The Management of Radioactive Waste in the European Union—Opinions, Situation and Proposal for Changes

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Abstract: Radioactive waste is seen by many as the major issue for nuclear energy in the European Union (EU). Public opinion surveys conducted by the European Commission show that while they know little about radioactive waste, the public feels concerned about it. A solution to the waste issue is a vital issue in determining public perception. Few realize that the EU has already disposed safely of much of the waste it has produced. However, no long-lived intermediate or high-level radioactive waste has yet been disposed of in the European Union. Geological disposal is identified by nearly all experts in the field of waste management as the only safe and sustainable option presently available, but progress towards its implementation is slow. Lack of public acceptance in the identification of new sites is compounded by failures to take decisions at the political level. New European legislation has been proposed to help guarantee greater progress, but this has not yet been adopted.

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Introduction

Radioactive waste is seen by many as the major issue for nuclear energy in the European Union (EU). It is a widely held view that the nuclear option can only remain open if all radioactive wastes can be managed in a safe and sustainable way. Public opinion surveys conducted by the European Commission show that while they know little about radioactive waste, the public feels concerned about it and has very little trust in the nuclear industry ("Public Opinion on Radioactive Waste in European Union"). Most do not realize that the industry is already safely disposing of a high percentage of the waste that it generates. However, no long-lived high-level waste has yet been disposed of in the EU and progress towards identifying a disposal route has been too slow in several States ("Radioactive Waste Management in European Union"). There is a growing need to guarantee a high level of nuclear safety across a soon to be enlarged EU. The Commission's proposal for legislation covering spent fuel and radioactive waste should be an important step in achieving this ("Nuclear Package").

Public Opinion on Radioactive Waste in European Union

In 1998, the European Commission—the European Union's executive body—conducted a public opinion survey on the subject of radioactive waste (European Commission 1998). Over 16,000 people across the Union were interviewed on the subject. A new survey was carried out in October/November 2001 (European Commission 2001). A comparison of the results of the two surveys on public opinion in the European Union on radioactive waste generally show that in the intervening period there had been very few really significant changes. The events of 11 September 2001, in particular, appear to have had no measurable impact on people's views.

The information from these two surveys is supplemented by data from a more recent Eurobarometer survey (Spring 2002) covering all energy sources that included a number of questions about nuclear energy and its wastes (European Commission 2002). More detailed results of the survey are available on the European Commission's web site (for nuclear activities: ⟨http://europa.eu.int/comm/energy/nuclear/index_en.htm⟩; for public opinion surveys: ⟨http://europa.eu.int/comm/public_opinion/archives/special.htm⟩).

People Are Worried About Radioactive Waste

From both radioactive waste management surveys it is clear that the average European is worried about radioactive waste. He or she is also very poorly informed about the topic. In 1998, three quarters of the population were worried about radioactive waste. There was considerable regional variation in the replies. Those in the south of the Union were most worried (up to 98% in Greece) while those in the Northeast had the least concern (down to 41% in Sweden).

In five member states there were more people who said they were "not worried" than said they were "worried." These were Luxembourg, Finland, the Netherlands, Denmark, and Sweden. Greece still had the most people worried by radioactive waste. Rather surprisingly, among the "worried" states, France scored very highly—with nearly 75% being worried about waste.

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People Are Not Well Informed about Radioactive Waste

Three quarters of the people questioned thought they were not well informed on the subject in both surveys. Only between 2 and 3% of the public thought they were very well informed. From the replies to the questions that were included to test the knowledge of the individuals, they were generally accurate in their assessment of their low level of knowledge.

For example, in the 1998 survey each person was asked which member state in his or her opinion produced the most radioactive waste. The answer is France. However, Germany was the first choice in five member states (Denmark, Greece, Spain, Portugal, and Sweden), equal first with France in Finland and only slightly behind France in the opinion of the French. The United Kingdom was first choice in the United Kingdom—and also in Ireland. However, over 40% of those interviewed replied "don't know" to this question.

What is Done with Low-Level Radioactive Waste?

When people were asked what was done with low level radioactive waste, very few—one person in eight—realized that the large majority of the waste is disposed of by shallow burial. Even in France—where disposal sites have been in operation for many years—only 16% identified at or near surface burial as the technique used for disposal of such wastes, with nearly twice as many opting for deep disposal.

Trusted Sources of Information

Asked who they would turn to for further information or trust concerning how radioactive waste is managed in their country, the average European is divided between independent scientists (32%), NGOs (31%), government bodies (29%), waste agencies (27%), with the media (23%), and international organizations (22%) also playing a role. The nuclear industry was the least trusted source of all—with only 10%. There was considerable regional variation—with Swedes trusting most sources and Italians trusting hardly anybody!

The people in Sweden, for example, have a high level of trust in their national waste management agency (60%) and over 36% trust the nuclear industry in general. The large majority of Swedes also trust NGOs (70%), the media (55%), and government (52%). Over 40% of the people in Germany trusted their waste agency—although only 10% trusted the nuclear industry. Portugal has the lowest level of trust in NGOs (19%). Italy has little belief 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 spontaneously said they did not trust anybody to give them information about radioactive waste.

Accurate Reporting

When people were asked if they thought the media was fair in its reporting of nuclear issues, there was a 50/50 split. The Irish had the greatest faith in their media, with 80% thinking the reporting is fair. The Danes are also ready to believe the media (66%) with the United Kingdom not that far behind (63%). The Italians have the lowest opinion of the accuracy of the media with only one person in three thinking it reports fairly.

Less than 20% thought that the nuclear industry was open in its reporting, while almost 70% said it was not. This is a very worrying statistic. However, once again there is significant regional variation. While only 12% of Italians think that the nuclear industry is open in providing information, over 46% of the people in Sweden agree that the industry in their country is. It might not be unreasonable to assume that this is because 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.

Why Has High-Level Waste Not Been Disposed of?

When people were asked why they thought high-level waste had not yet been disposed of, nearly half of them (46%) said because there was no safe way to do it. Not surprisingly, it is in the more "antinuclear" of the states (such as Austria and Ireland) that this percentage tends to be highest. However, rather surprisingly, it is a view held by close to 50% of Swedes and over 50% of French people. On the other hand, only around 20% believe that the delay was caused by the authorities carefully assessing all the risks before making a decision and a similar percentage believe that decision might be politically unpopular.

Ninety percent of respondents thought that the lack of a decision on how to dispose of the high-level waste had a negative impact on the image of nuclear energy.

Some Perceptions about Nuclear in Relation to Other Energy Sources

It is interesting to examine the public's view on radioactive waste in the context of their perception of present and future energy supply and nuclear energy's role in it. The following results are taken from an even more recent Eurobarometer regarding European opinions on energy in general (*EB 57*). This survey was conducted in Spring (mainly March) 2002.

Asking people how much of the electricity in their state was produced by nuclear energy gave some rather surprising results. Nearly one Austrian in five believes that nuclear energy produces a significant amount of electricity in the country. Austria has no nuclear power plants and the state has an official "antinuclear" policy. In Italy a majority of respondents thought nuclear produced at least a "medium" amount of their electricity. No nuclear power plants have operated in Italy since they were closed following a referendum after the Chernobyl accident in 1986. There was a surprisingly high percentage of "don't knows" with 34% in Portugal and 30% in Greece—neither state produces any nuclear electricity.

Around 90% of those interviewed thought global warming and climate change are serious issues which need immediate action. However, nearly half the people interviewed thought nuclear power makes a significant contribution to climate change. Excluding the "don't knows" this percentage rose to 63%. So for every person who does not think that nuclear energy contributes to climate change, two people think it does. In fact, the majority of respondents gave this answer in most of the EU's 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%)—was this view held by the minority.

Over 30% think that new and renewables (including hydro) will provide the European Union with most of its energy in 50 years time. Fusion (16%) was the second choice, followed by gas (14%), nuclear energy (12%), and oil (10%). Solid fuels came

last with 3%. Fusion was identified as likely to produce more of the Union's energy than fission. This possibility must be regarded as highly unlikely.

The majority of people also thought that new and renewables would be the least expensive form of energy by that time. Asked if they would be willing to pay more for such energy, the resounding answer was "No"! Experience so far—and most predictions—would indicate that new and renewable energies will not be less expensive than current sources and, in many instances, are likely to be significantly more expensive.

Given a list of eight possible priority topics for government action, the majority of people identified food safety (52%). This was not surprising given recent problems in the Union with "mad cow disease" and with foot and mouth disease. However, this was quite closely followed as a public concern by nuclear safety (50%) and then by management and disposal of radioactive waste (47%). A maximum of three answers was possible. Road accidents—that result in thousands of deaths across the EU each year—were only identified as a priority by 19%. Safety of oil and gas transport was identified by 16%.

Radioactive Waste and Future of Nuclear Option

In the 2001 survey, the interviewer made a number of statements and asked the interviewee if they agreed or disagreed with them. One of these concerned keeping the nuclear option open. The researcher said "if all the waste is safely managed, nuclear power should remain an option for electricity production in the European Union." Just over 50% of the people agreed with this statement while only 25% disagreed and the same percentage did not know. This 2:1 ratio holds for many member states and rises to over 3:1 in Belgium, Italy, and Sweden. In fact, in only one member state (Austria) was there a majority against keeping the option open.

Another statement was that "the generation using nuclear power should be responsible for dealing with its waste." Most people will probably not be surprised to know that 80% agreed with this while only 7% disagreed. There was a 13% "don't know," again with the Iberian Peninsula (Spain and Portugal) accounting for many of these while the Scandinavian member states had by far the smallest number. While few people are surprised at this response, few can explain why so few states are not really doing anything about taking decisions on the long-term management of their waste.

Some Simple Conclusions about European Public's Opinion on Radioactive Waste

Some brief conclusions can be drawn about the opinion of the public in the EU. These are:

- The average European is worried about radioactive waste;
- The average European knows very little about radioactive waste and how it is managed;
- The average European wants to know more about radioactive waste;
- The waste management agencies are trusted sources of information in some countries—but not in all;
- The nuclear industry is trusted by very few people; and
- A solution to the waste issue is a vital issue in determining public perception.

Radioactive Waste Management in European Union

Present Situation

In April 2003, the Commission published its fifth "Situation Report" on radioactive waste management in the European Union (European Commission 2003b). For the first time, the report covered radioactive waste management in both what were then the member states (EU-15) but also in the accession countries (now new member states-EU-10). The full report can be downloaded from the Commission's web site.

Annual production of all conditioned radioactive waste in the EU-15 was reported at around 40,000 m^3. This is around 10,000 m^3 year less than was reported in the fourth situation report in 1999. A comparison with what was expected when the previous report had been produced shows an even more dramatic reduction. In 1992 it was forecast that 80,000 m^3/year would be produced in the Union by the end of the decade. Even without taking into account the arisings in Austria, Finland, and Sweden, which were not member states at that time of the last report, the present production of waste is now less than half of what had been predicted. To this amount can be added 5,000 m^3 of low and intermediate level waste that is produced each year in EU-10, to give a total for the enlarged European Union (EU-25) of around 45,000 m^3/year and approximately 500 t of spent nuclear fuel.

The reasons for the reduction over previous estimates, even taking into account that there are now more member states, are: the construction of new power plants has been practically halted; a number of older plants have been definitively closed down; nuclear power plant operators have made tremendous efforts to reduce waste production at the source; and they have applied advanced volume reduction techniques. Costs and charges for management and disposal have been very important drivers here. The relatively high costs of managing and disposing of wastes has encouraged better practices with waste minimization playing an important role.

Quantities of high level waste and spent fuel are somewhat more difficult to calculate as it depends on the actual technology used for the management of the spent fuel—the reprocessing or direct disposal route. Some states calculate the actual amount of glass containing the waste for disposal rather than the volume of the waste itself. Others calculate the weight of heavy metal contained in the fuel elements. It is estimated that the total volume of such waste—once it is in a form for disposal—would be in the region of 400–500 m^3/year for EU-15 and between 50 and 70 m^3/year for EU-10. Around half of this would be vitrified waste and the remainder spent fuel.

We should keep these quantities in perspective. It is estimated that approximately 2 billion t of waste are produced in the Union every year—close to 4 t per inhabitant. Around 35 million t of this is "hazardous waste"—80 kg per inhabitant. These include pesticide residues, heavy metals, asbestos, and contaminated hospital wastes. There are around 55,000 sites in the Union contaminated by waste disposal—of which almost half are in a "critical state," threatening public health and groundwater quality in the vicinity of the site.

Of the radioactive waste, a very large percentage of it is now disposed of in very closely regulated sites. By now, close to 2 million m^3 of low and some intermediate level wastes have been finally disposed of. A large majority of the wastes have been disposed of at Drigg, United Kingdom and at the Centre de la Manche and Centre de l'Aube, France. Until 1982 ocean disposal was frequently used, but there is a moratorium on such practices

that is unlikely to be overturned in the foreseeable future. Near surface and shallow disposal are still the main techniques used. In EU-15, Finland, France, Spain, Sweden, and the United Kingdom operate surface- and shallow-disposal facilities for radioactive waste containing only small quantities of long-lived radionuclides. Until recently, Germany ran a deep geological disposal facility in a former salt mine. This is now closed and will be decommissioned. A new site, the Konrad mine, has recently been granted a licence, but this is now the subject of a legal challenge that could take at least another year to reverse. Belgium and the Netherlands do not have disposal sites for low and intermediate level waste—nor does Italy many years after it closed its nuclear power plants. In the new member states, only two countries—the Czech Republic and Slovakia—have repositories for low and intermediate level nuclear waste, though some others have repositories that only take institutional wastes.

Biggest Issue for Radioactive Waste Management

Undoubtedly the single biggest issue concerning radioactive waste management is that of high level waste. Most processes involved in radioactive waste management have reached the stage of industrial use. The only element lacking is actual disposal of high-level and heat-generating waste.

Some countries managing high level wastes have no plans for what to do with it. Several countries with nuclear power production plants, have—to date—decided to postpone disposal of high-level waste for periods ranging from at least 50 to more than 100 years. Only Sweden and Finland are close to authorizing sites. In fact, Finland has already selected a site, but final authorization for its development will depend on the results of detailed underground studies. These are now underway and should be completed in 4 or 5 years. First operation of the repository could take place in 2020. Sweden will make a choice between two potential sites in the next 3 years. First operations at the chosen site could also take place around the end of the next decade. Most member states are still far from siting a repository, though Belgium has operated an underground laboratory for several years and France is in the process of building one. The new member states generally lag behind the current member states, many of them having initially expected to export their spent fuel to Russia.

It must be clear that the present situation regarding storage of high level radioactive waste in the European Union does not pose any significant environmental or radiological threat. However, it was never the intention to store these wastes indefinitely. Therefore the delays in identifying sites for geological repositories in many of the member states must be a cause for concern.

In the past, some of the reasons for delay were technical. Storage at the surface allows the highly active shorter-lived radionuclides to decay, reducing their radioactivity and heat generation. This makes their eventual disposal easier and simplifies repository design. In addition, the volumes of such waste are small and they could be easily managed at or near the surface. There was little urgency to identify a disposal site. This delay allowed extra time for possible advances in disposal technology.

But now, there is a very broad consensus on the concept of geological disposal. The necessary technologies to do it have all been tried and tested. Research and development will continue to refine data, models, and concepts related to long-term safety of disposal. In particular, it is most important that work continue in the underground laboratories as they provide invaluable insight into the behavior of future repositories. However, the experts have very little, if any doubt that high-level radioactive waste could be disposed of safely today. There are now no technical reasons to delay decisions on disposal. In fact the European Commission has stated quite clearly that geological disposal is the safe option for the long-term management of high-level radioactive waste and spent nuclear fuel. In fact, with the present state of knowledge, it is the only safe and sustainable option for long-term management.

However, there continues to be opposition from large sectors of the public to most proposals concerning the siting of repositories. Given this, it is increasingly difficult to get political support—or even political decisions—on such sites. This failure to advance to the next stage in the waste management process reinforces the public's initial suspicions and resistance. In turn, this makes political decisions even harder.

Some Simple Conclusions about Situation of Radioactive Waste in European Union

1. The EU produces around 45,000 m^3/year—around 1/100th of this is high-level waste.
2. Expected volumes of such waste are decreasing as a result of improved waste practices.
3. Over 2 million m^3 of radioactive waste have already been disposed of safely in the EU.
4. No high-level waste or long-lived intermediate level waste has yet been disposed of in the EU.
5. Only Finland and Sweden are near to finding sites for their high-level waste repositories.
6. There are now no technical reasons to further delay disposal of high-level waste.
7. Failure to take political decisions on waste management results in increased public opposition.

"Nuclear Package"

In November 2002, the European Commission adopted the first part of what was known as the "Nuclear Package." This was a series of documents centered around the theme of improving nuclear safety in an enlarged European Union. The issue of radioactive waste management was one of the two central themes of the package—the other being safety of nuclear installations—and was the subject of a proposal for new European legislation that was adopted by the Commission in January 2003. While the European Union had been working actively in the area of radioactive waste management through research and other activities over the past 20 years or more, the profile of the issue was significantly increased by a publication on the security of energy supply in November 2000.

Security of Energy Supply

In November 2000, the European Commission adopted a Green Paper on security of supply or—to give it its full title—"Towards a European strategy for the security of energy supply" (COM2000 769 final) (Office for Official Publications of the European Commission, ISBN 92-894-0319-5). The Green Paper pointed out that the future of nuclear energy is uncertain, particularly in Europe and depends on several factors including, in particular, a solution to the problems of managing and stocking nuclear waste.

The use of nuclear energy to generate electricity results in the production of spent nuclear fuel and radioactive waste. In the European Union—as in other regions of the world—the most haz-

ardous and radiologically toxic forms of this material are presently held in temporary storage facilities. After 50 years or more of operating nuclear facilities in some member states, none of the high-level waste has yet been disposed of. In the meantime, accumulations of this material continue to grow.

Irrespective of future strategies regarding energy production, the waste that exists now must be dealt with in a way that respects the basic principles of protection of human health and the environment. Action must be taken very soon to ensure that the responsibility and burden of managing the growing quantities of spent fuel and waste held in temporary storage are not passed on to future generations. Current policies in most member states do not adequately address these issues.

This situation must change. It is simply not sustainable. What in the past might have been regarded as technical reasons for delaying decisions have now become excuses for failing to make progress.

Therefore, in its Green Paper, the Commission concluded that "nuclear cannot develop without a consensus that gives it a long enough period of stability, bearing in mind the economic and technological constraints of the industry. This will only be the case when the waste issue finds a satisfactory solution with maximum transparency."

However, the Commission also endorses the view that there is a need to keep the nuclear option open. This is not just because it is one of the Union's most secure energy resources—very diversified sources of supply, a fuel whose high energy density makes it easy to stockpile and extensive fuel cycle facilities within the Community result in an extremely low risk of supply interruption. But it is also because it is the only major source of electricity that does not produce any significant quantities of greenhouse gases.

This urgent need to make progress in the European Union to deal with the issue of radioactive waste management, especially for high-level waste, was a very important element of the nuclear package.

Contents of Nuclear Package

The nuclear package contained five sets of documents.

1. A communication from the Commission to the Council and to the European Parliament on "Nuclear Safety in the European Union" (COM2002 605 final).
2. A communication to the Commission "trade in nuclear materials with Russia" and a proposal for a Council decision instructing the Commission to negotiate a cooperation agreement between the European Atomic Energy Community and the Russian Federation in the area of trade in nuclear materials.
3. A proposal for a Council decision to raise the ceiling for Euratom loans for nuclear installations from 4 billion euros to 6 billion euros (European Commission 2003a).
4. A proposal for a Council Euratom directive "setting out the basic obligations and general principles for the safety of nuclear installations."
5. A proposal for a Council Euratom directive "the management of spent nuclear fuel and radioactive waste."

The first three documents were adopted by the Commission in November 2002 and the last two documents—proposals for new European legislation in the specific areas of installation safety and waste management—in January 2003.

Proposed New Legislation for Spent Fuel and Radioactive Waste

The objective of the proposed legislation is to bring about progress towards the safe long-term management of spent nuclear fuel and radioactive waste. While the emphasis of the directive is on high-level waste—including spent nuclear fuel that is to be disposed of directly—it does cover all forms of radioactive waste and all spent nuclear fuel regardless of the management route followed (reprocessing, storage, or direct disposal).

The directive is very much inspired by the Joint Convention (IAEA 1997) on the safety of spent nuclear fuel and radioactive waste management. It includes a number of "basic requirements" for safe management that will be quickly recognized by all who have studied the convention. These measures can be considered as established international best practices in the field of spent nuclear fuel and radioactive waste management, and cover such aspects as public health, environmental protection, nuclear safety, financing, and governance. Many of these measures are part of the current policy in many member states.

The directive requires that each member state establish a clearly defined program for radioactive waste management covering all radioactive waste under its jurisdiction and covering all stages of management including disposal. The program must also cover the management of all spent nuclear fuel that is not subject to reprocessing contracts or, in the case of research reactor fuel, take-back agreements. In particular, the program shall specify an approach to long-term management and disposal with a definite timetable for each step of the process. Where there is no suitable alternative to disposal available, a small number of decision points must be included in the program.

The member states must report at regular intervals on their programs-every 3 years—and the commission, with the help of national experts, will review these reports and publish its own report on the situation regarding radioactive waste management in the Union.

Some Criticism of Proposal

In the version of the proposed legislation adopted by the commission in January 2003, there were a small number of "fixed deadlines" for authorizations for development and operation of waste repositories. These were extensively criticized by other European institutions, member states, and the nuclear sector. They have now been removed from the text. However, the commission still insists on the message these deadlines conveyed. After 50 years or more of producing radioactive waste, it is now urgent to make progress towards a long-term solution.

There has been criticism that the directive emphasizes geological disposal to the exclusion of possible alternative technologies. This is not true. It clearly states that there is a consensus based on current knowledge that geological disposal is the best method for long-term management of high-level wastes. It is also very widely accepted that some of the present waste forms will not be further processed and that even if partitioning and transmutation becomes technically feasible and economically attractive, it would still leave a high-level waste stream that would need to be disposed of. The directive does strongly encourage progress on geological disposal, but it also advocates research, including into new technologies that would result in less radioactive waste.

In addition, the directive proposes to allow the shipment of wastes to third countries as an alternative to disposal in a national repository. However, in order to avoid the risk of radioactive

waste being sent to a country that could not safely manage it, there are strict conditions that would apply to such shipments. In particular, the shipments must be covered by firm contracts and only taken to a country with appropriate facilities that met the accepted norms and standards of the country of origin and, in the case of special materials are under adequate safeguards. This part of the directive has also resulted in intense discussions about "common facilities" for waste management, the new terminology for "regional repositories" on the one hand and the possibility to impose bans on imports of radioactive waste on the other. While this debate is still far from reaching a consensus, the fact that it is now being openly debated must be a significant step in the right direction.

Finally, the directive aims to encourage more—and better—research on radioactive waste management. The Commission's concern here is twofold. First, the level of research on radioactive waste management is presently inadequate. Second, the research that is done could be more effectively coordinated. From looking at the level of research being carried out in those countries that are the most advanced in management of their waste, and often closest to identifying disposal sites—including the United States, a rough figure was derived for the amount of research that is required relative to the amount of nuclear electricity that is produced. This appears to be a reasonable application of the "polluter pays" principle. The amount is around 500,000 euros/year for every terawatt hour of nuclear electricity generated. Only two or three of the EU's member states spend this much on radioactive waste research. The Commission believes that the present level of research in the Union is inadequate. But, in addition to encouraging a higher level of research, the Commission wants to see the work better coordinated and plans to introduce proposals to achieve this in the coming months.

Present Status of Proposed Legislation

Throughout 2003 the nuclear package—in particular the two directives—was the center of a great deal of attention. First, the EU's Economic and Social Committee (EcoSoc) adopted a positive report on the two directives. This was followed by intense debates in the European Parliament. Initially these debates took place in the Parliament's Industry, Transport, Research, and Energy Committee that prepared detailed reports on the two directives. The reports, which strongly supported the approach for new legislation taken by the Commission in its proposed directives, were adopted by large majorities in the European Parliament in January 2004.

For the last 18 months—or more in the case of the Waste Directive—the proposals were extensively debated in a wide range of forums. The Waste Directive, in addition to the extensive debates in EcoSoc, the European Parliament, and the European Council, has been presented to and debated with representatives of member states in the Commission's expert working groups, with all the radioactive waste management agencies—both within and even outside the EU, with a wide range of industry representatives including through the European Nuclear Society, the Foratom (the trade association representing the European nuclear industry), and Eurelectric (the union of the European electricity industry) and in countless conferences and symposia.

These debates and the various changes that have been introduced in recent months have resulted in texts that are widely acceptable from the point of view of content for a large majority of member states. However, there was one major "sticking point." This was the question of whether the directives should be adopted as new community legislation—or if some nonlegally binding text, such as a resolution of the Council—should be adopted.

While the European Parliament came down very strongly in favor of binding legislation, as the proposals were for EURATOM directives, only the European Council has the possibility of adopting them into European law. This needed what is known as a qualified majority of member states in favour of the Commission's proposals. This requires significantly more than a straight majority of states in favor of the Commission's proposals so that six or seven opposing states, out of 25, can block the proposal. As a result, the proposals failed to be adopted by the Council in its meeting in May 2004 and it was decided that the Council should aim to adopt some "conclusions" on the proposals at a future meeting. These "conclusions," adopted by the Council in June 2004, are limited to a political message concerning the commitment of Member States to a high level of nuclear safety and the safe management radioactive waste in the European Union and a commitment to continue to "engage in a wide-ranging consultation process" to further improve nuclear safety and the safety of the management of spent nuclear fuel and radioactive waste. They will not be legally binding.

Some Simple Conclusions about Proposed New European Union Legislation on Radioactive Waste

1. The Green Paper on security of energy supply identified radioactive waste as a key issue that must be addressed.
2. Waste is a very important element in the European Commission's "nuclear package."
3. The main objective of the proposed new legislation on radioactive waste was to accelerate progress on the management of high-level waste.
4. The new legislation would:
   - Promote the development of common standards and good practices for spent nuclear fuel and radioactive waste management;
   - Require member states to establish clearly defined programs for waste management, including a firm time scale for disposal;
   - Encourage a higher level and better coordinated research across the Union; and
   - Encourage greater public involvement and increased transparency in the nuclear sector.

Conclusions

Nuclear power plants—that presently produce around one-third of the European Union's electricity—will continue to make a significant contribution to the enlarged Union's electricity supply for many decades to come. This is apparent with the recent startup of the two new VVER-1000 reactors at Temelin, Czech Republic and the new order for a European pressurized water reactor by TVO in Finland.

So well into the second half of this century it can already be said that nuclear power plants will operate in the European Union. They will need to be supported by many other types of nuclear facilities. Of course, the radioactive waste will be with us for a great deal longer and will need to be disposed of in facilities that are not yet built.

It is in all our interest that these plants and facilities are operated safely—throughout the enlarged Union—and that the radioactive waste is properly managed. This is particularly important

as the nuclear option needs to remain open for all those member states who wish to use it to improve their security of energy supplies and to combat climate change.

While there are some early signs of a greater acceptance of the use of nuclear energy in Europe, the European public is still particularly worried about radioactive waste and wants it dealt with by the generations that produced it. On the other hand, if the waste can be shown to be safely managed in a sustainable way, an important part of the negative perception of nuclear power could be addressed.

While the present situation of waste management in the European Union does not pose any immediate risks to man or his environment, and in fact a majority of the waste produced has already been safely disposed of, the difficulties of identifying management routes for high-level waste is cause for concern.

There are no technical reasons why high-level wastes cannot be disposed of in deep geological repositories in the very near future. However, failure at a political level to take the necessary decisions has increased public opposition in some areas to the siting of new repositories.

The present situation in which high-level wastes have been produced now in member states for over 50 years with no site yet authorized for their disposal—or even, in some states, no established plans for their long-term management—is clearly not a sustainable one.

Progress will have to be made. Adoption of the Commission's proposals could help to guarantee this.

Disclaimer

The views expressed in this paper are those of the writer and may not reflect the position of the European Commission.

References

European Commission. (1998). "European public opinion on radioactive waste." *Eurobarometer Survey*, *EB 50*, Brussels, Belgium.

European Commission. (2001). "Europeans and radioactive waste." *Eurobarometer Survey*, *EB 56.2*, Brussels, Belgium.

European Commission. (2002). "Energy: Issues, options, and technologies." *Eurobarometer Survey*, *EB 57*, Brussels, Belgium.

European Commission. (2003a). "Proposal for a council decision amending decision 77/271/Euratom on the implementation of decision 77/270/Euratom empowering the Commission to issue Euratom loans for the purpose of contributing to the financing of nuclear power stations." *COM(2002) 457 final*, Brussels, Belgium.

European Commission. (2003b). "Radioactive waste management in the enlarged European union." *Fifth Situation Rep. No. EUR 20653*, Brussels, Belgium.

International Atomic Energy Agency (IAEA). (1997). "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management." *Proc., IAEA INFCIRC*, Vol. 546, International Atomic Energy Agency, Vienna, Austria.