general concepts we discussed at the beginning of the paper, how do they help us understand the overall results of energy polls?

The issue of agenda setting can be seen as of particular significance with respect to the purposes of polling and the way in which polling is conducted. In highlighting this factor we are not ascribing any particular motives to those commissioning the polls studied. However it is not unreasonable to assume that many of these polls are commissioned as much to shape the public agenda as they are to gather information on public attitude. Most of the organisations involved in polling have specific causes or interests which they are seeking to promote or defend. Interest groups have commissioned one third of relevant studies in the UK over the last 5 years.

From the point of view of interpreting the results this means we must be very careful to note the context of surveys, the style of questionnaire and the substance of questions in interpreting. Again we do not want to suggest that polling organisations are presenting any bias - nothing in what we were able to see suggested any shortcomings in conduct of polls - Indeed part of the reason for the commissioners using these organisations is that they provide credibility on the basis of their objectivity etc. However, limited access to the full set of data as we experienced it in some cases for this study make it difficult to respond to these challenges for the analysis of opinion polls and surveys.

A key issue to consider is how far the surveyed issues reflect a robust expression of public opinion towards these issues, how well informed that opinion is and how high the issue ranks in public attitudes: in other words, how knowledgeable are the public and how salient is the issue? Having already touched on the first of these aspects we focus here on the salience aspect.

Most of the surveys examined did not explore the relative importance which the public attach to their views whether in terms of the firmness of the opinion or the extent to which such views would shape their decision to vote (the exception here is the Greenpeace MORI poll of 2004). Moreover it is clear that generally energy issues have not been major campaign issues or manifesto points for the main political parties.

As Wylie and Hague (2003) note, while polls “offer a reliable way to gain a broadly representative indication of mass opinion”, the results of polls have to be related to the degree of importance which individuals attach to the issue. Wylie and Hague draw upon notions of salience and proximity to interpret the apparently negative attitudes of the public towards nuclear power. Contrasting the low levels of national support with relatively much higher levels in region near to the Sellafield site, they conclude that since nuclear power is an important issue for people in the region there is a greater degree of awareness of the technology and a more considered opinion whereas elsewhere in the country there is an almost “gut reaction” against nuclear power shaped by the poor image that the technology has in the media.

The reviewed surveys on wind confirm a similar phenomenon. While wind farms in the media are often described as spoiling the landscape, people living nearby existing wind farms show higher acceptance than the general public. However, while proximity to electricity generation sites lead to a certain salience of the issue and higher acceptance of them, it is debateable if this opinion is ‘more considered’ with respect to the energy technology itself as claimed by Wylie and Hague.

Like Sellafield most wind farms are located in remote or rural areas with weak economic infrastructure and little job opportunities for the local population. Electricity generation sites can fill this gap by offering jobs and income to the local community which can hence improve quality of life in the area. Thus, it could be argued that the salient issue is less the specific energy technology than economic benefits generated by these energy technologies.

What are the implications of this for the Research Councils?

Since 2000 there has been a substantial body of polling conducted on energy and energy technology issues in the UK. Moreover there appears to be a continuing commitment to the commissioning of such polls, at least as far as the wind and nuclear sectors are concerned: both BNFL and BWEA are likely to continue to commission polls on a regular basis.

This report has - given the resources available - only begun to explore this research and doubtless more sophisticated approaches (meta-analysis, statistical techniques) could go into greater depth and reveal more detailed findings (though such approaches would of course require full data sets).

Most of the available research has however concentrated on particular issues and technologies and has relied almost entirely on a single approach (opinion polling). There are therefore a number of gaps which should be followed up.

There is scope for more surveys drawing on other techniques of gauging public attitudes. The few polls considering knowledge and understanding of energy (and energy technology) issues show insufficient levels of basic knowledge to ensure an informed public opinion. There may be some value in repeating or extending the deliberative exercises which were undertaken in preparation for the Energy White Paper. In addition there may be scope for learning from other countries which have engaged in extensive energy consultations (for example, Finland and Belgium) and from exercises regarding other new technologies in the UK (most notably on biotechnology). If work in this area is commissioned it could be combined with a public opinion poll perhaps comparing the attitudes of those involved in the deliberative procedures with those of an “uninformed” sample.

As far as the substance of surveys is concerned, there needs to be a fuller survey of energy issues overall, taking into account a wider range of the existing and potential energy technologies and considering them both in relation to each other and with regard to a variety of energy policy considerations (supply security, cost, environmental protection, etc). In particular there is scope for a fuller exploration of attitudes to emerging technologies such as fuel cells and clean coal on the supply side and a more comprehensive analysis of energy efficiency opportunities. These elements could figure in a more integrated analysis of public attitudes.



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