

EUROPEANS AND RADIOACTIVE WASTE – OPINIONS, BELIEFS AND CONCERNS

S. Webster, D. M. Taylor
Directorate-General for Energy and Transport,
European Commission, B-1049 Brussels

(The views expressed in this paper are those of the authors and do not necessarily reflect those
of the European Commission)

ABSTRACT

In the autumn of 1998, the European Commission conducted a public opinion survey on radioactive waste. Roughly 16,000 people across the European Union (EU) were questioned in face to face interviews. A similar survey was carried out three years later in October and November of 2001, though this time questions of a broader nature concerning nuclear issues in general were also introduced. A comparison of the results of the two surveys shows that in the intervening period there have been very few significant changes in opinion. In particular, the events of 11 September 2001 appear to have had no measurable impact on people's views. The results of the surveys have been analysed and the key findings extracted and, where possible, interpreted. Though some of these findings might perhaps have been expected, others are somewhat surprising or even worrying, especially for the nuclear sector. However, people still seem prepared to accept that nuclear power should remain an option for electricity production in the EU, but the policy makers and the nuclear industry must demonstrate that the waste issue can be managed both safely and with respect for future generations.

INTRODUCTION

Between 13 October and 19 November 2001, wave 56.2 of the standard Eurobarometer survey was carried under the management of the European Commission's Directorate-General (DG) for Press and Communication. At the request of DG-Energy and Transport, a number of questions were included on the topic of radioactive waste. The survey itself was conducted by the European Opinion Research Group, a consortium of market and public opinion research agencies made up of INRA (Europe) and GfK Worldwide.

Questions on Radioactive Waste

By considering both value-based as well as specific factual questions, this important survey investigated a mix of beliefs, knowledge, opinions and concerns of a representative sample of EU citizens on the subject of radioactive waste. A similar selection of questions was included as part of Eurobarometer wave 50 in 1998, though the questions used in the 2001 survey were generally more refined and the results less ambiguous in a number of subject areas. Nonetheless, one or two of the questions in the 1998 survey were retained in an identical form in order to allow an analysis of trends in opinion over the three intervening years.

The surveys can be divided into the following question types:

- concerns about radioactive waste management at home and abroad;
- confidence in sources of information on radioactive waste;
- basic knowledge about radioactive waste;
- siting of disposal facilities for high-level radioactive waste;
- the impasse in the disposal of highly radioactive waste – people's attitudes;
- public concerns regarding proximity to underground disposal sites;

- current management programme for low-level waste;
- general opinions on broader nuclear issues.

Opinions on these broader issues were only sought in the 2001 survey and centred around five separate issues / propositions:

- the fairness of reporting of radioactive waste issues in the media;
- openness of the nuclear industry;
- greenhouse gas emissions from the nuclear industry compared with other energy sources;
- whether nuclear power should remain an option for electricity production;
- which generation, present or future, should be responsible for dealing with the waste.

When the questions were devised, care was taken both to reduce the technical content to a minimum and to use terminology that would be more readily understood by lay people. However, owing to the nature of the subject it was impossible to eliminate all technical references and several questions have unavoidably resulted in large numbers of “don’t know” replies. Consequently, it is sometimes useful to remove the “don’t knows” and renormalise the results by expressing them as a percentage of those who actually offered an opinion. When this has been done, the paper refers to the views of “respondents”.

The information in the present paper is supplemented by data from a more recent Eurobarometer survey (carried out in spring 2002 at the request of DG-Research and Technological Development) covering all energy sources and which also included a number of references to nuclear energy and waste.

Eurobarometer Standard Surveys

Eurobarometer standard surveys are carried out twice yearly and cover the population of the European Union (EU) aged 15 and over. In total, some 16,000 interviews are conducted with approximately 1,000 interviews in each Member State with the exception of Germany, where 1,000 are interviewed in both ex-West and ex-East Germany, Luxembourg, where only 600 are interviewed, and the UK where, out of the total of 1,300 interviews there are 300 in Northern Ireland. This number of interviewees ensures an acceptable level of statistical accuracy in the final results. Over the 28 years that these surveys have been conducted they have proved to be an invaluable source of information for EU policy makers and analysts on a broad range of economic, social, environmental and other issues of importance to EU citizens.

In each country, a number of sampling points are chosen for each survey that reflect the current population size and density (as provided by the most recent official census figures). This random sampling technique gives an accurate representation of metropolitan, urban and rural areas. Starting addresses are selected at random and further addresses are selected as every *n*th address by standard random route procedures. All interviews are face-to-face in interviewees’ homes and conducted in the appropriate national language. Before publication the results are weighted according to a complex and predefined system that compensates for the differences between the ideal and the actual sampling of demographic groups in a particular country and, in the case of statistics for the EU as a whole, the differences in population between the various Member States. These latter weights are proportional to the populations in each country aged 15 and over. Percentages quoted in the present report are the final weighted values.

Nuclear Power Programmes in the EU

To put the present survey in context, out of the current 15 EU Member States, eight have active nuclear power programmes (Belgium, Finland, France, Germany, the Netherlands, Spain, Sweden and UK), one had an active programme in the past (Italy) and six have never operated power reactors (Austria, Denmark, Greece, Ireland, Luxembourg and Portugal). The Netherlands’ programme is very small – only one operating unit – whereas the other programmes produce at least 24% of the countries’ electricity needs. In Sweden and Belgium this reaches 44% and

58% respectively, whereas in France, the Member State with by far the biggest nuclear sector, some 76% of electricity is nuclear generated. On average, a little over one third of all the EU's electricity comes from nuclear power. Current government policy in Belgium, Germany, Netherlands and Sweden is to phase out the nuclear option at the end of the operating lives of the existing units. Finland is the only Member State to have announced an expansion of its nuclear programme when the Parliament voted recently in favour of the go-ahead for a fifth unit. Both France and the UK operate commercial reprocessing plants.

THE MAIN FINDINGS

More detailed results of the surveys in 1998 and 2001, as well as information on Eurobarometer surveys in general, are available on the European Commission's Web site (1, 2). The final report of the spring 2002 survey on general energy topics has not yet been published, but will eventually also be available via the Commission's Web site (2).

People are Worried about Radioactive Waste

From both the 1998 and 2001 surveys, the average European professes to be worried about radioactive waste. In 1998, three quarters of the population said they were worried (either "fairly" or "very worried") about this issue. However, there was considerable regional variation in the replies. Those in the south of the EU were most worried (up to 98% in Greece!) while those in the north-east expressed the least concern (as low as 41% in Sweden). This same regional variation also occurred in the 2001 survey, though the percentage of "worried" people in the EU had actually fallen below 70%. In fact, in five Member States (Denmark, Finland, Luxembourg, the Netherlands, and Sweden) more people said they were "not worried" (either "not very" or "not at all worried") than said they were "worried". Greece still has the highest percentage worried by radioactive waste, but France also ranked quite highly with a rather surprising 75% in the worried camp.

In all Member States there are increased levels of concern about waste in other countries, especially in the EU candidate countries in Central and Eastern Europe, compared with home-produced waste.

People are not well informed about radioactive waste

In both surveys, three-quarters of the people questioned thought they were not well informed on the subject. Only between 2% and 3% of the public thought they were very well informed. Several questions were included in the surveys to test people's knowledge on the subject, and the results clearly indicate a lack of understanding on certain key aspects.

For example, even though a large majority of people (75%) correctly realise that there are several categories of radioactive waste, an even greater majority (over 79%) believe that all radioactive waste is very dangerous. In addition, though over 90% of the population know that nuclear power stations produce radioactive waste, fewer than 70% realise that hospitals do so as well, with only a minority (44%) of the population acknowledging that radioactive waste is also produced by the oil industry. Similarly, only a minority of people know that radioactive waste is generally produced in smaller quantities than other hazardous waste.

In the 1998 survey, people were asked which Member State produced the greatest quantities of radioactive waste. Though France (the correct answer) was the most popular first choice it was chosen by only 24% of those interviewed. Germany came second with just over 20%. In fact Germany was the first choice in five Member States (Denmark, Greece, Spain, Portugal and Sweden), equal first with France according to the Finns and only slightly behind France in the opinion of the French. The UK was first choice in the UK itself and, not surprisingly, Ireland. However, over 40% of those interviewed replied "don't know" to this question.

In a more difficult question, people were asked how much radioactive waste they thought was produced per person per year in the EU on average. Four choices were presented: less than 1 litre; between 1 and 10 litres; between 10 and 100 litres; and over 100 litres. Even though large numbers of "don't knows" were expected to this question, it was still thought that the results might give an indication of people's "gut feeling" about waste volumes. In the end, some 60% did not offer any answer, but of those who did the preferred option was between 1 and 10 litres with between 10 and 100 litres coming in second place. At the time, the actual answer was somewhat less than 150ml (and

is now probably down to an average of 100ml/year per person). Instinctively, therefore, people appear to overestimate the amount of radioactive waste by about a factor of 50 - 100.

An important finding from the two surveys is that countries where the population consider themselves better informed also tend to demonstrate lower levels of concern *about waste in their own country* (this correlation does not apply in the case of concern about waste in other countries). People in these countries also tend to respond more accurately to the questions on basic knowledge.

What is done with low-level radioactive waste?

When asked this question, very few people – one person in eight – realise that the vast majority of the waste goes for disposal in surface or near-surface sites. Even in countries such as France and the UK where such sites have been in operation for decades, less than one person in five identified this as a possible disposal method. An alarmingly high percentage believe that it is still dumped at sea (a practice that has been under a moratorium since 1983) or exported to other countries (which is only true for the very small quantity of hospital waste from Luxembourg). These latter beliefs probably result from the high publicity given to environmental discharges from reprocessing plants and to some international transports of spent fuel and waste to and from these plants. For this reason, when this question was rerun in the 2001 survey, the wording was modified to emphasise that the question only concerned “less hazardous waste in solid form packed in standard drums”. Also, in the second survey, people were allowed to select only one option from the list of management methods rather than the multiple selections allowed in the 1998 survey. Nonetheless, in the UK, for example, only one person in nine (11%) knew – or guessed – that this waste is routinely disposed of in shallow or near-surface facilities, with close to 30% thinking it is disposed of in deep facilities and 17% still opting for sea disposal. Even in France only 16% identified near surface burial as the technique used for disposal of such wastes, with nearly twice as many opting for deep disposal.

There was a very significant “don’t know” response to this question (average 26%). While this might have been anticipated in Member States where the quantities of such waste are relatively very small – such as those without nuclear power programmes – the fact that well over 40% of the people in Spain gave this reply was rather surprising, given the operation of the El Cabril disposal facility. Here 20% think these wastes are buried deep underground and only slightly fewer think they are dumped at sea.

There is clearly considerable confusion in some Member States between what happened to the different waste types in the past, what is happening now and what may be planned for the future. Should this be a concern? In one respect maybe not – after all, how many people know what happens to other forms of hazardous waste in their country? But on the other hand, how many industries face public acceptance problems over the management of such waste?

Trusted sources of information

When asked who they would turn to as trustworthy sources of information on the management of radioactive waste *in their country*, Europeans are typically divided between independent scientists (32%), NGOs (31%), government bodies (29%) and waste agencies (27%), with the media (23%) also playing a role. Relatively few people appear to trust the “European Union” – though there is probably an element of “who would you go to for information” in the way people responded to this question, and clearly nationally based sources are preferred for national problems. The nuclear industry is the least trusted source of those proposed in the question – with only 10% support on average. Multiple answers were possible with this question, so the percentages can add up to greater or less than 100. There is considerable variation between Member States – with Swedes trusting many sources and Italians trusting hardly anybody!

People in Sweden expressed a high level of trust (60%) in their national waste management agency and 36% even trust the nuclear industry itself (the fact that the waste agency is part of the nuclear industry is probably ignored by many people). The large majority of Swedes also trust NGOs (70%), the media (55%) and their national government (52%). Over 40% of the people in Germany trust their waste agency (which in reality is the State Office for Radioprotection) – though only 10% trust the nuclear industry. Possibly the most difficult numbers to explain come from Denmark, where 45% of people trust their waste agency, even though, strictly speaking, such an agency doesn’t exist, while only 25% trust NGOs. It also came as a surprise that there is more trust in the nuclear industry in Ireland (14%) than in France (11%). Spain has the lowest level of trust in its waste management agency (14%). Portugal has

the lowest level of trust in NGOs (19%). Italy has little trust in its media on such issues (17%) and even less in independent scientists (16%).

It is interesting to note that nearly 10% of the population said they did not trust anybody to provide them with information about radioactive waste and an additional 10% said they did not know whom to trust.

The picture changes quite significantly when people were asked about trusted sources of information on how waste is managed *in other EU Member States*, though independent scientists (27%) are still the most popular source closely followed by NGOs (26%). Whereas almost 30% of the EU population would trust national governments for information on waste in their own country, only 10% would rely on this source for information about waste in other Member States. There is also less reliance on the information available through the media (down to 17%) and waste agencies (14%). This is probably quite understandable since these sources essentially cater for information at the national level. On the other hand, the trust in the EU is greater – increasing to over 20%. Still very few people trust the nuclear industry (8%). Again, 10% trust nobody and the “don't knows” increase to 20%.

Regional variations follow a very similar trend to those in the previous question. However, rather surprisingly, the Irish have a higher level of trust in the information from the nuclear industry than the British, though admittedly the difference was very small (10% in Ireland compared with just below 9% in the UK).

International organisations working on peaceful uses of nuclear technology (e.g. IAEA) are trusted by a little over 20% of the population as a source of information on waste management both nationally and in the international context.

Fair reporting and openness

When asked whether they thought the media was fair in its reporting of nuclear issues, people are divided almost 50:50. The Irish have the greatest faith in their media, with 80% thinking the reporting fair. The Danes are also ready to believe the media (66%) with the UK not that far behind (63%). The Italians have the lowest opinion of the media with only one person in three thinking the media reports fairly.

About 70% of the EU's population think that the nuclear industry is not open in its reporting of waste issues. This is a very worrying statistic. In spite of the efforts of the industry over recent years, the public's impression in most Member States is still one of secrecy and cover-ups. However, once again there is significant regional variation. While only 12% of Italians think that the nuclear industry is open in providing information (though admittedly there is now no industry to speak of in Italy), over 46% of the people in Sweden think their industry is open on such issues. Sweden is probably the Member State with the strongest industry/public interaction in the nuclear sector – and a leader in public involvement in the various consultation processes – so it would appear that here at least the efforts by the industry are paying dividends. Of the other Member States, only in Finland and the Netherlands is the industry considered to be open by more than 30% of the population.

Perceptions about nuclear in relation to other energy sources

It is interesting to consider the EU public's current perception of present and future energy supply and nuclear power's contribution to it. The following findings are from a more recent Eurobarometer survey on European opinions on energy and related research in general. This survey was conducted in spring (mainly March) of 2002.

- Some rather surprising results were obtained when people were asked how much electricity (using such categories as “small”, “medium”, “significant” amounts) in their countries is produced by nuclear energy. Of the EU's non-nuclear Member States, Austria stands out with nearly one fifth of the population believing that nuclear power produces a significant amount of electricity in their country! The percentage is even higher in Luxembourg (36%), though the close proximity to a number of nuclear plants may explain this misconception. However, a similar reasoning cannot explain the results from Italy where the majority of respondents think that nuclear produces at least a “medium” amount of their electricity. There is also a surprisingly high number of “don't knows”, which peaks at 34% in Portugal and 30% in Greece, but is also high in the UK (23%) and in Ireland (22%). Of course, many non-nuclear Member States import significant quantities of nuclear-generated electricity from other countries, and it is possible that this introduced some confusion in the minds of many

people. Nonetheless, there still appears to be a significant lack of understanding about electricity supply in general.

- In all Member States, when asked whether it is true that over one quarter of electricity generated in the EU is from nuclear power (the real figure is about 35%), the majority of those interviewed agreed. However, in several countries – typically those without nuclear plants – over 40% of the people said they did not know. This was notably the case in Greece (over 50%) but also in Spain (43%), which has a sizeable nuclear power industry.
- About 90% of those interviewed think that global warming and climate change are serious issues that need to be dealt with through immediate action. However, nearly half the people interviewed think that nuclear power contributes significantly to climate change (equivalent to 63% of respondents once the “don’t knows” are excluded). In fact, the majority of respondents gave this answer in most Member States (over 90% in Greece, close to 90% in Spain and over 85% in Portugal). In only four Member States – Sweden (23%), Denmark (30%), Finland (34%) and the Netherlands (43%) – is this view held by a minority of the population.
- A greater number of people want additional information about nuclear power and radioactive waste (36%) than want additional information on new energy options (27%) and on how to save energy at work (13%). This upholds the results of the 1998 survey on radioactive waste in which over 80% of respondents expressed an interest in knowing more about how radioactive waste is managed.
- The main source of information on energy issues is television (40%), followed by newspapers (23%) and radio (13%). All other choices, including the Internet, account for 5% or less of preferred sources.
- Over 30% think that new and renewable energy sources (including hydro) will provide us with most of our energy in 50 years time. Nuclear fusion (16%) is the second choice, followed by gas (14%), nuclear fission (12%) and oil (10%). Solid fuels come last with 3%. In every Member State – except Austria – fusion is considered likely to produce more of our energy than fission in this time horizon, though it is unlikely that many of those interviewed fully appreciate what fusion entails. It is interesting to note that the majority of people also think that new and renewable sources will be the least expensive form of energy by that time. When asked whether they would be willing to pay more for their energy, the resounding answer is “No”!
- Given a list of eight possible priority topics for urgent government action, the majority of people chose food safety (52%), but this is closely followed by nuclear safety (50%) and then by management and disposal of radioactive waste (47%). People were allowed to choose a maximum of three answers. Perhaps rather surprisingly, road accidents – which result in thousands of deaths across the EU each year – was only identified as a priority by 19% of those interviewed. Similarly, safety of oil and gas transports was selected by 16%, though in the light of the recent sinking of the oil tanker Prestige off the coast of Spain, this figure would undoubtedly be higher if the same question were repeated now.

A lot more information can be extracted from this survey, but the above is perhaps the most interesting from the nuclear and radioactive waste perspective. The figures clearly endorse the findings of the 1998 and 2001 surveys and demonstrate that the public needs – and wants – more information about nuclear safety and waste management and wants governments to give these matters a higher priority.

The greenhouse effect – and the role of nuclear

The results of the above energy survey show that a large number of people think that nuclear energy makes a significant contribution to climate change. However, a related question was included in the 2001 survey on radioactive waste in the form of a statement that said “nuclear power produces less greenhouse gas emissions than other energy sources”, to which people were asked to mark their agreement or disagreement.

From the responses, about 40% agree and slightly over 20% disagree – but nearly 40% do not know! The latter percentage seems to be very high when one considers that the absence of greenhouse gas emissions is one of the major (and perhaps most publicised) benefits of nuclear energy.

Comparing this result with that from the 2002 energy survey, there would at first glance appear to be a conflict. However, a possible explanation can be found in the different wording of the questions. In the energy survey, it appears that nuclear energy was seen by the majority as contributing less to the greenhouse effect than, for example, fossil fuels but that it still makes a significant contribution. Clearly, given the concern with which the public regards climate change, the benefits from using nuclear energy might need to be better explained in future.

How close would you live to a repository?

In 1998 people were asked just how close to a disposal site for radioactive waste would they be prepared to live. The results produced no major surprises. Fewer than 1% would like to live within a kilometre of a site, fewer than 4% within 10 kilometres and fewer than 17% within 100 km. Close to half the people interviewed want a minimum distance of 1000 km! However, even with this question there are very significant regional variations. For example, around 40% of the Dutch are ready to live within 100km of the waste – while fewer than 3% of Greeks are.

National or regional repositories?

In both surveys people were questioned whether they thought that each Member State should have its own national repository or whether there should be regional (i.e. shared) repositories. In 1998, 75% opted for national disposal while 12% chose regional repositories, with 13% of “don't knows”. By 2001, these numbers had changed to 63% and 18% respectively with a higher number, 19%, of “don't knows”. Why this change has occurred is not clear, as the questions are almost identical. With support of over 40%, the Netherlands and Denmark are the Members States most in favour of regional repositories. At the other extreme, in Italy, Greece, Portugal and Spain over 80% of respondents are in favour of each Member State constructing its own facility.

However, it is interesting to look at the actual numbers of voters in the different camps. Of the one thousand people interviewed in Greece, 728 think that each Member State should dispose of its own high-level waste. In Sweden the number is almost exactly the same (722), whereas in France the number is slightly less (687). One might have expected that Finland, the Member State that is perhaps the most advanced in the development of a national disposal site, would have been closer to Sweden and France, but here the number is down to 603. This is very similar to Austria with 609. The Member States where the fewest people favour national disposal sites are Denmark (528), Ireland (521) and the Netherlands (481). Are people really aware of how much or how little waste is in their own country? Maybe this explains why people in some non-nuclear power countries, or countries with small programmes such as the Netherlands, favour regional solutions since they appreciate just how prohibitively expensive a national repository would be. However, it is almost impossible to understand all the influences affecting the way people respond to this type of question.

Why has high-level waste not been disposed of?

When asked why they thought high-level waste had not yet been disposed of anywhere in the world, nearly half of those interviewed (46%) think that it is because there is no safe way to do it. Not surprisingly, it is in the more “anti-nuclear” of the Member States (such as Austria and Ireland) that this percentage tends to be highest. However, this is a view also held by close to 50% of Swedes and over 50% of the French. On the other hand, around 40% of the EU public believe that the delay has been primarily caused either by the authorities carefully assessing all the risks before taking a decision or because this decision might be politically difficult or unpopular.

From an additional question included in the 1998 survey, some 90% of respondents think that this indecision regarding what to do with high-level waste has a negative impact on the image of nuclear energy.

Do you agree that

In the 2001 survey, interviewees were presented with a series of five statements on broader waste or nuclear issues and asked whether they agreed or disagreed with them. The results for three of these statements, concerning greenhouse gas emissions, the fairness of the press in reporting radioactive waste issues and the openness of the nuclear industry, have already been presented above.

Of the remaining two, perhaps the most important concerns whether the nuclear option should remain open. The statement read: “if all the waste is safely managed, nuclear power should remain an option for electricity production in the European Union”. Just over 50% of people either tend to agree or strongly agree with this statement while only just over 25% disagree (either tend to disagree or strongly disagree), with about the same percentage not offering an opinion (see Fig. 1). So, of those people expressing a view, two out of three are ready to keep the nuclear option open provided the waste issue can be resolved, though this result should be viewed in the light of the belief expressed by 46% of people that there is no safe way to manage these wastes.

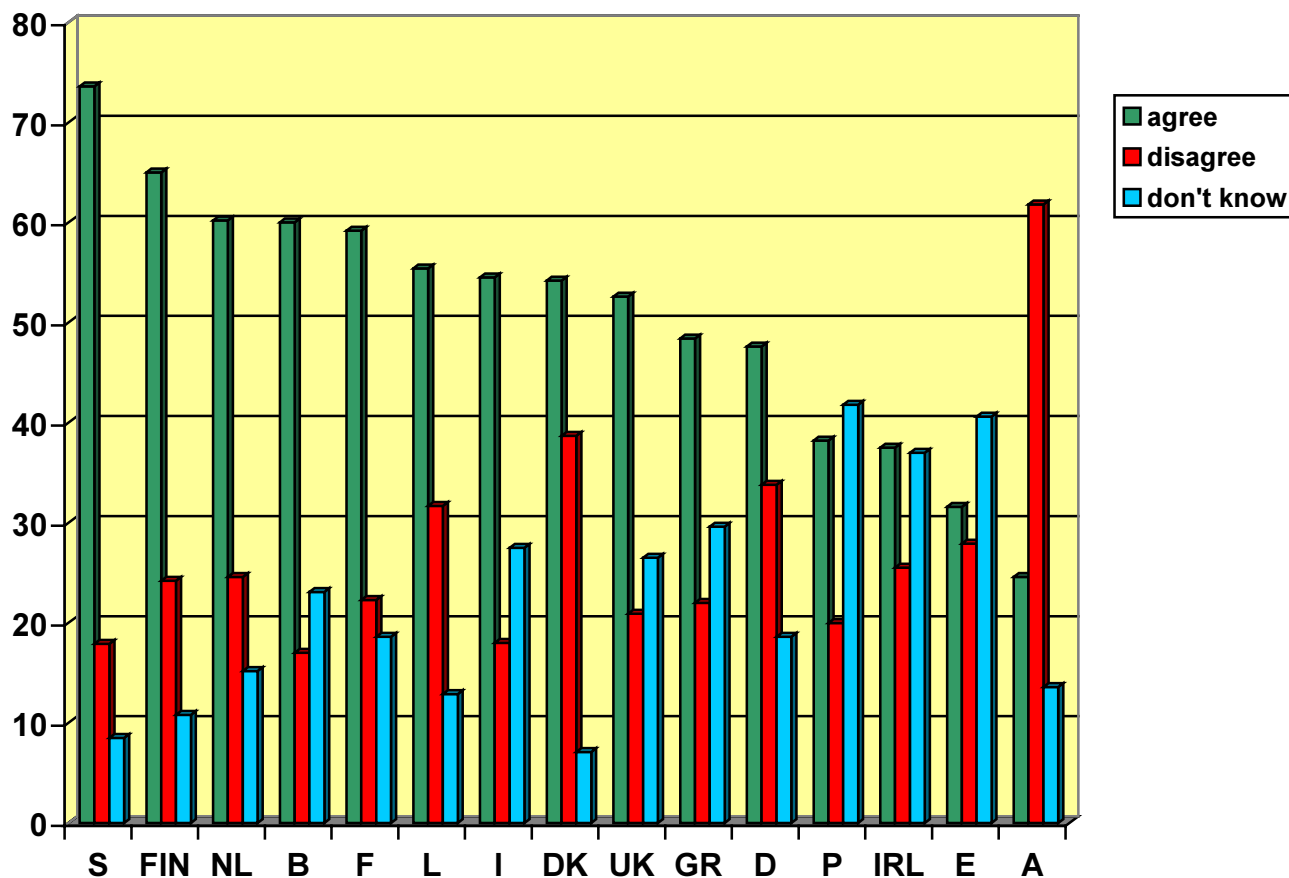


Fig. 1. “If all the waste is safely managed, nuclear power should remain an option for electricity production in the European Union”. Percentage responses by country in descending order of agreement (Sweden, Finland, Netherlands, Belgium, France, Luxembourg, Italy, Denmark, UK, Greece, Germany, Portugal, Ireland, Spain and Austria). The overall EU weighted averages are 50.5% agree, 25.5% disagree and 24% don't know.

This 2 to 1 ratio holds for many Member States, rises to over 3 to 1 in Belgium and Italy and peaks at over 4 to 1 in Sweden. In fact, in only one Member State (Austria) is there a majority against keeping the option open, and here the majority is more than 2 to 1 in the opposite direction. In some Members States the “don't knows” form a very significant percentage of the responses. This is particularly the case in Spain and Portugal (both over 40%) and Ireland (37%). On the other hand, in Denmark, Sweden and Finland the number of “don't knows” drops to as low as 10%.

There are probably several reasons why Austria is such a marked outlier. However, the proximity to some of the nuclear power plants in central Europe, especially the new plant at Temelin in the Czech Republic, and the

considerable adverse press coverage on and local political comment about these plants has undoubtedly had an important influence on people's opinions.

In the case of Denmark and, to a lesser extent, the Netherlands, there is evidence for a polarisation of views, with the strongly agree and strongly disagree camps each receiving more support than the tend to agree and tend to disagree camps respectively. This demonstrates what is already well known – even where support for the nuclear option is the majority view there is still a significant and probably very vociferous (and influential) minority of hard-line opponents.

The fifth statement read: “the generation using nuclear power should be responsible for dealing with its waste”. Around 80% agree with this view while only 7% disagree. There are 13% of “don't knows”, with again the Iberian peninsula accounting for many of these while the Scandinavian Member States exhibit by far the smallest number. Despite these don't knows, this is a very clear-cut result that reflects an unequivocal ethical viewpoint on the part of the general public. One is tempted to ask why, in the face of such clear support for immediate action, many Members States are still doing so little to push forward the decision-making processes that are urgently required in order to implement the required long-term programmes for the management of their waste.

Finally, in the 1998 survey, people were asked whether they would feel reassured if the European Union were to set common rules and standards, to be adopted in all Member States, for the processing and safety of radioactive waste. Some 68% of those interviewed (76% of respondents) replied positively as opposed to 22% (24% of respondents) replying negatively. There are significant variations ranging from a very small majority in favour in Denmark (50.2%), small majorities in Germany and Austria (both 57%), to very large majorities in Italy (94%) and Spain (92%). However, in all Member States there is a majority of respondents in favour of such initiatives being taken at the EU level. For this reason it could be expected that there would be strong public support for the new package of EU legislative proposals in the nuclear safety sector that has recently been approved by the European Commission. The package includes a proposal for a Directive (i.e. EU framework law whose measures must be adopted in all Member States) on the management of spent nuclear fuel and radioactive waste, which among other measures promotes the disposal of all radioactive waste according to pre-set time-scales. More information on this package can also be found on the Commission's Web site (3).

A WORD ABOUT DEMOGRAPHICS AND CORRELATIONS BETWEEN RESPONSES

The raw Eurobarometer survey data (all 16,000 records – each with a length of 330 characters containing not only the responses of one interviewee to the questions on radioactive waste but also all his or her demographic information) are initially processed by the market research contractor using standard statistical analytical methods. This processing yields the results per country and per demographic group and highlights any statistically significant variations between these groups (e.g. whether men responded differently from women, whether income level had an influence, or age, or urban vs. rural etc.). From this analysis it is clear that there are much greater variations between nationalities than between different demographic groups, either within an individual country or over the EU as a whole. Some minor variations are observed which indicate that women, workers in more manual jobs and less well educated people tend to consider themselves less well informed and are less “pro-nuclear” than the average. However, these effects are not very dramatic. Another clear variation is that the rate of “don't know” responses is less for people with higher levels of education and in more professional careers. Nonetheless, the predominant factor in determining responses remains without doubt nationality.

The raw data analysis performed by the contractor does not look at possible correlations between the answers to pairs of questions. For instance, if a person answered in a specific way to one question, was he or she more or less likely to have answered in a certain way to another question. Clearly the number of possible combinations of responses in this respect is almost limitless, but nonetheless there are a few interesting pairs of questions that warrant more immediate investigation.

Though this analysis is not yet complete, responses to one or two of these more interesting pairs of questions in the autumn 2001 survey have already been examined. For example, is someone who considers himself or herself better informed about radioactive waste also likely to be less, or more, worried about waste issues? Here the results do show a very slight correlation, with those people professing to be very well informed also exhibiting a profile with

higher levels of concern than the average, though the small number of people in this group (c. 3% of the whole population) means that the statistics are not very good.

This analysis has even been taken one step further in order to verify whether these people really are well informed by examining their responses to the knowledge-based questions. In total some 508 people across the EU admitted to being very well informed about radioactive waste, and though this group does show a much lower level of “don’t know” responses to the questions on basic knowledge than the average, these people also demonstrate similar – if not increased – levels of misunderstanding on key points. For example, almost 70% of this group still believe that all radioactive waste is very dangerous (average for population as a whole is only some 5% higher), and over 40% believe that the oil industry does not produce any radioactive waste (compared with a lower figure, 26%, in the population as a whole). Some 16% of the people in this group even thought that hospitals do not produce radioactive waste, and 20% that radioactive waste quantities generally exceed those of other hazardous waste. As for the question on how low-level radioactive waste is managed, only about 28% of the people in this group knew (or guessed) the correct response for their own countries, though this is probably slightly above the average for the population as a whole. Nonetheless, these figures still represent a very poor score for a group that claims to be “very well informed” on the subject. Are these results significant? Are they indicative of something more sinister? Is it a question of a little knowledge is a dangerous thing? Or is it simply a question of an ill-informed but nonetheless opinionated minority? Clearly there are still many avenues to explore in this analysis and many more possible effects to consider before the full picture can emerge.

A further possible correlation could exist between those more opposed to nuclear power and those who selected the response “because there is no safe way” in reply to the question on why no high-level waste has yet been disposed of. Here, though, nothing really conclusive emerges, except that the “don’t know” are very highly correlated. In fact, this is a pattern seen throughout the survey – if a person replied “don’t know” to one question he or she is much more likely to have replied “don’t know” to others.

IN CONCLUSION - THE KEY MESSAGES

The present paper summarising the three Eurobarometer surveys does little more than present an overview of the opinion of the EU public on nuclear issues, in particular radioactive waste. There is an enormous quantity of information that could still be extracted from these surveys and analysed in more detail. It is recommended that individual Member States examine their national data to understand better the views of their own public.

However, even at this relatively superficial level, some important conclusions can be drawn.

- *The average European is worried about radioactive waste, knows very little about it and wants to know more about how it is managed...*

There are some strong regional variations, with the north-eastern region of the EU being the least worried and best informed and the southern Member States often being more worried and less well informed. These variations can often be linked to cultural differences, the levels of trust that various societies traditionally have in political and public bodies and the efforts made by the nuclear industry in the various countries.

However, this is not to say that simply by informing people will their concerns be alleviated or views changes. What is particularly important is the quality of the information and the way in which it is made available. In Sweden and Finland, the public has been very extensively involved in debate and discussions about radioactive waste for many years. Many ordinary citizens have also played a role in the decision-making process, especially where these decisions have been and are being taken at the local level.

- *...however, the average European is also prepared to accept that nuclear power should remain an option in the EU's energy mix.*

The 2001 survey (in agreement with other national surveys on the same topic) provides incontrovertible proof of public support for keeping the nuclear option open and at the same time exposes a degree of misinformation propagated by anti-nuclear groups who insist that this support does not exist. However, one must be wary about taking the result of one question in isolation – other results from the same survey clearly demonstrate that many

people also believe that there is no safe way to manage high-level waste. To educate people to believe the contrary represents an enormous challenge for the nuclear sector and policy makers alike.

- *The waste management agencies are trusted sources of information in some countries – but not in all – and the nuclear industry is trusted by very few people.*

There is some indication that the waste management agencies are amongst the most trusted bodies in those Member States where they have spent time and effort to make contact and foster good relations with the public. Importantly, they are clearly regarded as separate from the nuclear industry itself (even though they may not be in reality). Some agencies might need to make more efforts in this direction.

The industry, unfortunately, still seems to be linked in the public's mind to the culture of secrecy and cover-ups. Openness and transparency are the keywords here, though gaining trust will still take many – blemish free – years.

- *A solution to the waste issue is key to the public's perception of the nuclear industry.*

The European Commission believes that finding a solution to the waste issue – in particular high-level and long-lived waste – is vital. This is equally true regardless of whether the nuclear option is to be closed or remain open.

While the technology exists for safe disposal of such waste, it is a very common belief by the public in the EU that no solution has been found. Only a minority appreciate that the main problem lies with the decision-making processes. However, the public would clearly like to see progress made in this area. Continued failure to make significant progress only endorses the public's presently held view that no solution has been found and this in turn has a major influence on their overall perception of nuclear energy.

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