

Nuclear Development

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## **Public Attitudes to Nuclear Power**

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NUCLEAR ENERGY AGENCY  
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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## FOREWORD

Many governments are re-evaluating their energy policies in the light of the multiple challenges of fossil fuel price volatility, climate change and ensuring security of energy supply. This report brings together a number of particularly insightful public opinion polls and surveys about nuclear energy with the objective of making the assembled outcome available to a wider audience of decision makers and opinion leaders. More than in most other areas of policy making, public attitudes are critical in shaping nuclear policies in OECD/NEA countries and the reverse may also be true, i.e. that policy itself can have an impact on public opinion. In those countries where nuclear already forms a part of the energy mix, the public tends to show distinctly more supportive attitudes.

OECD/NEA countries will only be able to make use of nuclear energy if a well-informed public considers that its benefits outweigh its risks, an opinion which is not yet widely shared in the countries polled. In the absence of dramatic events, opinion changes slowly and, in a number of countries surveyed, it has become more supportive of nuclear energy. However, a large minority of respondents holds no firm views. The attitude of this middle ground will be critical for any future developments in the role of nuclear energy.

This report provides a number of insights into public attitudes towards nuclear power. Support is generally correlated with the level of experience of and knowledge about nuclear energy. Interestingly, while the public is generally aware of the contribution of nuclear power to ensuring security of energy supply, its potential contribution to combating climate change is less well recognised. The public is also more concerned about nuclear waste, terrorism and proliferation than the safety of operations. In particular, solving the waste storage issue would significantly increase support for nuclear energy, as would a better appreciation of its possible role in reducing the emissions of greenhouse gases.

OECD/NEA governments may wish to reflect carefully on how to react to these results as, according to the surveys, they are the least trusted source on energy issues, far behind regulators, non-governmental organisations and

scientists. Those OECD/NEA governments that are seeking to make greater use of nuclear energy will have to muster a sustained effort to provide the general public with open, honest and balanced information.

### **Acknowledgements**

This report was written by Pal Kovacs and Torsten Eng, Nuclear Analysts, and Stan Gordelier, former Head of the NEA Nuclear Development Division, under the supervision of the NEA Committee for Technical and Economic Studies on Nuclear Energy Development and the Fuel Cycle (NDC).

## TABLE OF CONTENTS

<b>FOREWORD</b> .....	3
<b>KEY ISSUES SUMMARY FOR POLICY MAKERS</b> .....	7
<b>EXECUTIVE SUMMARY</b> .....	9
<b>1. BACKGROUND</b> .....	11
<b>2. RESULTS FROM INTERNATIONAL POLLS</b> .....	15
2.1 Eurobarometer studies .....	15
2.2 IAEA polls – Public opinion around the world on nuclear issues .....	34
2.3 Socio-demographic matters .....	37
2.4 International polls – general issues .....	38
<b>3. TIME TRENDS IN NATIONAL PUBLIC OPINION POLLS</b> .....	39
<b>4. IMPACTS OF NUCLEAR EVENTS ON PUBLIC OPINION</b> .....	45
<b>5. TRUST BUILDING THROUGH STAKEHOLDER     INVOLVEMENT</b> .....	47
<b>6. COMMUNICATION AND PUBLIC UNDERSTANDING</b> .....	51
<b>7. CONCLUSIONS</b> .....	53

### LIST OF FIGURES

Figure 1: What do you expect to be the top three energy sources in 30 years? .....	20
Figure 2: The advantages of nuclear power outweigh the risks it poses... ..	22
Figure 3: Level of personal experience and perception of risk .....	23
Figure 4: Level of knowledge and perception of risk .....	24

Figure 5: Degree of support for nuclear energy in countries with nuclear programmes .....	25
Figure 6: Degree of support for nuclear energy in countries without nuclear programmes .....	26
Figure 7: It is possible to operate a nuclear power plant in a safe manner.....	27
Figure 8: Terrorism is a major threat to nuclear power plant .....	28
Figure 9: The disposal of radioactive waste can be done in a safe manner.....	28
Figure 10: The use of nuclear materials is sufficiently protected against misuse.....	29
Figure 11: Change in acceptance of nuclear power if radioactive waste disposal problem was solved.....	31
Figure 12: Confidence in nuclear regulators, operators and legislation.....	33
Figure 13: Finland.....	40
Figure 14: France .....	40
Figure 15: Hungary .....	41
Figure 16: Japan.....	41
Figure 17: Sweden .....	42
Figure 18: The United Kingdom.....	42
Figure 19: The United States .....	43
Figure 20: Perceptions of Tokai Mura residents on safety of nuclear power facilities before and after the 1999 accident.....	46

## LIST OF TABLES

Table 1: What are the most important issues facing your country today? .....	16
Table 2: When you first think about energy related issues, what comes first into your mind? .....	17
Table 3: In your opinion, which two of the following should be given priority in your Government(s) energy policy? .....	19
Table 4: To what extent do you trust information about energy related issues from the following sources?.....	32
Table 5: Support for expansion of nuclear power before and after the benefits of nuclear to combat climate change have been explained .....	36
Table 6: Summary of time trends in support for nuclear energy .....	39

## KEY ISSUES SUMMARY FOR POLICY MAKERS

- While many governments are reconsidering the role of nuclear energy in their national energy mix, nuclear power is still a contentious issue with respect to public opinion. This study uses a variety of public opinion poll data to explore what the public thinks and why.
- Nuclear energy does not feature amongst most people's highest concerns. The highest energy related concerns are those of price and security of energy supply.
- Public opinion on nuclear energy seems to change slowly and is not normally volatile. Not surprisingly however, dramatic events (e.g. the Three Mile Island and Chernobyl accidents) can cause a rapid drop in public support, which only recovers slowly.
- The data clearly show that countries that already include nuclear power in the energy mix have publics that are more knowledgeable on the issues and are more supportive. Which comes first is not clear.
- There are large sections of the public with no firm views for or against nuclear energy in many countries. If governments want to introduce or continue to use nuclear power in the energy mix, the attitudes of this middle ground will be critical.
- There is a clear correlation between knowledge and support. Large parts of the public are still unaware of (or choose not to believe) the potential benefit of nuclear energy to reduce the emissions of climate change related carbon dioxide.
- The factors that reduce public support for nuclear energy are concerns with respect to terrorism, radioactive waste disposal and the misuse of nuclear materials, in that order. The concern with respect to terrorism still seems to be strong, well after the events of 11 September 2001.

- When the climate change benefits of nuclear energy are explained, the support for nuclear energy amongst respondents increases significantly. Similarly, if the radioactive waste disposal issue was satisfactorily resolved, support would again significantly increase.
- The data show that males are more supportive of nuclear energy than females, that support generally increases amongst the more highly educated, amongst those with right of centre political views and older members of the community.
- If governments wish to expand the use of nuclear energy, an ongoing relationship between policy makers, the nuclear industry and society that develops knowledge building and public involvement will become increasingly important. This communication must be open, honest and balanced.
- The public gains most of its information on energy and nuclear power from the media, but does not trust it. Scientists and environmental protection or consumer organisations are the most trusted groups. National governments are, in general, even less trusted on these issues than the media. This presents a clear problem to governments who wish to educate and influence their publics.



## **EXECUTIVE SUMMARY**

Many countries are revisiting their energy policies in the light of concerns about climate change, security of energy supply and fossil fuel price volatility. Nuclear energy is seen as having significant benefits in alleviating these difficulties. Despite this, nuclear energy remains contentious with the general public of most countries. This report explores a variety of public opinion data to try to understand public attitudes towards the various issues associated with energy and nuclear energy in particular. It uses these data to explore what drives these opinions and how policy makers might best interact with their publics to achieve an informed debate on energy matters.

The study first makes considerable use of Eurobarometer data, which provides a rich source of information via its several related studies and allows comparison across a wide selection of European countries using a consistent methodology and consistent questions. This allows, in particular, a comparison of countries which currently employ nuclear power in their energy mix and those that do not.

Use is then made of an International Atomic Energy Agency (IAEA) opinion poll, conducted on its behalf by an independent professional polling organisation. The data in this survey were collected from 18 countries, only four of which are members of the European Union. A comparison of the two sets of results serves to show that the messages derived from the Eurobarometer studies are generally applicable to a wider spectrum of countries.

Finally, where data were readily available (7 countries), time series data are used to explore the trends in public opinion over time. These data show that, outside of the periods associated with dramatic events, public opinion changes slowly and, excluding some degree of uncertainty associated with polling errors, is not particularly volatile. Accidents, however, can cause a rapid reduction in public support for nuclear energy, which only recovers slowly. In 6 out of 7 of the countries considered, public opinion has been growing more supportive of nuclear energy in the energy mix.

The data show that countries where nuclear energy is already present have populations that are generally much more supportive of its use. They also show that these publics are generally better informed and more knowledgeable on nuclear issues and there is a clear positive correlation between knowledge and support. However, a difficulty for countries wishing to introduce or continue to use nuclear energy is that government information sources are generally one of the least trusted sources of information in this field.

## **1. BACKGROUND**

There is increasing concern on energy issues in many OECD and other countries with respect to rising and volatile prices, security of supply and carbon-dioxide releases leading to climate change. Nuclear energy is regarded by many governments as having a potential role in addressing all three of these difficulties, but it remains a contentious technology with the public. We cannot hope to understand public attitudes to nuclear energy, and the issues that influence these attitudes, without asking people for their views.

Public opinion is typically measured through opinion polls and there is strong evidence to show that, if properly conducted, polls generally provide objective and trustworthy reflections of public opinion. That said, there are many points to be taken into consideration when assessing the validity of an individual poll. Among these are:

- Whether the organisation that commissioned the poll has a vested interest in a specific outcome.
- Whether the question wording and ordering will influence respondents to answer in certain ways. Asking respondents to choose between categories (e.g. do you prefer nuclear energy to renewables?) and using closed questions hides the reasons behind public opinion. It is preferable to use open questions that lead to spontaneous answers.
- Whether the sample is representative of the relevant population (for example, gender, age, education) and contains an adequate number of respondents.

Differences in wording and methodologies can produce misleading comparisons between the outcomes of different polls.

Nuclear energy is a controversial issue and a difficult topic for opinion polls. Respondents tend to have a general opinion on the matter, but nuclear issues can provoke attitudes that are not necessarily linked to people's level of knowledge of the subject or awareness of current affairs. However, data on public attitudes to nuclear energy can be found in a number of high-quality

opinion polls. Opinion polls may be imprecise, but they are the only readily available tool to allow an understanding of the public's views.

This study starts by looking at peoples' overall concerns, to see where energy issues and nuclear energy in particular fit into the big picture. It then drills down into their views on nuclear energy specifically, to understand which particular issues give rise to concern, and why. Some of the factors driving concerns on nuclear energy relate to a perceived lack of information; a later Section looks at which organisations are trusted by the public to provide understanding.

Because of the need to compare equivalent polls, with a consistent client, purpose, wording and methodology, the matters described above are mainly summarised by reference to the Eurobarometer series of polls. In 2007, Eurobarometer published the results of extensive public opinion surveys on knowledge and perception of energy technologies [1] and on attitudes to nuclear safety [2]. These surveys were carried out in 2006 on behalf of the European Commission, to provide an insight into the views of the 500 million citizens of the 27 European Union countries.<sup>1</sup> A 2005 Eurobarometer poll addressed attitudes to radioactive waste [3].

The study then looks at the outcome of an IAEA sponsored poll that considers public opinion from around the world, in an attempt to judge whether the picture in Europe is typical. It also looks at how public attitudes towards nuclear energy have changed over the past decade, by reference to some internally consistent national time-series polls. It then, briefly considers some socio-demographic factors and, finally, discusses social factors and communications.

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1. EU countries that have nuclear power plants: Belgium, Bulgaria, the Czech Republic, Finland, France, Germany, Hungary, Lithuania, the Netherlands, Romania, Slovenia, Slovakia, Spain, Sweden and the United Kingdom. Bulgaria and Romania joined the EU during the period of these polls; results from these countries are only included in the nuclear safety poll.

EU countries that do not have nuclear power plants: Austria, Cyprus, Denmark, Estonia, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Poland and Portugal.

## References

- [1] European Commission (2007), Special Eurobarometer, *Energy Technologies: Knowledge, Perception, Measures*, available at: [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_262\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_262_en.pdf)
- [2] European Commission (2007), Special Eurobarometer, *Europeans and Nuclear Safety Report*, 271/Wave 66.2 – TNS Opinion & Social available at: [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_271\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_271_en.pdf)
- [3] European Commission (2005), Special Eurobarometer, *Radioactive waste*, available at: [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_227\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_227_en.pdf)

## 2. RESULTS FROM INTERNATIONAL POLLS

### 2.1 Eurobarometer studies

Since 1973, the European Commission has been monitoring the evolution of public opinion in the Member States. Surveys and studies address major topics concerning European citizenship: enlargement, social situation, health, culture, information technology, energy, environment, etc. These studies can be grouped into five different sets based on the methodological approach. These are: standard, special, candidate country, flash (or *ad hoc*) and qualitative Eurobarometers.

- The standard Eurobarometer was established in 1973. Each survey consists of approximately 1 000 face-to-face interviews per Member State (except Germany: 1 500, Luxembourg: 600, United Kingdom: 1 300 including 300 in Northern Ireland). Conducted between 2 and 5 times per year, with reports published twice yearly.
- Special Eurobarometer reports are based on in-depth thematic studies carried out for various services of the European Commission or other EU Institutions and integrated in Standard Eurobarometer's polling waves.
- Candidate Countries Eurobarometer studies were carried out in between 2001 and 2004 in all the 13 countries applying for membership. Its methodology was almost identical to that of the Standard Eurobarometer. One report was published each year, excluding the special reports.
- Flash Eurobarometer ad-hoc thematic telephone interviews conducted at the request of any service of the European Commission. These surveys enable the Commission to obtain results relatively quickly and to focus on specific target groups, as and when required.
- Qualitative Studies investigate in-depth the motivations, the feelings, the reactions of selected social groups towards a given subject or concept, by listening and analysing their way of expressing themselves in discussion groups or with non-directive interviews.

Eurobarometer reports on radioactive waste (227, 297), nuclear safety (271), energy technologies (262) and climate change (300) are all special thematic in-depth reports, while policy issues, e.g. on the EU energy policy (206a), are quick *ad hoc* telephone interviews, flash reports. These are the Eurobarometer reports that are analysed in this study.

**2.1.1 The big picture: is nuclear energy really one of the public’s major concerns?**

Some stakeholders have the impression that nuclear energy is a major concern for many people. The Eurobarometer Special Report on Energy Technologies [1] gives an insight into the issues that people see as important and the relative positioning of energy issues in this overall picture. To find out where energy issues are situated in their daily lives, respondents were asked to state, *spontaneously*, which of the issues facing their country today they consider the most important. The results are shown in Table 1.

**Table 1: What are the most important issues facing your country today?**

Issue	%
Unemployment	64
Crime	36
Healthcare system	33
Economic situation	30
Immigration	29
Pensions	28
Inflation	26
Education system	19
Terrorism	19
Taxation	19
Housing	15
Energy prices and shortages	14
Environmental protection	12
Public transport	6
Defence and foreign affairs	5

Unemployment was cited as the issue of most concern by 64% of those polled, followed by crime (36%), healthcare (33%), the economic situation (30%), immigration (29%), pensions (28%), rising prices (26%), education

(19%), terrorism (19%), taxation (19%), housing (15%) and then energy, mentioned by just 14% of respondents. Protecting the environment was cited by 12%. Nuclear energy did not figure in this spontaneous statement of concerns, indeed energy related issues in general seem to have relatively low importance.

Table 2 shows the results from a second question requiring a spontaneous answer *When you think about energy related issues, what comes first into your mind?*, one-third said price and one-quarter said sufficiency of energy, either in terms of electricity supply, limited energy sources or energy dependency.

Nuclear energy was spontaneously mentioned by just 8% of people in total, although more by the citizens of Sweden (30%) and France (22%), which were also the countries where the lowest numbers of people (18%) mentioned energy prices. Half of Sweden’s electricity supply comes from nuclear and in France, four-fifths. It should be noted that this 8% of respondents said “nuclear energy” rather than, for example, “concerns over nuclear energy”. Similarly, 14% said “renewable energy sources” and 4% said “gas”. In almost every country, energy prices were spontaneously mentioned most often as the first thing associated with energy issues.

**Table 2: When you first think about energy related issues, what comes first into your mind?**

Issue	%
Energy prices	33
Renewable energy sources	14
Electricity supply	12
Limited energy sources	9
Nuclear energy	8
Environmental issues	7
Energy consumption	6
Fuel	6
Ways to use energy	4
Gas	4
Energy dependence	3
Importance of energy	3
Other fossil fuels	3
Power plants	1

The conclusion from these Eurobarometer Energy Technologies poll questions is that nuclear energy does not dominate people’s everyday concerns.



Issues that rank uppermost in importance relate more directly to economic stability, crime and healthcare. Energy-related issues that are important in the minds of those polled are volatile energy prices, insecurity of energy supplies – matters that do affect people on a day-to-day basis – and the promise of renewable energy sources.

### ***2.1.2 How much do people know about energy-related issues?***

It is helpful to recognise peoples' level of knowledge and awareness of the matters on which they are voicing opinions. The Eurobarometer poll on Energy Technologies [1] examined citizens' knowledge of energy-related issues, including new energy technologies and energy dependency, both at country and at continental level.

People were asked which of coal, oil, gas, nuclear, hydroelectric, biomass, wind, solar and ocean are the three most used energy sources in their country. Citizens correctly identified the three most used primary energy sources at EU level as oil, gas and nuclear, but tended to have only a vague idea of the importance of the three most used energy sources in their own country. People tend to overestimate the share of renewable energy sources, although in countries where nuclear energy is among the top three energy sources, respondents are generally aware of this fact.

To explore perceptions of energy dependency, citizens were asked to what extent their country and the EU as a whole is dependent on energy coming from abroad. Almost two-thirds (61%) of people correctly think that their country is entirely or very much dependent on imported energy, whilst just over half (53%) think the EU as a whole is dependent on external energy imports. Spanish citizens stand out as thinking their country is more energy independent than it truly is. Only 42% believe Spain is dependent on imported energy whereas the country actually imports 81% of its needs.

Over half of those polled claim to have heard of nuclear fusion (58%) and almost one-third (31%) claimed to have heard of fourth generation nuclear reactors. It should be remembered that this question measures whether respondents have heard of the technologies, not whether they understand them. Countries where citizens appear to be more aware than the average about new energy technologies are France, Germany, Finland, Luxembourg and Sweden.

In summary, two-thirds of respondents understand that their country is dependent on imported energy sources. They did not always know which energy sources were the most important in their country, although citizens of countries

with nuclear power were generally aware of this. They had a better knowledge of important energy sources at EU level, including the fact that nuclear is currently a significant contributor to energy supply.

### **2.1.3 Energy-related threats and expectations**

The Eurobarometer poll on Energy Technologies [1] also examined peoples' expectations of national energy policy in their country. The results are shown in Table 3. When asked to choose two priority measures for Government energy policy from a list, 45% said guaranteeing low prices and 35% guaranteeing a continuous supply of energy. Protecting the environment and fighting global warming were mentioned by 29% and 13% respectively, guaranteeing national energy independence by 18% and protecting public health by 22%.

Again, we see that price and security of supply are the most important energy related issues in peoples' minds.

**Table 3: In your opinion, which two of the following should be given priority in your Government's energy policy?**

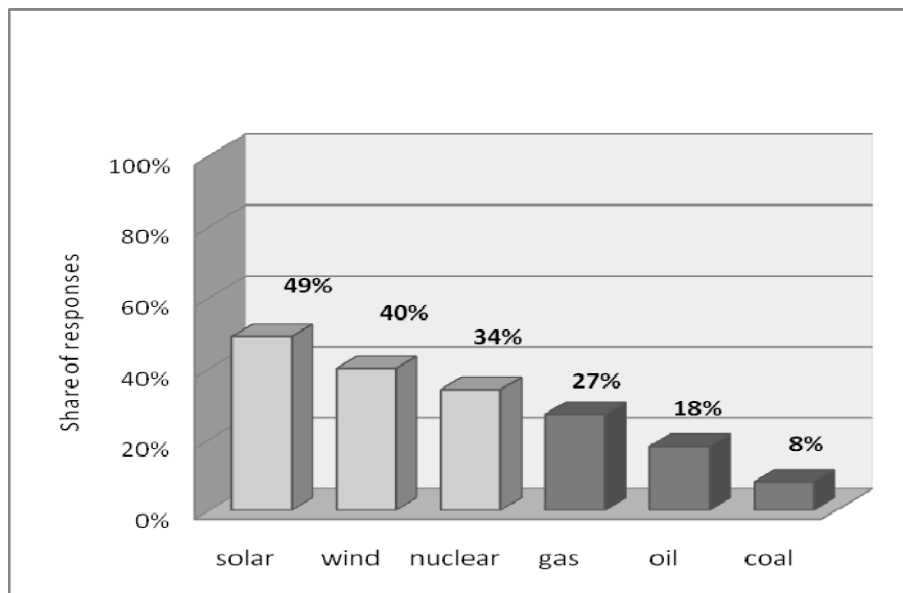
<b>Issue</b>	<b>%</b>
<b>Guaranteeing low prices for consumers</b>	<b>45</b>
<b>Guaranteeing a continuous supply of energy</b>	<b>35</b>
<b>Protecting the environment</b>	<b>29</b>
<b>Protecting public health</b>	<b>22</b>
<b>Guaranteeing your country independence in the field of energy</b>	<b>18</b>
<b>Reducing energy consumption</b>	<b>15</b>
<b>Fighting global warming</b>	<b>13</b>
<b>Guaranteeing the competitiveness of your country's industries</b>	<b>7</b>

When asked about energy-related threats to their country over the next three years, 76% thought "very likely" or "somewhat likely" a doubling or more of energy prices, 48% a significant disruption in gas supply, 40% a terrorist attack on energy infrastructure and 36% a national electricity blackout.

The perceived potential of renewable energy sources becomes clear when respondents were asked which would be the three most used energy sources in their country in 30 years time. As it is shown on Figure 1 respondents expect

the use of fossil fuel, in particular oil and gas, to drop drastically and to be replaced by dramatic rises in renewable energy, in particular solar and wind. Only nuclear and hydroelectric energy are expected to provide similar amounts of energy in 30 years time as they do today. Solar energy is expected to be among the top three in 21 of the (then) 25 EU states, with citizens of Belgium, France, Germany, Hungary and Luxembourg in particular expecting to see solar as a significant source of energy. Only 27% think gas will be in the top three, 18% oil and 8% coal.

**Figure 1: What do you expect to be the top three energy sources in 30 years?**



This examination of expectations and perceived threats shows the overwhelming importance of energy price and security in the minds of respondents. The poll also demonstrates that people have what may be a somewhat unrealistic perception of the contribution solar and wind energy could make to energy supplies in the future. However, the only energy source that is in peoples' understanding of the top three, both today and in 30 years time, is nuclear. Across Europe, people expect the share of nuclear energy to stay approximately the same in the future as it is today, with 14 EU states expecting it to be in the top three future energy sources in their country.

### ***2.1.4 Perceptions of risk and value in nuclear energy***

The previous sections reveal that, as far as energy-related issues are concerned, peoples' primary concerns relate to energy prices and security of supply. When asked spontaneously to list them, nuclear energy does not dominate people's concerns. Across Europe, nuclear is put in the top three most used energy sources both today and in 30 years time.

However, when the Eurobarometer poll on Energy Technologies asked, *Are you in favour or opposed to the use of nuclear energy in your country?*,<sup>1</sup> only 20% of people overall were clearly in favour of nuclear, with 36% having balanced views, and 37% clearly opposed. See Section 6 for further analysis of these data. People are much more positive about the use of renewable energy sources: 80% support the use of solar energy, 71% wind energy, 65% hydroelectric energy, 60% ocean energy and 55% biomass energy. Very few respondents oppose these energy sources. As regards fossil fuels, 42% are in favour of the use of gas and about a quarter accept the use of oil and coal.

The Eurobarometer poll Europeans and Nuclear Safety [2] looked at whether people perceive any value in nuclear energy. It found that 69% of people agree that nuclear makes their country less dependent on energy imports and so increases security of supply, 50% agree that it ensures lower and more stable energy prices and 46% agree that nuclear energy helps to limit global warming.<sup>2</sup> In all cases, respondents who agree with these three assertions are in the largest group.

Why then are 37% of people polled clearly opposed to the use of nuclear energy in their country? The Eurobarometer poll Europeans and Nuclear Safety [2] provides some answers by asking the question *When you think about nuclear power, what first comes to mind?* The risks of nuclear power as an

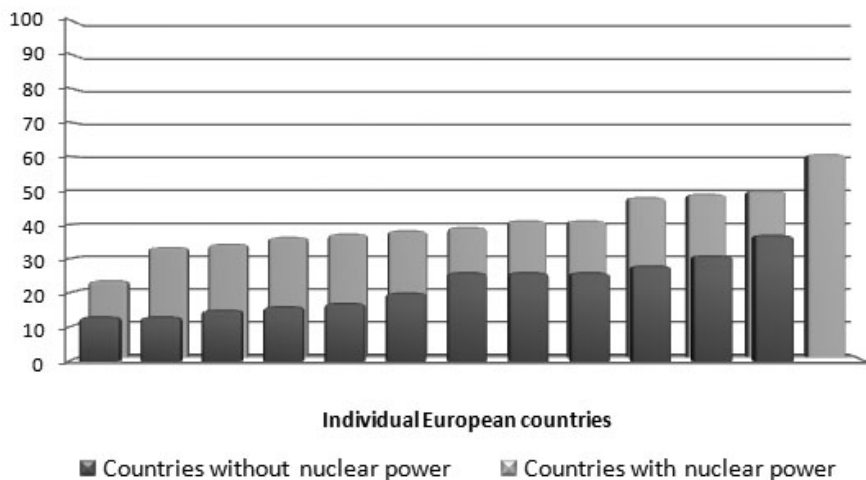
- 
1. Eurobarometer respondents were asked to use a scale from 1 to 7, '1' meaning "strongly opposed" and '7' meaning "strongly in favour". Eurobarometer took '1' and '2' responses to be "opposed" and '6' and '7' responses to be "in favour". Responses '3', '4' and '5' were taken as "balanced views".
  2. A high level (23%) of "don't knows" is seen in response to the question about nuclear energy's effect on global warming, implying considerable lack of understanding of the low level of greenhouse gas emissions by nuclear energy compared with fossil energy sources.

energy source were judged to outweigh its advantages by 53% of respondents overall, whilst only 33% judge that the advantages outweigh the risks it poses.<sup>3</sup>

Data gathered in this poll also show that perceived levels of knowledge in and personal experience of nuclear energy have a significant impact on views about nuclear energy. This is demonstrated in a number of ways.

First, Figure 2 presents the level of respondents’ agreement with the statement *The advantages of nuclear power outweigh the risk it poses* dividing responses into countries that have nuclear energy – where citizens are likely to perceive they have more knowledge – and those that do not. This Figure clearly demonstrates that in countries where there is an existing nuclear power programme, people perceive the risks as lower than do their counterparts in countries with no nuclear power. However, in only six countries do respondents who consider that the advantages of nuclear energy are greater than the risks it poses outnumber those who are of the opposite view. These are Sweden, where 61% of respondents think this (despite their Government’s policy at the time to phase out nuclear energy), Bulgaria, the Czech Republic, Estonia, Finland and Slovakia. Estonia is unusual in this regard, as it does not have nuclear power.

**Figure 2: The advantages of nuclear power outweigh the risks it poses**

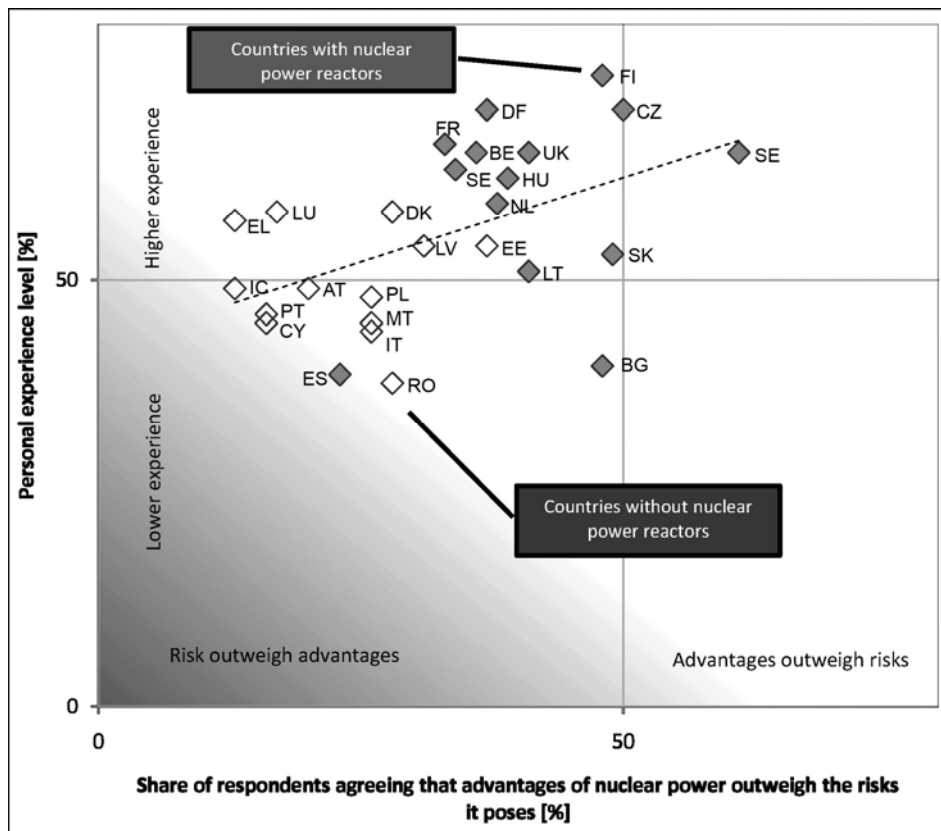


3. Respondents were asked to choose between two answers: “The advantages of nuclear power as an energy source outweigh the risks it poses” and “The risks of nuclear power as an energy source outweigh its advantages”. Six percent of people spontaneously said “neither” whilst 8% responded “don’t know”.

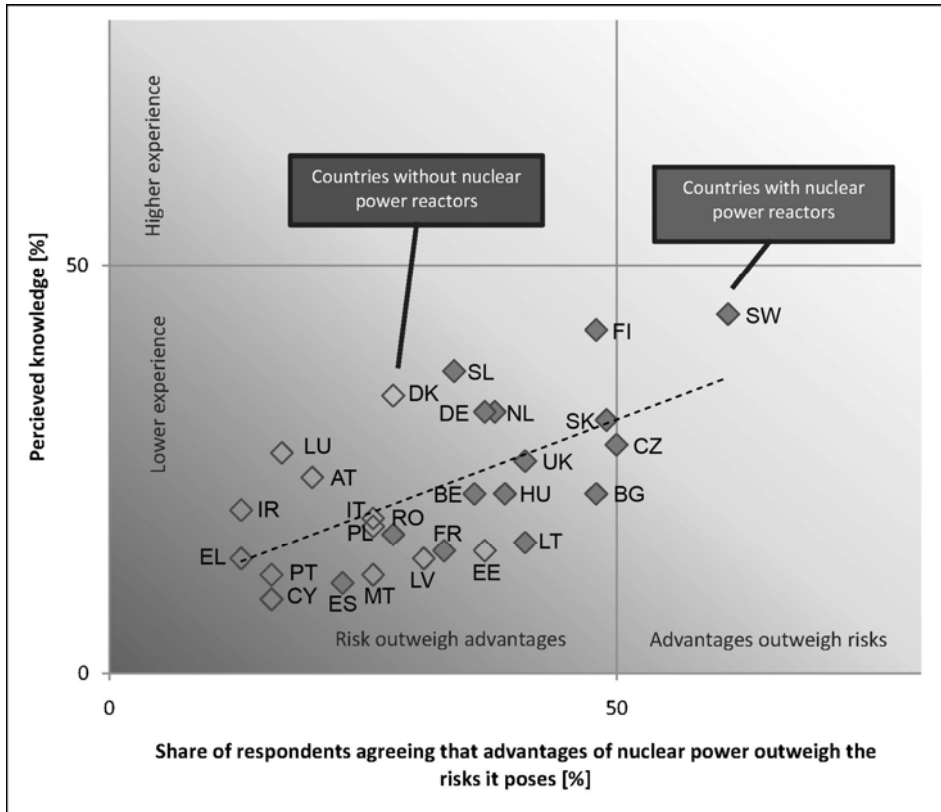
The Eurobarometer poll on Europeans and Nuclear Safety shows that personal experiences of nuclear issues have an impact on public opinion, albeit rather small. This is shown in Figure 3, where the vertical axis indicates the percentage of respondents who believe they are experienced. The experiences polled were those of having visited a nuclear power plant, having lived within 50 km of one or having worked on nuclear energy issues or having known somebody working on them. People in Luxembourg report high levels of personal experience of nuclear energy, but still think the risks outweigh the advantages.

Figure 4 (where the vertical axis indicates the percentage of respondents who feel themselves to be informed) shows that people who feel informed about nuclear safety tend to perceive less risk than those who feel uninformed. This is particularly the case in Sweden. The feeling of being informed appears to play a more significant role than does personal experience when people form opinions on the advantages and risks of nuclear energy.

**Figure 3: Level of personal experience and perception of risk**



**Figure 4: Level of knowledge and perception of risk**



In summary, two-thirds of people agree that nuclear power helps to make their country less dependent on energy imports, half agree that it ensures lower and more stable energy prices and just under half recognise the benefits in terms of climate change. Despite this, over half of people see the risks of nuclear power as outweighing its advantages, particularly if they live in countries with no nuclear power, and so have little personal experience of it, or if they do not feel well informed. Only one-third of those polled thought the advantages of nuclear outweighed the risks.

### ***2.1.5 The spectrum of public opinion***

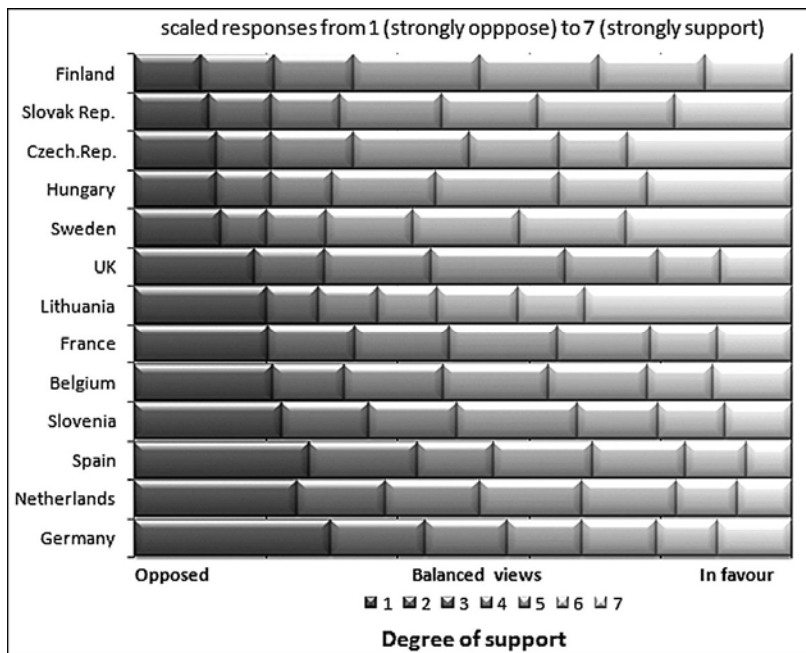
Many opinion polls asking respondents whether they are supportive of nuclear energy require simple “yes” or “no” answers. These can be useful to determine time trends, as shown in Section 12, but can hide nuances in the data. The Eurobarometer poll on Energy Technologies asked, *Are you in favour or*

*opposed to the use of these different sources of energy in your country.* As shown in the main text of the poll report, and described in the previous Section, 20% of people are in favour of nuclear, with 36% having balanced views, and 37% are opposed. It is useful to look more deeply at these data to understand the significance of that fraction of respondents said to have balanced views.

Eurobarometer respondents were asked to use a scale from 1 to 7, ‘1’ meaning “strongly opposed” and ‘7’ meaning “strongly in favour”. Eurobarometer took ‘1’ and ‘2’ responses to be “opposed” and ‘6’ and ‘7’ responses to be “in favour”. Responses ‘3’, ‘4’ and ‘5’ were taken as “balanced views”.

Figure 5 presents these data in more detail for those countries that have nuclear power programmes. In this figure, countries are ordered by the fraction of respondents having balanced views as shown by the three centre blocks.

**Figure 5: Degree of support for nuclear energy in countries with nuclear programmes**



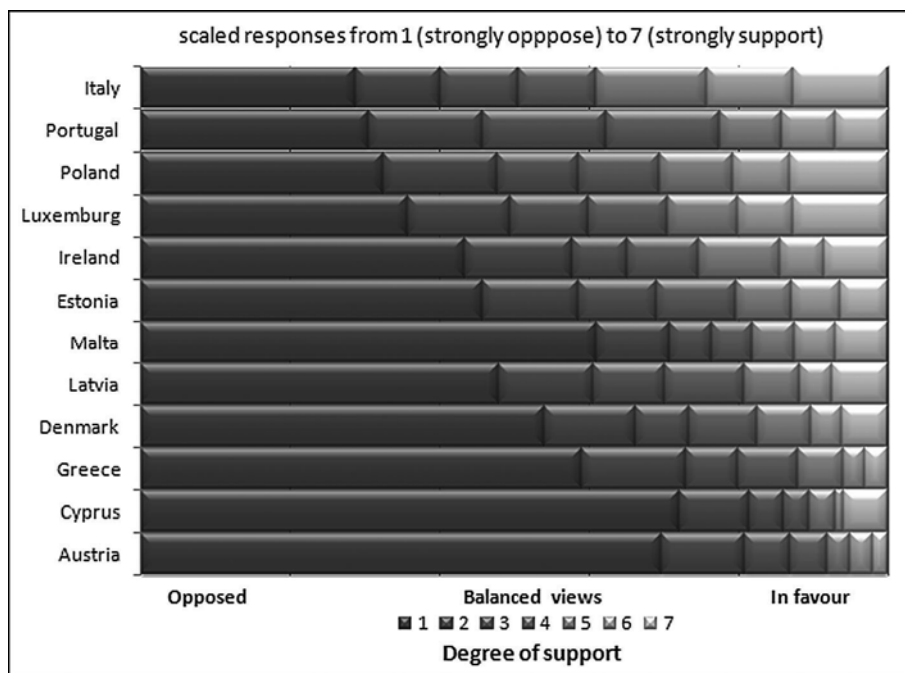
This figure shows a broad – and rather balanced – spectrum of opinion with 41% of people having centre-weighted views with ‘3’, ‘4’ and ‘5’ responses. In contrast, 28% gave ‘6’ and ‘7’ (in favour) responses and 31% said ‘1’ and ‘2’ (opposed). This group of people with centre-weighted views forms the plurality (i.e. the option attracting the largest vote where there are more than



two options) in Belgium, the Czech Republic, Finland, France, Hungary, Slovakia, Slovenia and United Kingdom and almost equals the number opposed to nuclear across the EU. It is likely that people in the centre ground feel uninformed and that they would formulate a more definitive opinion if they had more information. In those countries wishing to continue to deploy nuclear energy, therefore, communication strategies might usefully target this group of people.

Figure 6 shows a similar set of data for those countries without nuclear power programmes. This figure shows a very different spectrum of opinion with only 25% of people having centre-weighted views with '3', '4' and '5' responses. In contrast, only 12% gave '6' and '7' (in favour) responses and 54% said '1' and '2' (opposed).

**Figure 6: Degree of support for nuclear energy in countries without nuclear programmes**



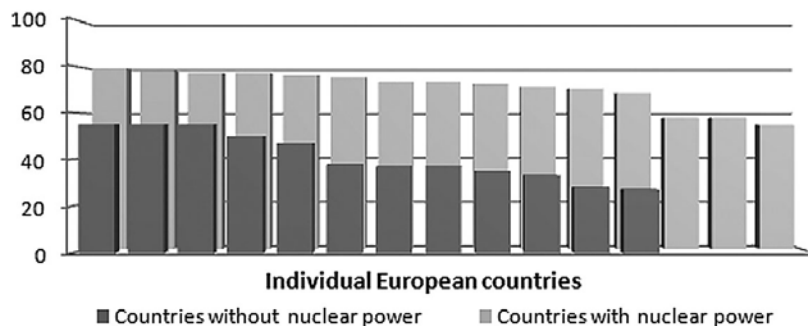
It follows that governments wishing to introduce nuclear power to these latter countries will need to address their communication strategies not only to those in the centre ground, but also to at least some of those people that are strongly opposed to the development.

### 2.1.6 What drives public opinion on nuclear energy?

The Eurobarometer poll on Europeans and Nuclear Safety included questions about specific risk factors, to analyse what influences risk perceptions.

Firstly, we should recognise that a majority (59%) believes that nuclear plants can be operated safely against 31% who do not. This is shown in Figure 7.

**Figure 7: It is possible to operate a nuclear power plant in a safe manner**  
[Answer: "Agree"]



Respondents believe the biggest risks associated with nuclear power are:

- terrorism, with 74% of respondents agreeing that this is a major threat to nuclear power plants (The fieldwork for this report was conducted in November 2007, some 6 years after the 11 September 2001 attacks in the United States);
- disposal of radioactive waste, with only 39% agreeing that it can be done safely;
- misuse of radioactive materials, where only 38% agreed with the proposition that nuclear materials can be sufficiently protected from misuse.

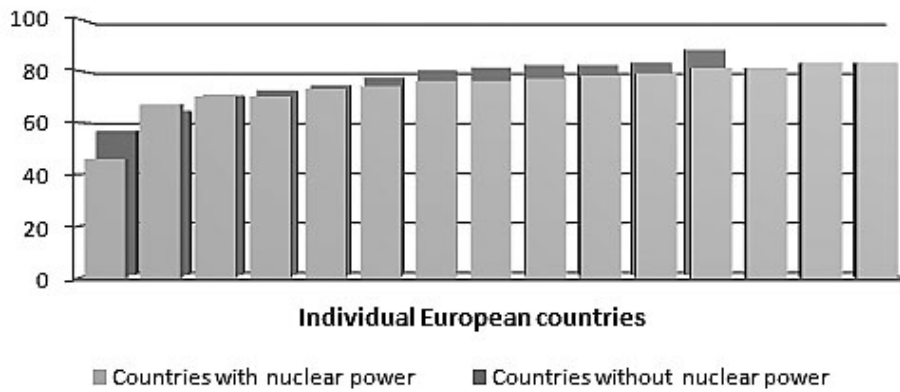
Figures 8 to 10 show the outcomes of these questions with the results split between countries with and without nuclear power.

In addition, only 51% think that their national nuclear safety authority is capable of ensuring safe nuclear operation. Public opinion is almost evenly split over whether radioactive materials can be transported safely, and the sufficiency of national nuclear safety legislation.

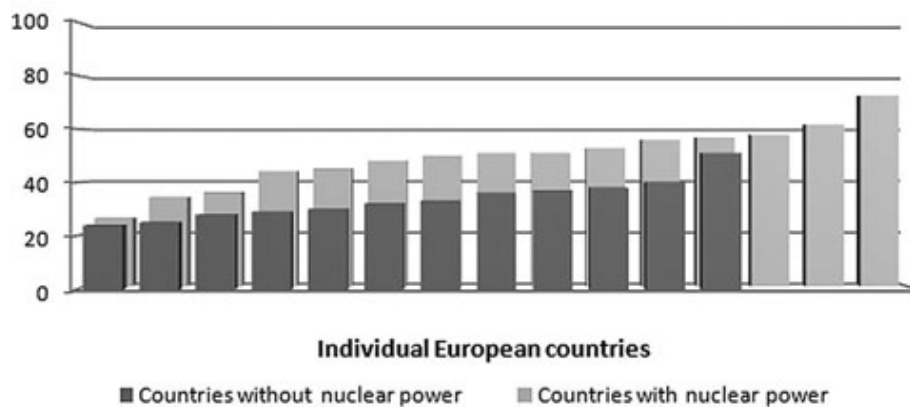
*It is important to recognise that these are responses to closed questions and that the poll did not provide the opportunity for respondents to suggest other risks.*

The majority of people in each country where nuclear power plants operate are confident this can be done safely. In addition, where nuclear plants operate, the majority of people trust the companies that run them – except in Germany – and people tend to be more trusting of their national nuclear safety authorities.

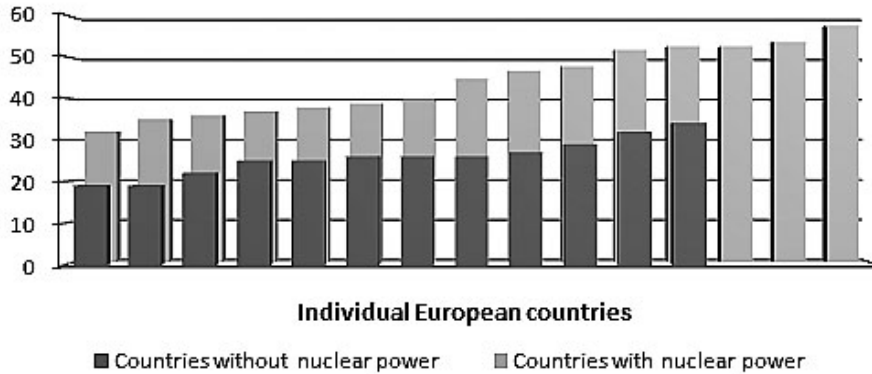
**Figure 8: Terrorism is a major threat to nuclear power plants**  
[Answer: "Agree"]



**Figure 9: The disposal of radioactive waste can be done in a safe manner**  
[Answer: "Agree"]



**Figure 10: The use of nuclear materials is sufficiently protected against misuse**  
 [Answer: "Agree"]



However, irrespective of whether they have nuclear plants or not, the majority of people in all countries – except Spain – think terrorism is a major threat to nuclear plants. Perhaps the potential cross-border consequences of terrorist actions influence this outcome.

Half of European citizens think radioactive waste cannot be disposed safely, although 39% believe that a solution does exist. Only seven countries have a majority believing that a safe solution exists for the final management of radioactive waste. These include a non-nuclear country, Greece. However, in 12 countries, a plurality believes that a safe solution exists for the final management of radioactive waste: the difference between plurality and majority is because of a significant proportion of “don’t know” responses. In France, 65% of citizens do not believe that radioactive waste can be managed safely even though the French Government has made firm decisions on the matter and 80% of French electricity comes from nuclear plants.

Although the Eurobarometer poll did not directly address views on the cost of nuclear energy, it seems likely that people would be less opposed if it were clear that nuclear would reduce the price they paid for electricity. As noted above, 50% agree that nuclear ensures lower and more stable energy prices and Section 2 showed that price are at the top of peoples’ concerns about energy. Conversely, opposition is likely to grow if people start to believe that nuclear produced electricity would increase their fuel bills.

In summary, the Eurobarometer poll shows that respondents are rather more concerned about the “by-products” of nuclear energy (radioactive waste, terrorism and proliferation) than about the operation of the nuclear plants themselves.

### *2.1.7 Radioactive waste disposal*

The previous Section showed that disposal of radioactive waste is seen by many as a significant reason to oppose nuclear energy. This Section explores this matter in more detail, drawing on a third Eurobarometer poll on radioactive waste. The fieldwork for this poll was carried out in 2005.

Data presented in the Eurobarometer Radwaste poll allow insight into changes in attitudes to nuclear energy if the radioactive waste problem were solved.

The poll first asked, *Are you totally in favour, fairly in favour, fairly opposed or totally opposed to energy produced by nuclear power stations?* This showed 55% of people to be opposed to nuclear and 37% to be in favour. Opponents of nuclear energy were then asked to what extent they would be in favour of nuclear energy **if** the problem of radioactive waste were resolved.

Responses to this question show that 38% of those opposed to nuclear energy would support it, if the issue of radioactive waste disposal were to be resolved. Just over a half (57%) of people opposed to nuclear would continue to be opposed if the issue of waste were resolved.

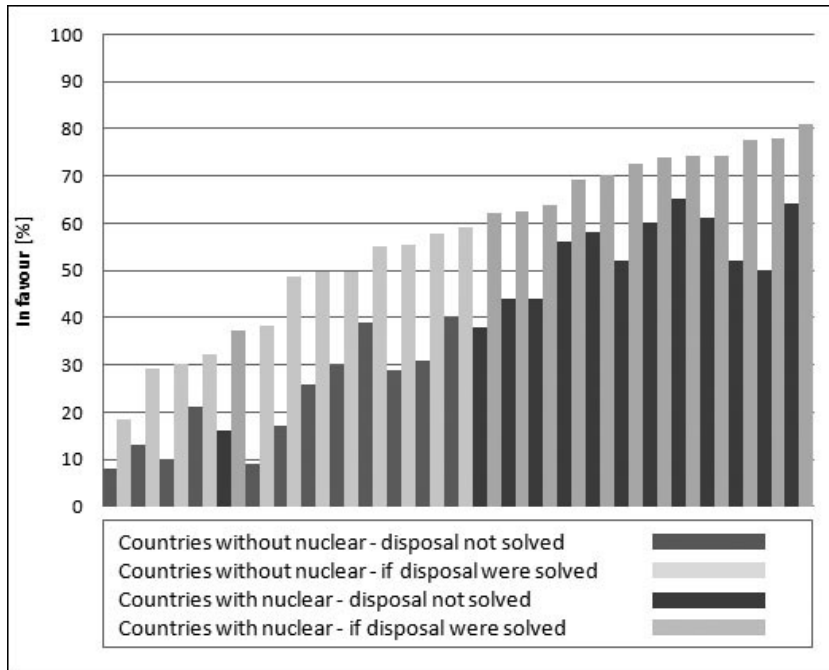
This outcome is shown in Figure 11, again split between countries with and without nuclear power. This shows that citizens of 16 of the (then) 25 EU countries would support nuclear if the waste problem were solved, about double the number that support nuclear with the issue unresolved.

More evidence of the depth of concern on waste disposal comes from responses to further questions in the Eurobarometer Radwaste poll.

- 92% agree that a solution for highly radioactive waste should be developed now and not left for future generations;
- 81% believe that it is politically unpopular to take decisions about the handling of any dangerous waste;
- 79% think that the delay in making decisions in most countries means there is no safe way of disposing of highly radioactive waste.

It is immediately clear that opposition to nuclear energy would reduce considerably if the matter of waste disposal were resolved.

**Figure 11: Change in acceptance of nuclear power if radioactive waste disposal problem was solved**



**2.1.8 The need for better information on nuclear energy**

In general, it seems that people become increasingly supportive of nuclear when they feel better informed. The Eurobarometer polls show that Europeans believe they are not familiar with nuclear safety issues. A quarter feel “completely uninformed” about them and a further half feel “not very well informed”. As seen above, the feeling of being informed is linked to whether or not a country has nuclear power plants.

Section 6 showed that, when asked for opinions against a spectrum of possible responses, a significant number of people in countries with nuclear plants occupied a centre ground of opinion rather than forming an opinion at the extremes of the scale. The Eurobarometer Europeans and Nuclear Safety poll allows insight into whether support for nuclear energy would increase if people better understood its potential benefits. The poll asked whether the current level of nuclear energy as a proportion of all energy sources should be reduced, maintained or increased. Assertions were then provided of the value of nuclear power to combat climate change and increase energy security. Given that the assertions were true, 21% of those who previously wanted to reduce the share of

nuclear energy would now maintain its share, and a further 6% would increase it. Among those who initially wanted to maintain the share, 16% would now increase it. Providing more information about nuclear power as an energy option appears to have a positive effect on attitudes towards it.

The mass media are peoples' main source of information, with 87% getting their information from television, 44% from radio and 37% from local or regional newspapers. Only a few think that the media provide sufficient information to form an opinion on nuclear issues. With the exception of Finland, in every country the vast majority of people feel that the information the media offer is not sufficient.

Only a quarter of people polled are satisfied with the information on nuclear issues received in schools.

Who then is trusted to provide information on nuclear safety? Again, the Eurobarometer Europeans and Nuclear Safety and Energy Technologies polls provide some insight as shown in Table 4.

**Table 4: To what extent do you trust information about energy related issues from the following sources?**

Source	Poll	Trust %
<b>Scientists</b>	Energy	<b>71</b>
<b>Environmental protection organisations or consumer associations</b>	Energy	<b>64</b>
<b>National nuclear safety authorities</b>	Nuclear	<b>51</b>
<b>Energy companies that operate nuclear power plants</b>	Nuclear	<b>46</b>
<b>TV, radio, newspapers</b>	Energy	<b>31</b>
<b>National Government</b>	Energy	<b>29</b>

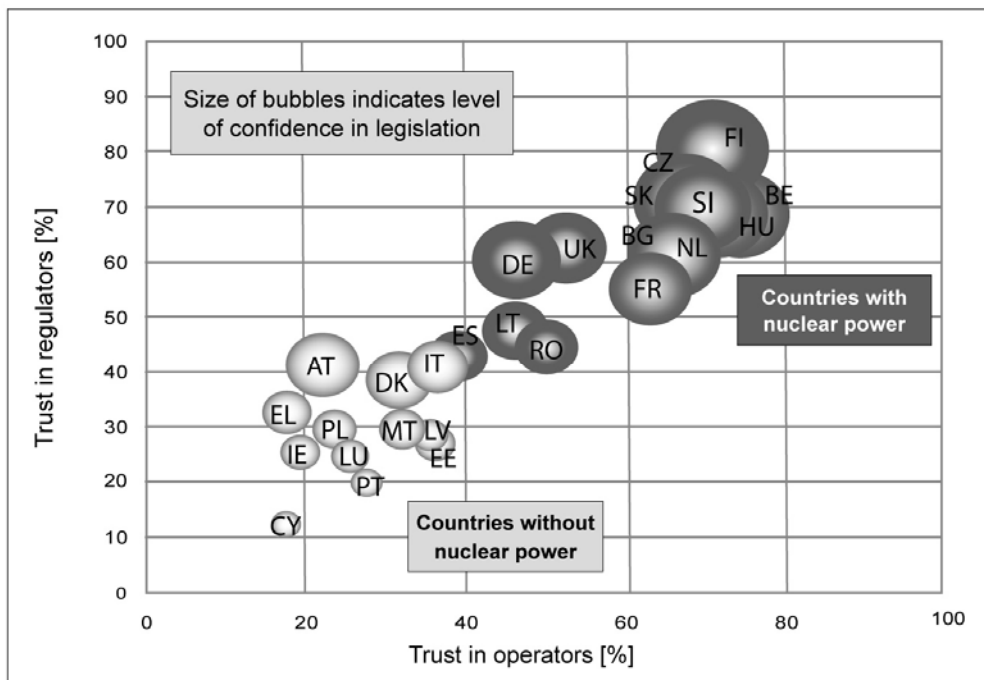
Although the mass media are the most used sources to gather news, in the case of nuclear safety people tend not to trust journalists as much as more specialised sources of information such as scientists or environmental organisations. National Governments are trusted by less than one-third of the people.

It is a matter of concern that only a half of people overall appear to trust national nuclear safety authorities or the energy companies running nuclear power plants. This matter is further addressed in Figure 12 that compares trust in regulators, in operators and the degree of confidence in legislation for countries that have nuclear power and those that do not. It is clear that levels of

trust in operators and in regulators are strongly correlated. In addition, trust rises as confidence in legislation improves. Again, countries without nuclear power, and therefore little first hand experience of it, show the lowest levels of trust in both operators and regulators.

**Figure 12: Confidence in nuclear regulators, operators and legislation\***

\* AT-Austria, BE-Belgium, BG-Bulgaria, CY-Cyprus, CZ-Czech Rep., DE-Germany, DK-Denmark, EE-



Estonia, EL-Greece, ES-Spain, FI-Finland, FR-France, HU-Hungary, IE-Ireland, IT-Italy, LT-Lithuania, LU-Luxemburg, LV-Latvia, MT-Malta, NL-Netherlands, PL-Poland, PT-Portugal, RO-Romania, SE-Sweden, SI-Slovenia, SK-Slovak Rep., UK-United Kingdom.

In summary, increased knowledge of nuclear energy leads to increased levels of support, but most people feel they have inadequate levels of knowledge. Scientists and environmental protection organisations (NGOs) are far more trusted to provide information than the mass media – which is the source of most peoples’ knowledge. Energy companies and safety authorities are trusted by only half of people in total, but that degree of trust rises in countries with nuclear power programmes.



## 2.2 IAEA polls – Public opinion around the world on nuclear issues

This study has so far concentrated on nuclear opinion in Europe, primarily to take advantage of the consistent methodologies employed by the Eurobarometer series of polls. This Section looks at opinion in 18 countries around the world using data taken from a poll conducted for IAEA by Globescan in 2005.<sup>4</sup> It is important to remember that the questions and methodology employed by Globescan are not necessarily the same as those used by Eurobarometer. Therefore comparison between the data sets can only be qualitative.

### 2.2.1 Support for nuclear power

The Globescan poll shows that, across the 18 countries surveyed:

- 34% of respondents believe countries with nuclear power plants should use the ones they already have, but not build new ones;
- 28% believe nuclear power is a safe and important source of electricity and that interested countries should build new nuclear power plants;
- 25% believe that nuclear power is dangerous and that all operating nuclear power plants in the world should be closed down as soon as possible.

Across these countries, 59% of respondents do not favour new nuclear plants being built. Support for new nuclear build is one third or more in Australia, India, Indonesia, Jordan, South Korea, the United Kingdom and the United States but only in South Korea there is an absolute majority for building new plants. In France and Japan, countries with significant fleets of nuclear power plant, only 25% and 21% respectively support new nuclear build. However, 50% and 61% respectively want to keep existing plants running. Support for closing all nuclear plants in the world is highest in Morocco, Jordan and Saudi Arabia, Cameroon and Indonesia – all countries without nuclear power – although Jordan and Indonesia also show strong support for new build.

In the EU, when asked, *Are you in favour or opposed to the use of nuclear energy in your country*, 36% of respondents had balanced views, 20% were in

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4. The countries polled were Argentina, Australia, Cameroon, Canada, France, Germany, Great Britain, Hungary, India, Indonesia, Japan, Jordan, Mexico, Morocco, Russia, Saudi Arabia, South Korea, and the United States.

favour of nuclear and 37% were opposed. It would therefore appear that Europeans are less well disposed to nuclear energy than are their counterparts in the 18 countries sampled by Globescan. The difference in view between the averages of the European and global populations is around 30%.

### ***2.2.2 Nuclear security***

The Globescan survey was based on telephone and in-person interviews and conducted between 13 May and 25 August 2005, some four years after the terroristic attack on New York City. The survey of approximately 1 000 adult respondents in each of 18 countries surveyed shows that:

- 54% of respondents believe the risks of nuclear terrorist acts are high because of insufficient protection;
- 28% believe the risks of terrorist attacks are low because of sufficient protection.

Majorities in 14 of the 18 countries believe that the risk of terrorist acts involving radioactive materials and nuclear facilities is high because of insufficient protection. The Japanese (79%) are more likely than others to believe this, followed by Russians (63%), Indonesians (62%), Germans (60%), French (57%), Mexicans (57%), Moroccans (57%), and Americans (56%). These findings indicate a high level of concern among the public, particularly in Japan, about nuclear terrorism.

The position in Japan echoes the position in Europe, where 74% agreed with the proposition that terrorism is a major threat to nuclear power plants. However, again we see that Europeans are rather more concerned than are their counterparts in the rest of the world.

### ***2.2.3 Climate change***

The Globescan poll shows that by outlining the climate change benefit of nuclear power, across the 18 countries surveyed:

- support for the expansion of nuclear power increases by an average of 10%, from 28% to 38%;
- 19% of respondents who said that nuclear power is dangerous change their mind;

- 35% of those who said that no more plants should be built change their mind.

However, only in two countries (Indonesia and South Korea) do majorities favour expanding nuclear power to help combat climate change, emphasising the general indecision or even reluctance among the public to build more nuclear plants. The data are presented in Table 5.

**Table 5: Support for expansion of nuclear power before and after the benefits of nuclear to combat climate change have been explained**

Country	Post-climate change explanation	Pre-climate change explanation	Change in support for nuclear energy
Argentina	24	14	+10%
Australia	47	34	+13%
Cameroon	32	21	+11%
Canada	42	34	+8%
France	42	25	+17%
Germany	38	22	+16%
Hungary	36	19	+17%
India	43	33	+10%
Indonesia	52	33	+19%
Mexico	46	32	+14%
Saudi Arabia	25	16	+9%
South Korea	66	52	+14%
United kingdom	44	33	+11%
United States	45	40	+5%

The United States shows the smallest increase in support for nuclear when faced with the climate change proposition: this may be a reflection of the United States' policy position on climate change at the time of the poll.

The Eurobarometer Europeans and Nuclear Safety poll also sought to discover whether support for nuclear energy would increase if people better understood its potential benefits, although that poll question included the concept of increased energy security. The outcomes were similar to the Globescan poll, 21% of those who previously wanted a reduction in nuclear energy would maintain it and a further 6% would increase it. Among those who initially wanted to maintain the share, 16% would now increase it.

As noted above, providing more information about nuclear power as an energy option appears to have a positive effect on attitudes towards it.

### **2.3 Socio-demographic matters**

Eurobarometer and Globescan report similar socio-demographic trends in their data.

The Eurobarometer polls for the EU report that:

- Significantly more males than females think that nuclear energy has more advantages than risks (39% *vs.* 27%).
- Respondents with higher levels of education are more likely to think that the advantages of nuclear outweigh the risks (38% in the highest educational group *vs.* 27% in the lowest).
- Those to the right of the political spectrum think the advantages of nuclear energy outweigh the risks it poses more often than do those to the left (43% *vs.* 29%).
- Older people are less inclined to want the share of nuclear energy reduced (34% over 55 *vs.* 41% under 55).

The Globespan poll for the IAEA reports that:

- Males are more inclined than women are to say that nuclear energy is safe (33% *vs.* 23%).
- People with high levels of education are more inclined than those with low levels of education to say that nuclear energy is safe and that interested countries should build new nuclear power plants (36% *vs.* 24%).
- People with less education are more likely than the well educated to say that nuclear power is dangerous and that all plants should be closed down (28% *vs.* 21%).

In summary, nuclear energy is supported more by males, the better educated, those to the right of the political spectrum and those who are older.

## **2.4 International polls – general issues**

This section has shown that the Eurobarometer and Globescan polls provide broadly the same view of public opinion in three key issues: support for nuclear energy is limited around the world, terrorism is seen as a significant threat and opposition reduces when respondents are educated about the potential benefits of nuclear energy.

### **Reference**

- [1] European Commission (2007), Special Eurobarometer, *Energy Technologies: Knowledge, Perception, Measures*, available at: [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_262\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_262_en.pdf)

### 3. TIME TRENDS IN NATIONAL PUBLIC OPINION POLLS

This Section presents trends in opinion polls to understand whether support for nuclear is broadly rising or falling around the world. The outcomes of polls from different organisations can be compared provided a consistent methodology has been used each time public opinion has been sampled. However, it should be noted that most of these polls required yes or no answers rather than sampling a spectrum of opinion.

Time trending polls are presented in Figures 13 to 19 for Finland [1], France [2], Hungary [3], Japan [4], Sweden [5], the United Kingdom [6] and the United States [7]. These polls each asked slightly differently worded questions, therefore quantitative comparisons between polls is not appropriate. The Hungarian poll referred specifically to operation of the Paks nuclear power plant, the only one in Hungary.

The outcomes of these trending polls are shown in Table 6.

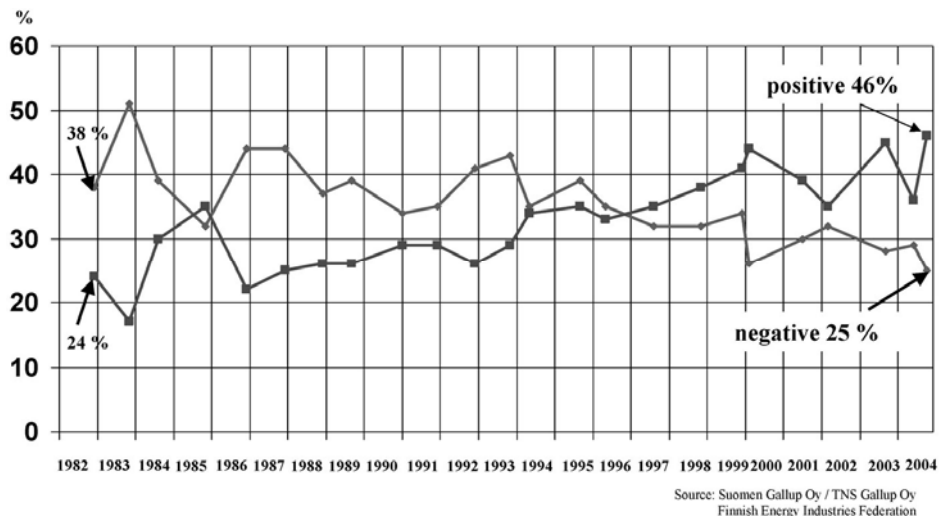
**Table 6: Summary of time trends in support for nuclear energy**

	Poll timescale (years)	Increase in support (%) over period of poll	Level of support (%) in most recent poll
<b>Finland</b>	21	21	<b>45</b> (2003)
<b>France</b>	13	~0	<b>47</b> (2007)
<b>Hungary</b>	14	7	<b>75</b> (2005)
<b>Japan</b>	30	-15	<b>40</b> (2008)
<b>Sweden</b>	19	38	<b>50</b> (2005)
<b>United Kingdom</b>	6	16	<b>36</b> (2007)
<b>United States</b>	9	20	<b>62</b> (2007)

From this table it can be seen that support for nuclear energy has risen strongly in Western Europe over the past one or two decades, except in France. Inspection of the poll trends there show broadly the same fraction of the population remains in favour of nuclear, but an increasing number are moving

from a “don’t know” position to a negative one. Opinion has moved more slowly in Hungary, but is still rising despite being at a consistently high level. In the United States, supportive opinion has increased by around 20% over the past decade. Time trended data were not readily available from the Asian countries other than Japan. In Japan public support is steadily increasing since the Chernobyl accident, and has increased 10% in the last two decade.

**Figure 13: Finland**



**Figure 14: France**

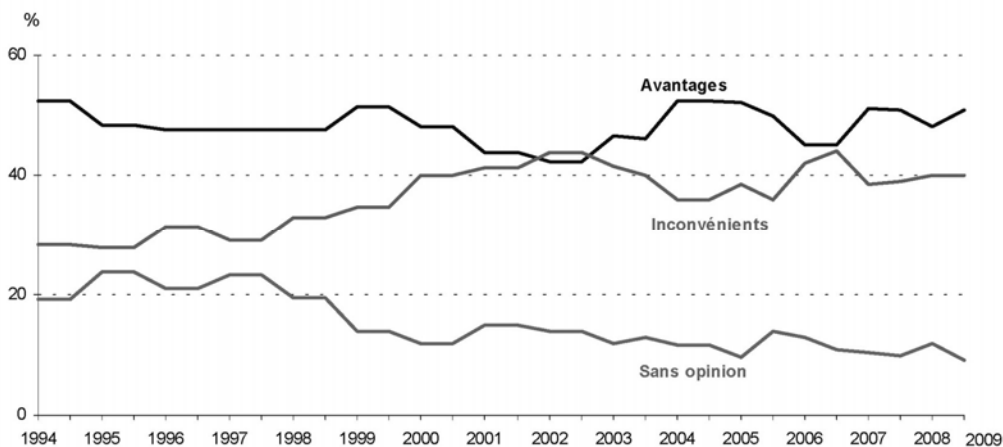
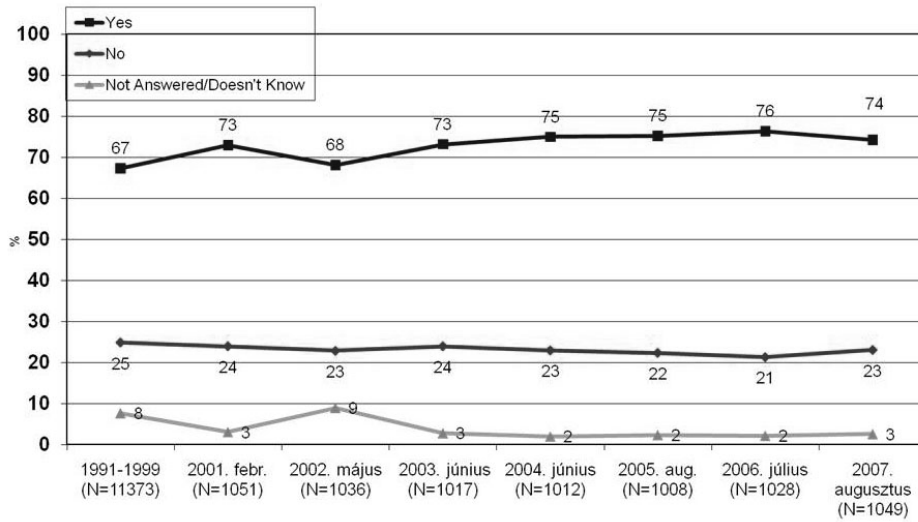


Figure 15: Hungary



Bázis=az összes válaszadó, A/14. kérdés

Figure 16: Japan

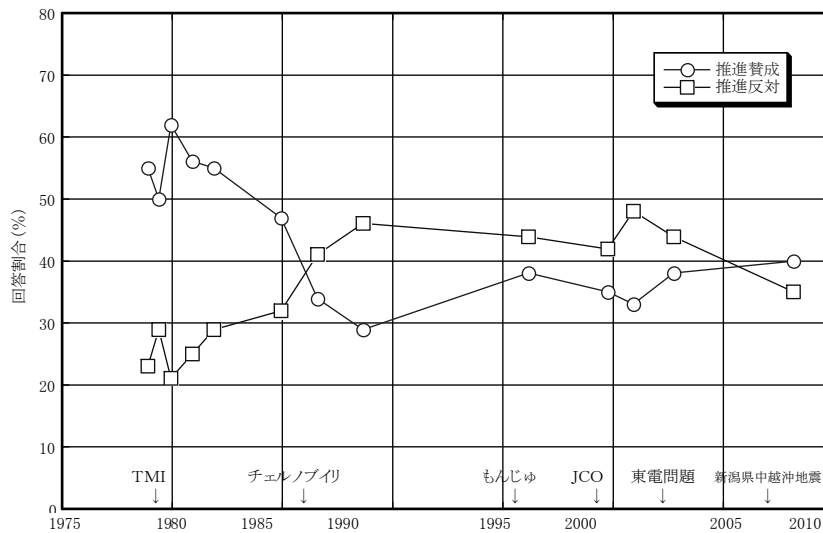
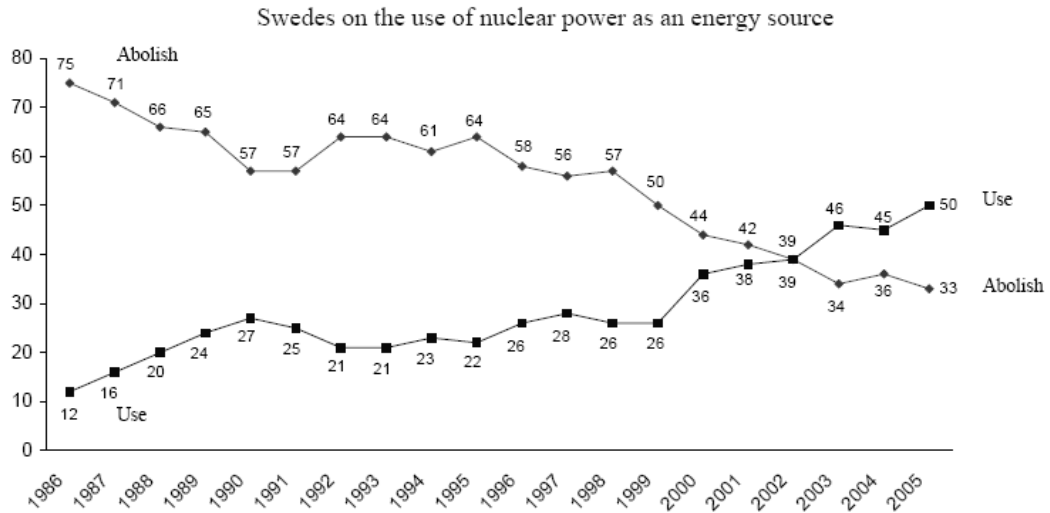


図1. 朝日新聞社による原子力発電に関するアンケート調査結果の時系列変化

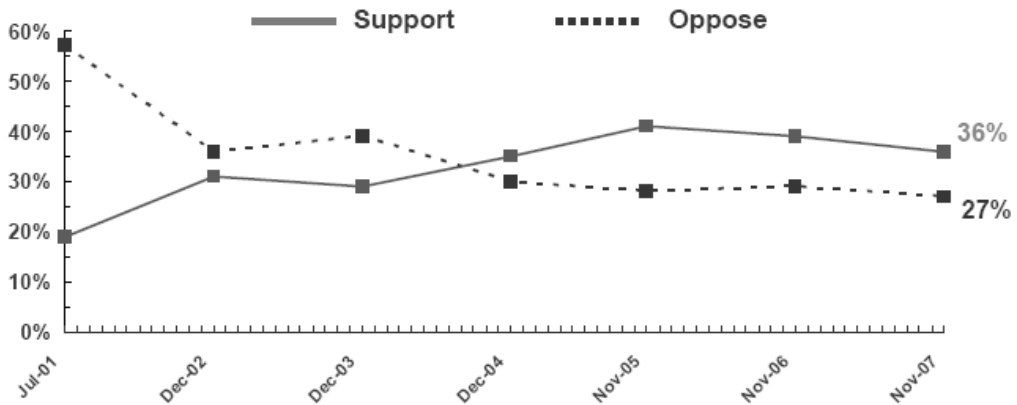


**Figure 17: Sweden**



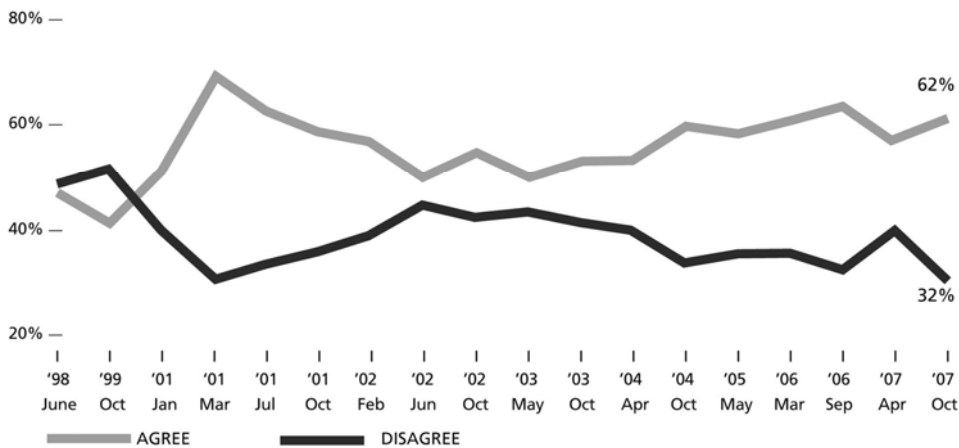
**Figure 18: The United Kingdom**

*To what extent would you support or oppose the building of new nuclear power stations in Britain TO REPLACE those that are being phased out over the next few years? This would ensure the same proportion of nuclear energy is retained.*



**Figure 19: The United States**

Support for Definitely Building More Nuclear Power Plants  
 "DO YOU STRONGLY AGREE, SOMEWHAT AGREE, SOMEWHAT DISAGREE, OR STRONGLY DISAGREE WITH THE FOLLOWING STATEMENT: WE SHOULD DEFINITELY BUILD MORE NUCLEAR POWER PLANTS IN THE FUTURE."



In summary, time trended polls indicate that opinion is turning in favour of nuclear power in Europe – at least for the countries considered here – and in Japan and the United States.

## References

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- [7] Nuclear Energy Institute (2007), *Perspective on Public Opinion, December 2007*, Washington DC, United States. See NEI website:  
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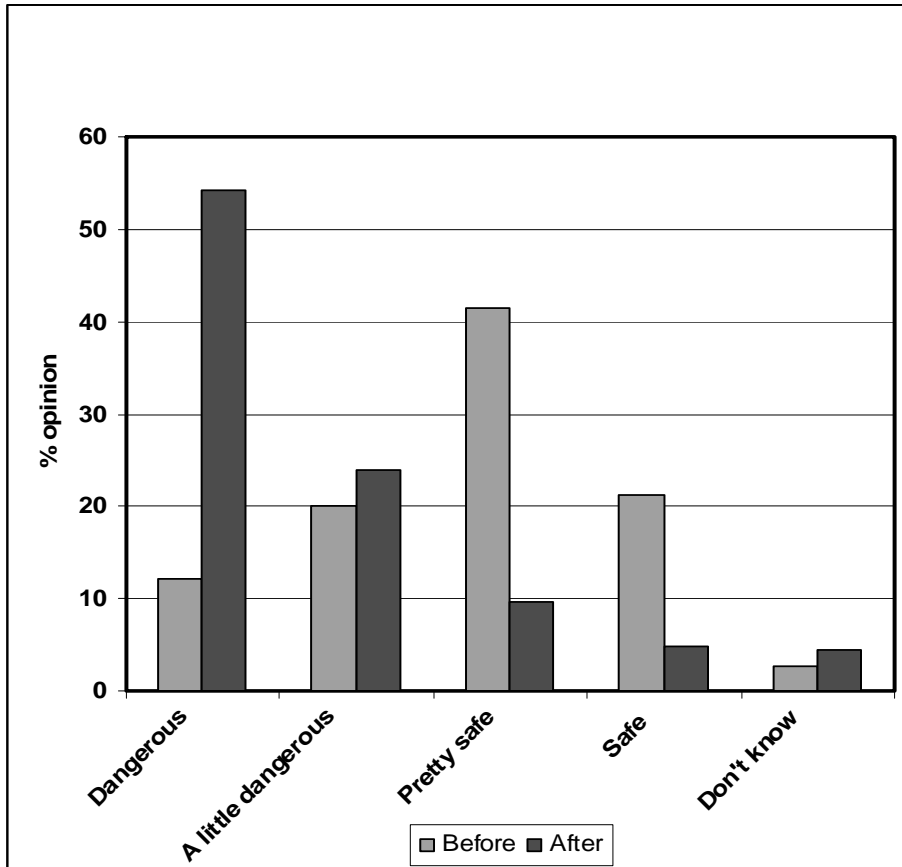
#### **4. IMPACTS OF NUCLEAR EVENTS ON PUBLIC OPINION**

The Three Mile Island accident in March 1979 and the much more severe Chernobyl accident in April 1986 had a significant impact on public attitudes to nuclear power. This can be seen in the abrupt change in public opinion in Finland in 1986.

Figure 20 shows how opinions changed [1] in the Tokai Mura region of Japan after a criticality accident in 1999 in the uranium processing facility. An operational error led to a radiation leak, killing two workers and exposing around 400 people to small doses of radiation. In a survey conducted at the end of 1999 by the local authority, the number of respondents supporting nuclear power after the Tokai accident fell from 52% to 32%, whilst those wanting nuclear power to be discontinued rose from 12% to 40%. In addition, after the Tokai accident, the number of respondents who said that nuclear power facilities are unsafe rose from 32% to 78%.

One factor heavily influencing trust in nuclear plant operators is any significant time delay between an event and the release of information to the public. For the Three Mile Island and Chernobyl events, this period was long. Today, response times have been drastically shortened and even small events in nuclear power plants can be followed through the media with a high degree of transparency.

Figure 20: Perceptions of Tokai Mura residents on safety of nuclear power facilities before and after the 1999 accident



## References

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## **5. TRUST BUILDING THROUGH STAKEHOLDER INVOLVEMENT**

Over the past two decades, the importance of the social dimension in making decisions affecting public and environmental protection has become increasingly clear. This is particularly true in situations involving complex, technical aspects of the type typically encountered in nuclear energy.

The mid-1990s saw a growing expectation on the part of the public that it would be more directly involved in decision making about technology in general. This, of course, represented a clear challenge to the way in which such decisions had traditionally been taken. In liberal democracies, duly elected governments had been understood to have a mandate to take those decisions and to delegate authority to a whole range of expert bodies to oversee the implementation and operation of technologies. Consultation with interested parties was always a part of this overall process, but the complex nature of many of the issues at stake made it seem natural that much would remain the preserve of the experts in the various fields. The notion, therefore, that a broad range of “stakeholders”, many perhaps without any expertise in the field in question, should be involved in decision-making raised apparently difficult questions. The NEA explored these questions, in the context of radiological protection, with a series of three workshops in 1998 [1], 2001 [2] and 2003 [3].

In 2000, the NEA formed the Forum on Stakeholder Confidence (FSC) [4] that facilitates sharing experience in addressing the societal dimension of radioactive waste management. The FSC explores means of ensuring an effective dialogue with the public with a view to strengthening confidence in the decision-making processes. The FSC convenes a series of alternating meetings and national workshops focusing on stakeholder involvement in waste management issues in the host country. Such workshops have been held in Finland 2001, Canada in 2002, Belgium 2003, Germany in 2004, Spain in 2005 and Hungary in 2006.

One of the trends that clearly emerges from the NEA discussions is that the time when exchanges between radioactive waste management institutions and society were confined to rigid mechanisms is over. A more complex interaction

is now taking place among players at national, regional and especially at local levels, as large industrial projects are highly dependent on siting and other local considerations, and a broader, more realistic view of decision making is taking shape. It is clear that several useful goals are achieved through stakeholder involvement, including:

- incorporating public values into decisions;
- increasing the substantive quality of decisions;
- resolving conflict among competing interests;
- building trust in institutions;
- educating and informing the public.

These findings are in broad agreement with other recent work in this area, notably at the OECD (the Public Management programme) [5], and the European Commission [6].

A significant example of stakeholder engagement comes from the United Kingdom [7]. For three decades, the United Kingdom had sought but failed to find a long-term solution to the problem of managing its higher activity radioactive wastes. During this period, every initiative to find a way forward foundered in the wake of opposition and protest. After an extensive borehole drilling programme and a lengthy Public Inquiry, the proposal for an underground laboratory at Sellafield was rejected in 1997. In part, the problem had been a technical one, but radioactive waste is also a social problem. A solution to the problem must not only be technically achievable but also publicly acceptable. It was recognised by the UK Government that openness and transparency in decision making are necessary in order to gain public trust and that mechanisms to include the public in decision making would be necessary. These included early involvement of the public, adequate time to take decisions, openness and transparency, and a deliberative approach to decision making.

Against this background, the Committee on Radioactive Waste Management (CoRWM) was appointed by the UK Government to undertake this task and began its work in November 2003. Its' task was to "inspire public confidence" by engaging with the public, and applying ethical principles to decision making as well as the best science and technology.

CoRWM placed a very high value on the need to engage with stakeholders and citizens. There was four main phases of public and stakeholder engagement (PSE) designed to involve participants in a continuing contribution to key decisions. Various techniques were used including stakeholder round-table discussions, Citizens' Panels, a National Stakeholder Forum and open meetings. Wider audiences were reached, including young people through an in-depth Schools Project involving 15 schools and 1 305 students, through a widely circulated Discussion Guide and through some 700 website and written responses. All contributions were recorded and made a significant input to CoRWM's decisions. Members of the public were also able to participate through attendance at CoRWM's plenary meetings, which included public question and answer sessions, and through written and web-based correspondence.

CoRWM's PSE programme is probably the most wide-ranging, informative and influential effort so far undertaken in the United Kingdom in public decision-making. It has proved an integral element in the CoRWM process and provided the basis on which the Committee can claim it has laid the foundation for inspiring public confidence in its recommendations, especially as the response to the Committee's draft recommendations was supportive from nearly all respondents.

The UK Government has accepted all of CoRWM's recommendations. Similar examples exist in a number of other countries.

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## 6. COMMUNICATION AND PUBLIC UNDERSTANDING

As shown by the United Kingdom experience with CoRWM, members of the public can play a strong role in shaping nuclear energy policy making. However, the quality of this interaction is dependent on a number of factors that are influenced by risk communication, including levels of knowledge and understanding, trust and public (rather than expert) perceptions of risk. It is clear that if decisions about whether or not to use nuclear energy are to involve stakeholders, including members of the public, then they must be able to make informed decisions. Public involvement, and consequently knowledge-building, is likely to become increasingly important in many countries in determining the future of nuclear energy.

While public trust in decision makers has clearly been eroded in the area of nuclear energy, public acceptance of nuclear power is increasing around the world, although perceived levels of knowledge seem low. The Eurobarometer polls show that, currently, the public do not believe that they are in control of decisions about acceptable risks, or the implementation of those decisions, at least partly because of lack of information. Governments, industry groups and NGOs can fill these information gaps, by addressing issues such as nuclear waste, differences between expert and public perceptions of risk and the confusion existing over the role that nuclear energy could play in mitigating climate change.

Eurobarometer polls show that, at a country level, public understanding about security of energy supply is low; security of supply seems to act as a key policy driver on a political level, but not on a public level. Climate change does play a significantly positive role in influencing public perceptions of nuclear energy, but again there is a lack of knowledge and understanding. This suggests a failing on the part of political leaders in energy policy education.

Policy makers must endeavour to increase public knowledge about all energy options, including options that are not chosen for implementation. Until the role of all energy options is fully decided, industry experts, policy makers and NGOs must continue discussion within the public arena of the risks and

benefits of each. Education and communication are crucial to improving understanding of the benefits of all energy technologies, including nuclear.

The public primarily trusts scientists and NGOs on nuclear matters. Trust in national governments on these issues is low, presenting a clear problem for how governments can successfully communicate with their publics.

Nearly all scenarios for future energy demand and supply indicate a significant rise in the use of nuclear power until at least the middle of the century. Therefore, an ongoing relationship between policy makers, society and the nuclear industry to develop knowledge-building and public involvement will become increasingly important in determining the future of nuclear energy policy. This communication must be open, honest and balanced.

## 7. CONCLUSIONS

- We cannot hope to understand public attitudes to nuclear energy, and the issues that influence these attitudes, without asking people for their views. Opinion polls may be imprecise, but they are the only readily available tool to allow an understanding of the public's attitudes.
- Polls show that nuclear energy does not feature to a great extent in people's everyday concerns. Issues of more importance are economic stability, crime and healthcare – matters that affect people on a day-to-day basis.
- Most people understand that, where this is the case, their country is dependent on imported energy sources. Two-thirds of people agree that nuclear power helps to make their country less dependent on energy imports and half agree that it ensures lower and more stable energy prices. These are matters that top their concerns about energy. There is, however, a general lack of understanding that nuclear energy can help combat climate change.
- Across Europe, people expect the share of nuclear energy to stay the same in the future as today. However, polls show that people may have an unrealistic perception of the contribution solar and wind energy could make to energy supplies in the future.
- Over half of people think the risks of nuclear power outweigh its advantages, particularly if they live in countries with no nuclear power, and so have little personal experience of it, or if they do not feel well informed. Only one-third of those polled thought the advantages of nuclear outweighed the risks.
- In countries with nuclear programmes, some 40% of citizens hold views in the centre of the opinion spectrum when asked, *Are you in favour or opposed to the use of nuclear energy in your country*. Of the rest, 28% are clearly in favour and 31% are clearly opposed. In

countries without nuclear programmes, 25% hold centre views, with 54% opposed and only 12% in favour.

- People are rather more concerned about the “by-products” of nuclear energy (radioactive waste, terrorism and proliferation) than about the actual operation of nuclear power plants. Almost 60% believe that nuclear plants can be operated safely. Opposition to nuclear energy would reduce considerably if the waste disposal issue could be resolved.
- Support for nuclear energy has increased over the past decade in Europe, Japan and in the United States.
- Increased knowledge of nuclear energy leads to increased levels of support – but most people feel they have inadequate levels of knowledge. Scientists and environmental protection organisations (NGOs) are most trusted to provide information. Energy companies and nuclear safety authorities are trusted by only half of people in total, but that degree of trust rises in countries with nuclear power programmes. Trust in governments as a source of reliable information about nuclear power is low.
- If governments wish to expand the use of nuclear energy, an ongoing relationship between policy makers, the nuclear industry and society that develops knowledge-building and public involvement will become increasingly important. This communication must be open, honest and balanced. The low level of trust in governments on these issues presents a particular difficulty in achieving an effective interaction.