

## Les Entretiens européens

*La gestion des déchets nucléaires*

### *Les Entretiens européens on the Management of Nuclear Waste*

Wednesday 11th October 2006  
Chamber of Commerce and Industry, Paris

#### *“The 2006 French Law – A Contribution to a European Policy?”*

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#### **Opening Address**

**Claude Fischer, Director, Les Entretiens Européens** – I am delighted to welcome you to these discussions on a subject that is still as controversial as ever in France (despite the public debate organised by the Government over the last few months leading up to the vote on the law) and equally problematical in Europe. I am, of course, talking about the management of nuclear waste. It is true that *Confrontations Europe* and *Les Entretiens européens* are used to coping with difficulties and I have to say that Europe has become a subject almost equally taboo in our country since the referendum and the French people's rejection of the Constitutional Treaty. At this point, I should like to pay homage to François Lamoureux, who left us this summer after working so hard to draft a European framework or a directive on waste management. He used to talk about our obstinate determination to discuss these subjects – and I sometimes feel as if we are engaged in some sort of “therapeutic harassment”. This is the fourth meeting on this topic, following discussions in Nogent, Bar-le-Duc and Reims, and we are delighted to be able to lead this new public debate in Paris, the first one since the Law entered the statute books.

**The one thing that unites us this time is the 2006 law. France kept its promise and voted in a new law, 15 years after the Bataille Law.** We do not want to stand back from the result but we cannot express satisfaction with the law until we have studied it closely and, although it is too early to assess the way it is being implemented, we can at least learn something from it.

Initially, we shall ask French stakeholders who have played an active role in drafting the law for their views

(we have with us today an M.P., a Senator, a representative of waste producers with the French Electricity Board (EDF) and a trade unionist from the CGT). In their opinion, progress has been made. This was the one element outstanding and, if we want to consider the law as an example to follow or as a model, it could provide a means of relaunching the idea of a European framework after the failure of the “nuclear package”. France has its laws. However, in the current climate of globalisation and changes in the energy sector, do we do not need a European framework on security and safety (and, therefore, on conditions of nuclear waste management) if we want to see nuclear power being included in Europe’s energy mix? It requires more extensive public debate all over the country, by and between central governments, bringing together the actors in the sector and those people who pride themselves on being “European”.

Secondly, we shall hear the reactions of our European and American friends who will tell us about their national perspective and the possibility of a European policy on the issue, given an international background that is undergoing complete change.

We are faced with President Putin’s proposal to set up an international centre for deep geological disposal in Russia and this idea may wrong-foot Europe in its efforts to ensure that each State develops its own research and sets up its own disposal site for the most dangerous waste. Who, though, will prevent the smallest countries from storing waste in Russia? It is easy to understand all that this idea implies with regard to independent energy management (and, of course, safety of supply) in the light of the blackmail that the government of that country is quite capable of exercising. **Europe can, and must, envisage cooperation with Russia but should certainly not create a situation of dependency for itself.**

So, what is Europe going to do? The Commission has launched a few initiatives but we are critical of the Green Paper which set aside nuclear power for tactical reasons. We are awaiting the Commission’s recommendations at the end of 2006 or the beginning of 2007. We will know more about the issue then and discussions may be introduced again if the States want to support them. This is not the case today. They are quarrelling among themselves about several issues, including disagreement on the choice of energy sources. Jean Coadou will talk to us about this at greater length later on, since he is representing the European Commission today and he will draw a few conclusions from our discussions.

At least the informal and free discussions that we will be having today will be useful for lobbying purposes, in the best sense of the term, in meetings with the Commission and governments. With Rolf Linkohr, who will be chairing the first round table dealing with French reactions, we want to re-open the debate on the future of the nuclear industry in Europe. With this in mind, he was brave enough to add the question to the agenda for the Berlin conference in November. This will be the first time in ten years that the nuclear industry will have been discussed in Germany and France will be well represented since both *Les Entretiens européens* and *Confrontations Europe* hope to take highly representative delegations to the meeting.

**1<sup>st</sup> Round Table:**  
**The 2006 Law: What do French Stakeholders Think of it?**

*Chaired by Rolf Linkohr, President of C.E.R.E.S. (Center for European Energy Strategy)*

*With Bernard Dupraz, Deputy Managing Director, Engineering Production, EDF*

*François-Michel Gonnot, M.P. and Chairman of Andra*

*Bruno Sido, Senator and Chairman of Haute-Marne “County Council” (Conseil Général)*

*Alain Vassaux, Secretary of the atomic energy industry branch, CGT Mine-Energie*

**Rolf Linkohr, President of C.E.R.E.S.** – Before handing over to people with much greater expertise in the subject, I should like to make a few, brief comments on the new French law. Firstly, **France now has an agenda**; it knows where it is going, unlike many countries in which people are discussing the issue in a vacuum. France also stands out in that **the separation and transmutation of long-lived radioactive waste remains one of the features of its strategy**, while many people want to abandon this concept. Thirdly, it has decided on **reversible disposal**, which will allow future generations to use the waste as a resource – after all, in the industrial sector, there is no waste, only usable materials. This is a French particularity and I hope it will be successful. Finally, I believe that a **European initiative for a technological waste centre** will probably come to fruition. In your opinion, will this serve a common interest and, if so, in what way?

**François-Michel Gonnot, M.P., Chairman of Andra** – As you have said, the 2006 law gives us an agenda and retains the three areas of research outlined in the 1991 law, even **though disposal is the preferred solution, with the reversibility option.**

This law is the end-result of one year of scientific discussion and assessment. During this period, the opinion of the general public was being sought throughout the country; discussion was not limited to those with the greatest direct interest in the management of waste. I should like to thank *Les Entretiens européens* for arranging this seminar because we have to show our support for the introduction of the law and, to achieve this, continue to build a relation with the general public that is based on trust.

Speaking as Chairman of Andra rather than as an M.P., I should like to go over the main differences between the 1991 law and its counterpart in 2006. The earlier law laid down areas of research into long-lived highly-active waste only; the 2006 law, on the other hand, covers the sustainable management of all waste and radioactive materials. Secondly, it gives Andra, which was set up by the 1991 law, new areas of competence especially with regard to the possibility of additional disposal capacity after 2015 because, at

the present time, Andra is not going to provide management for the materials stored by EDF, CEA or Areva. The law also requires Andra to carry out new public service tasks relating, firstly, to the management of more or less dangerous “orphan” radioactive waste and, secondly, to increasing the reputation of our expertise in the international arena. Finally, the law includes new conditions on funding. Finance will no longer result from annual or multi-annual agreements with waste producers but from a research fund managed by Andra and financed by a tax on basic nuclear plants. The level of tax will be defined annually, depending on research needs. There will also be a number of public funds to pay for public service tasks such as the inventory (carried out by Andra) and the management of orphan waste. The law lays down some key dates for the future: 2013 for the introduction of disposal of graphite and radium-containing waste; 2015 for a new report on research and the application for authorisation to carry out reversible deep geological disposal; and 2025 for the use of the deep geological facility.

**Finally, I should like to emphasise one unusual feature of the French law. Throughout the entire public debate phase, we paid great attention to the way things were done elsewhere and the procedure that we have adopted takes account of a number of successful experiences. It is true that our authorisation procedure for a disposal facility is complicated, much more complicated than for a new industrial plant. However, it takes account of the local people, especially those who are directly affected. It refers back to the law and allows for the organisation of further public discussion by the *Commission nationale du débat public* (CNDP, national committee for public debate) on the setting up of a disposal facility.** Once the discussions are finished, Andra will have to file an application for authorisation to create such a facility and apply a management process suitable for long-lived high-level waste. The application will be subject to a report by the *Commission nationale d'évaluation* (CNE, national assessment committee), a recommendation from the *Autorité de sûreté nucléaire* (ASN, Nuclear safety authority) and the views of the local and regional authorities concerned i.e. regional and “county” councils, and town councils from within an area greater than 10 km. The actual zone will be specified in a decree. The application will then be forwarded to the *Office parlementaire des choix scientifiques et technologiques* (OPECST, Parliamentary office for scientific and technological choices) which, after seeking expert opinions, will report to the relevant committees in the National Assembly and the Senate. At this point, the Government will table a draft law in Parliament on the choice of a disposal site, laying down the conditions of reversibility given that, according to the 2006 law, the duration of disposal cannot be less than one hundred years. At this point, there will be a public enquiry on the setting up of the facility and, finally, authorisation will be granted in the form of a decree in the Council of State. We hope that this would enable the facility to begin operation in 2025. The 2006 law also specifies that, at the appropriate time (i.e. in at least one hundred years), a new law will be required to authorise the permanent closure of the facility and, therefore, the abandonment of the idea of reversibility.

**Bernard Dupraz, Director, Energy Production, EDF** – EDF is a producer of mainly nuclear energy and it intends to remain so, on a sustainable basis, in Europe. Let us first remember the context i.e. a sudden change in just a few years from the carefree days of the 1990's (when, with a barrel of oil at 15 dollars, *The Economist* could run the headline "Drowning in Oil" in March 1999) to a situation in which, structurally speaking, energy is rare, precious and expensive with volatile oil prices ranging from under 60 to over 70 dollars a barrel. The discussion is no longer focussing on whether there will be a *peak oil* but on whether it will occur in one decade or two. Whatever happens, the certainty that the end is relatively near is shared by all the oil companies.

In Europe, the production of electricity will have to increase by 600 gigawatts by the year 2030, mainly to replace obsolete production plants but also partly to meet consumer demand, despite energy savings. **This volume of 600 gigawatts corresponds to the opening of one gas combined-cycle power plant every week or one nuclear power plant every month. We have to give it our all and begin by saving energy.** White certificates now oblige producers to supply a certain number of terawatt hours; if they fail to do so, they pay a tax. This is an excellent measure. We can also be pleased to see that the debate opposing renewable energy sources and nuclear power is now out of date. EDF will be spending 3 billion over the next five years on renewable energy (wind turbines), the same amount as was spent on the EPR in Flamanville. Moreover, coal will remain an inevitable source of power for electricity production, despite all the questions about CO<sub>2</sub> emissions, and sequestration will not be feasible for another 20 or 30 years; it will not be a solution in the short term.

**Given this situation, although nuclear power is not the overall solution to our problems, it is another inevitable solution,** as the Asians, Americans and Europeans have realised. The UK, for example, which is already a major gas importer as a result of the decline of oil fields in the North Sea and which will have 70% gas-powered facilities in ten years' time even though this means geopolitical dependency, has relaunched the discussion on sources of energy. The renewal of interest in nuclear power raises two questions – competitiveness and acceptance.

As far as competitiveness is concerned, an estimate drawn up for the EPR in Flamanville gave a production cost of 45 or 46 euros per megawatt hour, whereas a gas combined-cycle plant gives a cost of 45 euros if oil is priced at 35 dollars a barrel and 55 euros if the oil price rises to 50 dollars a barrel. With the structurally high price of oil, **the competitiveness of nuclear power is no longer a problem, although we have to maintain our efforts. The main issue is rather more its acceptance and, therefore, the safety and transparency of sustainable waste management.** The favourable vote given to two laws, firstly on 13th June on transparency and safety in the nuclear industry and secondly on 28th June with the law on sustainable waste management was excellent news for France and Europe.

As far as transparency is concerned, the 13th June law strengthens the competence and powers of the *Commissions locales d'information* (CLI, Local information committees), grants institutional status to these agencies (which have been in existence for more than twenty years) and gives them increased resources and access to expertise or even to a second opinion from independent experts. We have already seen this system working during public discussion of the EPR. The fact that all these conditions are now covered by law is a source of immense satisfaction for the operators. With regard to the law of 28th June on waste management, I see the most important feature being the **method**. This is the first time that a law has been voted in after public debate – and it is easier for me to say in October 2006 than it was at the end of 2004 that this is an excellent thing because EDF was nevertheless concerned about the combination of participative and parliamentary democracy. After a short period of doubt and a quickly-resolved disagreement on the subject, it is now apparent that these two approaches complement each other perfectly. I should like to pay homage to the Public Debate Committee for the public discussions on the management of radioactive waste. Chaired with outstanding skill by Mr. Georges Mercadal, the process gave rise to very high-quality public debate on a very difficult issue.

From EDF's point of view, what are the other salient points from the law of 28th June 2006? Firstly, this is a comprehensive law, dealing with all types of nuclear waste without exception. To date, there is no solution for radium-bearing and graphite waste but the law requires us to find one for those types of waste as we have for the others.

Secondly, the three areas defined in the 1991 law have been confirmed and the knowledge resulting from fifteen years of research has been taken into account, which is important if we are to build confidence. Likewise, the law lays down a timetable that follows on from the Bataille Law, with a new legislative discussion scheduled for 2015 and an objective laid down for 2025.

**The law also deals with the financial security of nuclear waste management.** The question of who would be funding the management was a recurring theme throughout the public debate. The law states that the sale price of a kilowatt hour must take account of dedicated assets i.e. 1.5 billion euros per annum with a view to building up a reserve of 15 billion. This may not be the best financial investment but it is the price we pay for trust. From EDF's point of view, this is a good choice and it will help to promote the acceptability of nuclear power.

**Finally, the law requires greater involvement from industry.** Like CEA and Areva, EDF has been spurred on by local councillors, the Government and public authorities in general. They invited us not only to become financially involved as planned in the 1991 law but also to become involved in local development. This is not easy but we do it in three ways. Firstly, by developing biomass, biofuels and cogeneration. We are, in particular, working on projects to produce gas from timber and we will shortly be answering calls for tender for the production of biomass using this technology. Secondly, by

strengthening energy efficiency. Meuse and Haute-Marne are among the *départements* (“counties”) chosen for these projects and we are concentrating our efforts in this respect on low-rent housing and local and regional authority buildings. Finally, we are supporting mechanical engineering and metalworking industries to ensure that they meet the needs of builders.

The law of 28th June 2006 is an exemplary law and, because it has been planned for the long term, it strengthens trust without any illusion or naivety. We have ten years in which to consolidate this policy and it is our determination to succeed which is driving us on.

**Alain Vassaux, Secretary of the Atomic Energy Sector, CGT Mine-Energie** – The CGT is delighted that there has been a follow-up to the 1991 law and that the drafting of the new law has been preceded by high-quality public debate. Very difficult but complementary issues have been raised; concerns, questions and disagreements have been expressed, along with requests for scientific explanations. Questions were asked about existing experience. The discussions went far beyond our experience in France and allowed for a comprehensive analysis of the guidelines laid down in several countries, in Europe and elsewhere.

Using this approach, we have pinpointed the possible issues in a European energy policy, more particularly the problem of nuclear waste management. This approach will shortly take on its full meaning given that the European Union is expanding to include new Member States that use nuclear energy. **Generally speaking, the CGT is anxious to ensure that any energy policy allows access to energy for all, right across the planet. This can only be achieved with solidarity, defined to preserve resources and reduce greenhouse gas emissions. To this end, the use of all types of energy is required, including nuclear energy.**

The law of 28th June 2006 sheds light on a diagram of the parties involved and deals with all the waste produced. The CGT is happy to see that the entire “research” area was taken into account (research on separation and transmutation of long-lived radioactive waste and research into deep geological disposal) and that the law lays down a timetable for completion. The research into “separation and transmutation”, which is linked to the development of fourth-generation reactors and specific tools, conditions the future of nuclear power in terms of acceptability and control of raw materials, by improving the use of uranium and plutonium to extend by several hundred years the period before the resources run out. This also involves a major issue – the reduction of the noxious effect of waste and the reduction of its volume.

**Everything would be fine if the uncertainty about the reactors of the future was lifted, either as regards funding for research or the extension of the corresponding human resources.** The President of the Republic of France issued a challenge to CEA, to be settled by 2020, but the limited budget of the agency leaves very little room for manoeuvre and few resources to launch the project. Moreover, the deregulation of the electricity market is creating new behaviour patterns. The traditional osmosis between

research, industry and producers no longer seems to be part of the energy landscape. It would seem that, today, every individual party wants to define its own industrial strategy and establish its own alliances within a commercial framework. Given this situation, it is difficult to highlight the general system in the international Generation IV forum.

As far as research into deep geological disposal is concerned, the CGT insists on the need to achieve solutions that will be validated and accepted in 2015. Ultimate waste already exists and even though the volumes have been greatly decreased, we shall continue to produce some at least.

The notion of reversibility has been the subject of much debate. Let us leave time to do its work... Research into disposal has produced advanced demands for confinement and, if this solution is finally selected, the technology will leave future generations to make the choices. However, **the extension of the research period should be an opportunity for all parties to meet (industry, councillors and local people) so that each individual can gain in-depth knowledge of the project and find out about the responses supplied to questions of security, especially with regard to confinement. Communication and explanation should remain the rule.**

I shall end with a few comments on a number of other points. Firstly, there is a vital need for the application of this law to be monitored by a national representative body. It cannot be random and it must allow for ongoing debate. In particular, the mechanism chosen to calculate additional tax is complex and will require stringent monitoring. Then, if we want the “separation and transmutation” research to produce results, there must be major involvement by the benchmark industry and the power producer. Moreover, the conditions relating to the tax cannot remain a mere intention; they must be concretely and efficiently translated into action.

I cannot finish without stressing the fact that the application of this law, as for all laws referring to an energy policy, cannot be achieved within the general framework of a public pole. Finally, my remarks would be incomplete if I did not mention the social effect of all this. The “waste” industry, including hygiene and dismantling, is a demanding sector as regards security and working conditions. It must give its work force a high-level status. We denounce the current situation, which is far from satisfactory.

**Bruno Sido, Senator and Chairman of Haute-Marne “County Council”** – I should like to thank the organisers of this seminar for having invited me to take part. I attended the first *Entretiens européens* in Nogent then I took my distance from the meetings... I shall express my thoughts today firstly as a senator then as a local politician.

Three discussions took place in the Parliament. During the debate on the **draft guideline law on energy**, one of the most important points was a statement of the need to make faster progress in the fight against CO<sup>2</sup> emissions. I then became the *Rapporteur* in the Senate for the **draft law on transparency and**

**security in the nuclear industry**, a law which some think should have been discussed at the same time as the **draft policy law on the sustainable management of radioactive matter and waste**. The Government preferred to table two distinct laws, luckily in the correct order. Both laws were seen as urgent. I would remind you that there was almost no legislative corpus on the nuclear industry in France and that it was high time we set a framework for this powerful industry. The law was also necessary to ensure the transparency and security without which acceptability could not be guaranteed.

I would like to look at the political aspects of the law on transparency and security in the nuclear industry, promulgated last June. The law sets out a number of strong principles i.e. respect for the environment and people's health on the one hand, and the responsibility of today's generations to resolve outstanding problems on the other. I observe that the problem has been adjourned for far too long despite the fact that the nuclear industry was known to produce waste and that the section located at the bottom right of the periodic table drawn up by Mendeleïev is constantly increasing in size. The issue should have been dealt with in 1974 when the industry was first launched. At that time, the solutions would have been easier to implement. Moreover, the law bans the disposal of nuclear waste from foreign countries in France.

It was absolutely essential to lay down these principles and it was equally necessary to establish a timetable for their application. This has been done. **However, there remains one ambiguity because the law states what must be done, but not how.** What will we do when the Phoenix reactor is shut down? Will we go and try out the Russian solution?

I shall not return to the question of disposal but it is in my capacity as a local politician that I shall mention "permanent storage" to emphasise that it must be accompanied by a stronger economic incentive. **Andra is not intending to build a deep geological disposal facility in the Nevada Desert. The producers of waste must therefore make a commitment to develop a new-generation local industry.** Finally, security of funding is vital.

I shall summarise the law by saying that it shows great determination and that, in this respect, we are far in advance of the other European nations and the USA. The law finally institutes consultation, which was essential. It is, though, equally important for the ongoing research to be validated by national and international assessment – this provides reassurance.

However, the new law also introduces a number of major changes. **There is no longer any mention of a single facility or, by the way, of a single potential disposal site, placing enormous pressure on local people and politicians at all levels.** I should like to salute the presence of two mayors who are directly concerned by this issue and who will be more demanding than ever on backing, security and reversibility. In this respect, something has failed! As François-Michel Gonnot said, the law is giving preference to disposal. In fact, the "packaging" concept has been abandoned. Finally, although the law does mention reversibility, the issue is scheduled to be discussed by Parliament in 2015 and nobody knows what the

future law will contain.

Somebody will no doubt point out to me that there is very little mention of Europe in the law apart, as I have said, from confirmation of the ban on the disposal of waste from other countries. **This is such an important issue that the Member States will not agree to hand nuclear waste management over to the Union.** The new law was necessary because it introduces a method and a timetable. Now we have to make nuclear power an everyday feature of life in France and Chernobyl has made this more difficult. Making nuclear power acceptable is a vast project, as yet scarcely out of the starting blocks. All the stakeholders must be called to the rescue, whether researchers, philosophers or politicians. Since fossil fuels will eventually be all used up, we shall only be left with renewable energy, including nuclear energy produced by fast-breeder reactors. The future lies in the hands of nuclear energy, but it has to be an acceptable, “socialised” nuclear energy. Without it, we will never succeed.

**Rolf Linkohr** – We will now spend a moment or two on some very precise questions resulting from these papers since the general discussion will take place after the presentation of the situation in foreign countries.

**Emmanuel Horowitz, Project Leader, EDF** – What does Mr. Sido mean by “permanent storage”?

**Robert Toulemon, former Director General at the European Commission** – Mr. Dupraz, when you talk about energy saving, are you including the considerable savings that could be achieved by the setting up of an integrated, jointly-managed European electricity area? Secondly, in the cost price of nuclear-powered electricity, do you take account of the provisions for waste management and the decommissioning of power plants? Finally, how can we reconcile Mr. Sido’s remarks on the strictly national character of energy policy with the Government’s position in favour of a European energy policy?

**Yves Demanet, General Secretary CGT Melox** – Mr. Vassaux, could you specify your thoughts on a status for decommissioning and cleansing? At the moment, there are a number of unacceptable things occurring.

**René Gerun** – With regard to military nuclear power, can we trust waste management? The military is covered by the official secrets act. How should their waste be processed?

**Rolf Linkohr** – We hear a lot about “sustainability”. **Does waste management make nuclear power a sustainable energy?** In countries such as Germany, the word is only used for renewable energies. If it could be proved that nuclear energy is “sustainable”, it would be a very useful factor in having it accepted

by public opinion.

**Bruno Sido** – We would have to ask the person who coined the phrase what he meant by “permanent storage”. However, from the moment we start producing waste for which the cooling period is 60 years, we will have to store it somewhere in the meantime. The question that we then asked ourselves was whether, if it is stored in good conditions for that length of time, could the storage not be prolonged, perhaps permanently, on a human scale of course. This is a question that should be the subject of public debate.

As to the national nature of energy policy, there is no use spouting incantations on a European policy; France adopted its own solution back in 1974. It produces 80% of its electricity from nuclear power and, in our country, everybody finds it praiseworthy. Other countries, on the other hand, have decided to abandon nuclear power and still others are considering its reintroduction. In this situation, can anybody imagine a European directive making nuclear power mandatory? No, of course not. This means that energy policy will remain essentially national.

Finally, the law on transparency deals with the issue of military waste. Andra must monitor it through a special committee but the waste is not covered by the official secrets act.

**Bernard Dupraz** – The cost of decommissioning power plants and managing waste has been taken into account in the cost of production when the price of 46 euros per GWh is indicated for the EPR. Together, these costs represent approximately 6% to 7%.

**Mention has been made of a European electricity area. EDF is one of the staunchest supporters of the concept because, given France’s geographical situation and the competition introduced by nuclear power, our company is the electricity producer for whom this would bring the greatest benefit.** Interconnections currently account for 15% of our production capacity; the Commission laid down an objective of 10% for each country. We should like to see strong future development of interconnections but there are problems, even building power lines between France and Spain for example. There is also a problem of acceptance, rather in the same way as for waste management. As to the use of existing interconnections, this is a question for those who draft the rules. Yesterday, they allowed exchanges between regional monopolies. **Today, the European electricity market has taken a backward step because there are no longer any rules in the medium term. In Europe, countries buy volumes of electricity from one day to the next. We need longer-term visibility of the rules if we are to build a European electricity market.**

**Alain Vassaux** – The link between client corporations and service providers poses a problem. Everybody has heard of “**nuclear nomads**”. It is obvious that all companies call on sub-contractors, sometimes third-

level sub-contractors as far as Areva is concerned. What we denounce is the **ongoing attempt to decrease costs which results in staff working in socially unacceptable conditions**. Is it acceptable for staff to sleep in their cars, in buses or in dormitories? Is it acceptable to continually compress the wages bill and hold the suppression of bonuses in return for renewals of contracts over the heads of the work force like a sword of Damocles? Yet this exists, and it gives the nuclear industry a bad name. We who defend nuclear power are found wanting because of it. So we have to stop and think. **In the very near future, we are going to have to decommission the first graphite power plants. Areva and CEA will be launching major projects. We will find ourselves centre stage and we will be watched closely.** If the situation that I have described continues to exist, it will be damaging. What we are proposing is a correct status for the decommissioning-cleaning industry given that the current situation is criticised by all. What we should like is to avoid creating conflict in our industry and to be constructive **so that nuclear power becomes acceptable and credible. This also requires action on the part of the people involved in it.**

**François-Michel Gonnot** – Whether produced by people in blue overalls or camouflage jackets, radioactive waste is still waste. Andra manages short-lived waste whether it comes from a military or a civilian source but it does so on two conditions – that the waste is clearly described because we only manage what we know, and that we approve the packaging. Still with these two provisos in mind, we envisage including spent fuel from nuclear submarines in deep geological disposal. As to obsolete military sites that may still contain nuclear waste, I do not know of any. **In the national inventory that Andra is drawing up with all producers, we are listing military waste and radioactive matter**, as you can see on our website which is updated every three years.

Is nuclear power a renewable sustainable energy, asked Rolf Linkohr? There is no doubt that, like renewable forms of energy, nuclear power is more environmentally-friendly as far as the production of CO<sub>2</sub> is concerned. However the fuel used is a fossile ore. The nuclear power of the future, which will operate almost in a closed circuit, will be a renewable energy to some extent. **Will it be sustainable? Quite honestly, it will be if we find a solution to three problems – security (which we already control in large democracies), proliferation (which is an international problem) and waste management.** If these three issues are settled (and waste management is particularly difficult since it is the issue on which public opinion considers that we still have a great deal to do to instill confidence), then civilian nuclear power will be a sustainable source of energy.

**Rolf Linkohr** – I agree with this opinion and, indeed, we have put this issue on the agenda for our conference in Berlin.

Let us now go on to the second part of our discussions.

## 2nd round table:

### The 2006 law: Information for national and Community policies

*Chaired by Claude Fischer, Director of Les Entretiens européens*

*With Paul Golan, Deputy Director in Chief of the Office of Civilian Nuclear Waste Management (OCRWM) at the Department of Energy, USA*

*Robert Leclère, Director Delegate of Synatom, a subsidiary of Electrabel Suez, Belgium*

*Jeremy Rycroft, Director of the Spent Fuels Department, British Nuclear Group, United Kingdom*

*Timo Seppälä, Director of Communications, Posiva Oy, Finlande.*

**Claude Fischer** – Europe is a very difficult subject to discuss at the present time, and even our national politicians do not see Europe as an area of common policies that are consistent with the reform of our national policies, an issue of some relevance, especially when set against a background of globalisation.

Bruno Sido told us that an energy policy was first and foremost national. For our part, we are working on the idea of a European energy policy (cf. *Confrontations Europe's* European seminar organised jointly with EDG and sponsored by the European Commission on 11th May<sup>[1]</sup>) and we are doing our utmost to advance the concept. **We need a European energy market. Companies are asking for one so that they can expand their businesses. It must be framed by a policy that encourages such development and prevents people from doing their own thing, especially in the nuclear industry.** Companies such as EDF question the idea of a European policy, seeing it as a constraint whereas it could actually become an advantage in building a dynamic market. Bruno Sido said it would be impossible to draft a directive that would impose nuclear power on Europe. This, however, is not the issue. Member States will retain the right to choose their sources of supply but, on the European market, it must be possible to have access to all possible sources! If, in Europe, we want an energy mix that includes nuclear energy, we have to create European conditions for nuclear production to guarantee security and safety for all. Moreover, François-Michel Gonnot emphasised that, if we want to make nuclear power a sustainable energy, we have to guarantee security, a question raised on an international level. It is therefore quite appropriate to discuss the issue on a European level and Europe could become exemplary in this regard.

Rolf Linkohr mentioned the possibility of a technological platform. François Lamoureux had even dreamt of a joint corporation. Is it a utopian idea or can we share funding for the three areas of research, an idea which presupposes a common policy?

France, then, has voted in its law. It does not have a European dimension except with regard to the ban on accepting waste from other countries – although it does not say that we may not send ours abroad. It does,

however, have an international aspect given that it was drafted on the basis of international benchmarking, by comparison with best practices.

The questions I would like to put to our European friends are as follows. In your opinion, is the French law a model for others to follow? We patted ourselves on the back and described the democratic procedure. Yet we still only have one site and a single possible disposal facility. Will the French law help to change the law in your own country? Is it an advantage for a European policy, to draft a European framework for the management of nuclear waste?

**Robert Leclère, Director Delegate of Synatom, Belgique** – Synatom is the Suez Electrabel subsidiary that manages the entire fuel cycle from beginning to end, and makes provision for the decommissioning of power plants and waste management i.e. a sum of 4.3 billion. **The 2006 law is of interest to us, especially as Suez would like to be a player on the nuclear market in France, but also so that we can compare its approach to our system in Belgium.** In fact, there has been extensive discussion at European level and common ground has been found on some points while there is divergence on others.

With regard to the guidelines laid down in the French law, I shall not come back to the first of them, relating to a three-pronged research programme. However, I should like to emphasise one element specific to France i.e. the laying down of a timetable for solutions, whereas **in Belgium, the law gives Ondraf (the equivalent of Andra) general responsibility for long-term management with a description of the technical and economic aspects of the actions taken, but without any schedule.** In my opinion, the Belgian Parliament wanted to take account of the uncertainties inherent to research, believing that a date can only be an objective and that, although it is good to establish a timetable, it may be difficult to comply with it. As to reversibility, it is only mandatory, at the present time, for short-lived low-level waste.

It is essential for each country to establish its own national waste management plan. In Belgium, Ondraf has an ongoing inventory which it translates into financial terms so that the Ministry of the Economy, to which it reports every five years, can ensure that the resources required for decommissioning and cleaning are adequate. A large number of small nuclear sources are used, for medical purposes for example, and we have to be sure that these facilities will also be decommissioned and that we have the funding to do so.

The reprocessing of spent nuclear fuel has been done for many years in La Hague and everything is going very well there. At present, the return of vitrified waste is coming to an end. The process has never posed any problems whatsoever but I understand why States want to reassure public opinion by stating that radioactive waste from foreign countries should not remain on their territory for a “politically incorrect” period of time. In this respect, Belgian legislation also provides for the return of waste to its country of origin but it does not go as far as the French law of June 2006.

Moreover, while France has selected taxation as a means of funding research and supporting public interest

groups, **Belgium has chosen a strictly conventional option, giving advantages to towns based on producer contributions negotiated between the parties involved.** The advantage of this system is that everybody seeks to minimise costs. Moreover, the fact that the agreement is negotiated for a period of 3 to 10 years gives very useful visibility.

In Belgium and France, provisions for decommissioning have been covered by law. France decided to build up dedicated assets and set up a National Evaluation Committee (CNE). *Mutatis mutandis*, the system adopted by Belgium is the same, with Synatom responsible for setting aside adequate provisions.

Finally, with regard to the legal system, I note that France has not planned to transfer any legal ownership rights to Andra, since Article 2 of the law of 28th June 2006 requires that “*the producers of spent fuel and radioactive waste are responsible for these substances, without prejudice to the responsibility of their owners as managers of nuclear activities*” – wording which seems to me to fall short of perfect clarity. **In Belgium, on the other hand, producers no longer own waste; ownership rights are transferred to Ondraf**, with Synatom being responsible for ensuring that Ondraf will be correctly supplied in 30, 40 or 50 years.

In conclusion, we believe that there are three points which require further explanation – the timetable; the decision on whether taxation or, as we believe, the signature of an agreement is the better method of funding; and the question of waste ownership.

**Jeremy Rycroft, Director of the Spent Fuels Department, British Nuclear Group, United Kingdom –**

The law on the management of nuclear waste is further advanced in France than in the United Kingdom where it dates from 1995. British law covers deep geological disposal for medium-level waste but, although it is planned to store high-level waste for fifty years, there is no provision for this waste thereafter. It had been planned to store it in a deep geological disposal facility but this was shelved in 1996.

**The Committee on Radioactive Waste Management (CoRWM)** was set up in 2003. After extensive consultations, it filed a report with the Government in July 2006 and Parliament seemed anxious to follow its recommendations and speed up measures for the management of nuclear waste. **The Prime Minister declared himself to be in favour of the construction of new power plants and the absence of any waste management policy is hindering this.**

The Committee considers that deep geological disposal is the best approach. It does not mention reversibility, estimating that **permanent disposal is the safest method given the threats from terrorism, conflicts and environmental changes and believing that this is a more reliable method than above-ground storage.**

Until such time as deep geological disposal is introduced, the Committee is of the opinion that intermediate disposal should be strengthened and scheduled to last for a century or more, with great care being taken to

ensure the security of the facility and **to avoid regional or central facilities as much as possible so that the transport of waste is limited.** With this in mind, it considers that, in certain cases, the waste could be stored near power plants, possibly in shallow below-ground storage.

The Committee recommends the intensification of research into permanent and interim disposal. It emphasises that other solutions may be feasible such as the drilling of very deep shafts and tunnels, and that research may reveal other possibilities over the next fifty years.

While underlining the fact that the decommissioning of reactors which have reached the end of their lives will require the storage of waste such as spent uranium and plutonium, the Committee suggests that, if the general public agrees to it, this waste should be stored locally and, in this respect, it insists on the virtues of transparency.

It is clear that there is little difference between the system adopted in France and the recommendations from CoRWM, except that the **Committee pleads in favour of willingness on the part of local authorities (in accordance with current practice in Scandinavia) and insists on the need for decision-making in real partnership, made easier by the granting of funds to the relevant local and/or regional authorities.** It also considers that any authority which agrees to the setting up of a facility should be entitled to change its mind up to a given date.

Other elements of waste management policy do not feature in the recommendations from the Committee. As is the rule in France, waste from abroad which is reprocessed in the United Kingdom cannot be stored there. However, this condition does not apply to waste reprocessed before 1976 since return to the countries of origin was not included in the contracts signed at the time.

The provisions to be used to fund decommissioning are paid to an Agency but the mechanism involves private enterprise. Proof is required that provisions have indeed been built up and are adequate.

With regard to Europe's role in the policy of nuclear waste management, it will come as no surprise to hear that the United Kingdom would prefer a system that is not too regulatory.

Apart from the voluntary approach from local and regional authorities, another difference between the French and British systems is that we are **less interested in separation-transmutation because we are not convinced of its usefulness.** Finally, the French law goes into great detail about very complicated mechanisms. Overall, however, the two approaches have much in common.

It is these common elements that we will have to look for if we want to define a European policy for the management of nuclear waste because it will be impossible to achieve a perfect overlay of points of view. The differences are too large between Scandinavian countries, Mediterranean countries and States such as France or Spain. The European Union should therefore concentrate on common points and ask for progress without demanding that everybody follows the same path because there are several viable techniques and every country should remain free to choose the one that best suits it. **In reality, however, although several**

**countries in Asia are acquiring nuclear technology, it is an international rather than a global system that should be aimed at, in order to institute the essential safety barriers.**

It is a good sign that Messrs. Chirac and Blair have decided to set up a Franco-British forum on nuclear energy. I intend to report back to the Ministry on this conference and suggest that the management of nuclear waste should be included in the agenda for the forum.

**Timo Seppälä, Director of Communication, Posiva Oy, Finlande** – *Posiva Oy* is the company responsible, in Finland, for the deep geological disposal of nuclear waste. **We are currently preparing the selected site. The application for operating authorisation is due to be brought before the Government in 2015 and permanent disposal will begin in 2020.** Before selecting the site, however, twenty years of enquiries and research were necessary.

I should like to compare French and Finnish approaches to the management and disposal of nuclear waste.

**In strategy terms, both France and Finland are preparing for permanent disposal and both have adopted the same principle of reversibility. The difference is that France is also engaged in reprocessing nuclear waste and that Finland does not do this.**

In legal terms, nuclear operators in both countries are responsible for the waste they produce and the importation of foreign waste is banned, as is exportation.

In financial terms, disposal is funded out of the profits made by nuclear operators, for example in Finland by a fund managed by the Ministry of Industry.

As far as the choice of permanent disposal site is concerned, both countries have a precise timetable. Finland selected its site five years ago, application for building permission will be filed by 2015 and disposal will commence in 2020. In France, authorisation will be granted in 2015 and disposal will begin in 2025.

**There is one difference relating to the status of public debate:** Finnish law does not make this an obligation as it in France where specific agencies have been set up to organise it, and it was done on a voluntary basis between applicant town and city councils and operators.

For a more general summary of the comparison between the strategies implemented in the two countries, I would say, firstly, that both have adopted a policy and a law which are well-defined on a national level, with responsibility for management and the funding of its costs payable in both cases by those who produce the waste, in accordance with the “Polluter Pays” principle. In France, however, the law that defines a strategy which is then described in territorial and local terms entrusts the implementation of the strategy to a public interest group, with requirements including questions of regional economic development and the circulation of technologies. **In Finland, a voluntary approach is the rule and those concerned are, therefore, those who will have to manage permanent disposal and the local authorities for the area of**

**the disposal site.** Unlike France, which has included socio-economic incentives in its law, Finland gives none to the council for the town within whose boundaries the disposal facility lies. The council has to negotiate directly with the manager of the site.

**From the Finnish experience, we can see the importance of local acceptance of the choice of site for permanent disposal and the town council enjoys a right of veto.** In fact, it was in the two applicant towns which already had nuclear plants that the local people supported the idea of a waste management facility whereas in the other two applicant towns which did not have this tradition, the local people were not in favour of the project. As far as the choice of site was concerned, it was wider in Finland than in France, because two town councils, in towns that already had power plants, were competing to become home to the disposal facility and the company had to select one. This experience also confirms that it is much easier to inform people locally than on a national level, and to increase awareness among the population of a small town than the population of the country as a whole. **Moreover, it is easier to discuss the matter with people who are already familiar with nuclear power and who can consider the question from a position of trust.** On the other hand, given the surveys carried out in Finland, I doubt whether it is possible to inform the entire population of a country correctly on a subject such as the management and disposal of waste, or create the necessary climate of confidence.

Finally, one important factor that should be underlined in the Finnish situation is the early political commitment on the question of waste, an issue first mooted in 1983. It was then that the government decided on a timetable for the management of waste and permanent disposal, taking into account a life cycle of fifty years for a power plant, which makes permanent disposal an issue for a period more than one hundred years hence. **The step-by-step decision-making made it easier to select the site, scheduled to close in 2130. In the decades to come, the project will be scrutinised again and it will be possible to reconsider or even reverse the decisions taken if alternatives are available.** This leaves very real room to manoeuvre, which is important in a sector such as this.

**Claude Fischer** – I should like to thank our guests for their papers, which fully met our expectations. They have put into perspective their legislative process compared to the French law and have considered the future of a European framework. I should like to hand over to our American friend, who has been kind enough to come here from Yucca Mountain.

**Paul Golan, Deputy Chief Director of Office of Civilian Nuclear Waste Management, Department of Energy, USA** – I should like to begin by thanking France for its hospitality and to congratulate it for the action it has taken to develop nuclear power, a clean, abundant and renewable energy source. I also congratulate the country on furthering waste management. This conference is taking place at just the right

time when it comes to discussing the American example because, **while the French law has only recently been voted in, American legislation on nuclear waste (the *Nuclear Waste Policy Act*) was also modified and updated last April, when it was also completed by four draft laws on high-level radioactive waste**, in particular one introduced by Senator Dominici from New Mexico.

Why was new legislation required in 2006? Firstly, the original law scheduled another law on the reservation of 140,000 acres of land (i.e. 56,000 hectares) for the disposal programme. Secondly, there was a need to clarify the authorisation application procedure, setting on a stronger base and giving it more visibility. Finally, there was a need to take account of the changes that have taken place, in the USA and worldwide, since the first major law on waste management, the *Nuclear Waste Policy Act* dating from 1982, after the accident in Three Mile Island, and the law that completed it in 1987, after the accident in Chernobyl. Thereafter, in 2002, Congress declared itself to be in favour of a disposal facility (Yucca Mountain) but the project was vetoed by the Governor of Nevada. Eventually, it was a presidential decision that established Yucca Mountain as the only disposal facility for nuclear waste for the entire country.

**The main arrangement consisted firstly of reserving a piece of land and secondly of funding operations, including the decommissioning of the Yucca Mountain facility.** This funding is provided through a fund to which military users of the facility and electricity producers pay a 0.1 cent per KWH tax on the electricity they produce. The law also abandons the limiting of total capacity to 70,000 metric tonnes as originally scheduled for disposal. At the time, it was believed that less and less use would be made of nuclear power whereas, in fact, authorisations have been extended and, at the moment, we are experiencing a real rebirth of this form of energy production.. Moreover, the law also provides for guarantees on waste management i.e. the regulatory body known as the *Nuclear Regulatory Commission* which cannot grant any new licences without first seeking the necessary assurances on the management of future waste.

As far as Yucca Mountain is concerned, I should like to stress that **the current capacity of 70,000 metric tonnes of spent fuels corresponds to an electricity production that would have required the mining and burning of 5 billion tonnes of coal in a coal-fired power station.** We have therefore avoided the emission of hundreds of thousands of tonnes of greenhouse gas. As a source of electricity, nuclear power is clean and we want to develop it.

With regard to the French law of 2006, it has much in common with the current legal framework in the United States. Firstly, **both countries have chosen deep geological disposal, the solution which, since 1957, the international scientific community has recognised as being the best for the management of this type of waste.** In both countries, there was a push for political commitment and involvement of public opinion before any authorisations were granted. In the USA, it was the authorities, counties and local committees that were consulted on the issue. They had enough resources to obtain their own expert opinion.

**Both countries have chosen to store waste in their own territory.** The United States, which produce a lot of waste (60,000 metric tonnes, not counting all the military waste, some of which is covered by the official secrets act) need a national disposal facility. Some countries may not be able to do this because of their geology. For them, a disposal site on their own territory may not be a viable proposition and they will therefore have to seek an international solution. However, in my opinion, the existence of the Yucca Mountain project should not cast doubt on the efforts currently being made in every country.

With regard to the stages in the Yucca Mountain project, we have recently filed our calendar and requested authorisation. It will be the *Nuclear Regulatory Commission* that will grant the building permit. We have also set a final date for the facility's connection to the railroad network. **We intend to build the facility with a view to receiving the first batches of nuclear waste in March 2017.** Of course, the timetable depends on Congress voting in the necessary legislation.

Over the last sixteen months, major changes have taken place in the Yucca Mountain programme. We have changed our approach to the reprocessing of waste and have chosen a system involving the use of metal barrels. We have commissioned a very well-known laboratory, *Sandia national Laboratory*, to coordinate research. We have also launched a project called *Global Nuclear Partnership* which aims to encourage the development of nuclear power by offering a solution to the reprocessing of waste, especially the 1% of non-spent plutonium. We have also revised the standards for radioactive protection. Originally, in the Yucca Mountain project, we had retained a period of 10,000 years. The courts demanded that we should set the standard to one million years and we are working on models and strategies that will meet this requirement.

France, in which the nuclear industry produces 80% of the country's electricity, is doing better than the United States when it comes to the management of waste. **We have to continue to make progress with waste processing to encourage the development of a civilian nuclear industry that is essential for our energy security and, more generally, that will enable us to better protect the environment. This is one way of combating global warming.**

**Claude Fischer** – I should now like to open the debate.

## DEBATE

**Laurent Milliat, *Dexia Asset*** – Can the producers explain the fairly major differences in the provisions built up by companies to cater for decommissioning? Is there a move towards standardisation?

**Bernard Dupraz** – A comparative study carried out by the OECD in 2003 showed that the differences lay in the technologies used. When comparing identical technologies, the differences are not so large – but there are differences nevertheless. That’s quite true. EDF lies towards the bottom of the ladder because standardisation, which has already reduced construction costs, will undoubtedly also reduce decommissioning costs. Our experience, from a decade of decommissioning, shows that the provisions are “on track” and we are confident that our forecasts are valid.

**Robert Leclere** – The cost of decommissioning and the cost of waste management are often confused. Moreover, the fact that countries have not chosen identical solutions will lead to major differences in the amount of provisions required for decommissioning. However, if the technology is equivalent, there is no great difference from one country to another.

**Michel Lung, *Deputy Secretary, Association of Ecologists for Nuclear Fuel (Association des écologistes pour le nucléaire)*** – You mentioned 60,000 metric tonnes of spent fuels, Mr. Golan. This is, of course, a sort of natural uranium mine for Generation IV reactors. Have the United States decided to reprocess these fuels?

**Paul Golan** – In the 1970’s, the American government abandoned the idea of reprocessing spent fuels. Now we want to show that certain reprocessing technologies can be used to make by-products that are non-polluting. This is why I intend to go and visit the facility at La Hague. **However, we still need a deep geological disposal facility. In our view, there is no question of it being either Yucca Mountain or reprocessing; it is a case of Yucca Mountain and reprocessing.**

**Jeremy Rycroft** – In these 60,000 tonnes, there are approximately 600 tonnes of plutonium. This means that it either has to be used or you have to find a guaranteed disposal system. Whatever the case, it is vital to take all necessary steps to avoid creating a plutonium mine in the long term. This means that long-term control is essential.

**Henri François, Mayor of Saudron** – What is meant by “long-term storage”? Are we talking about above-ground storage, shallow underground storage, or deep geological disposal?

**François-Michel Gonnot** – Using an intellectual mechanism that is typically French, I would say that, when we are faced with a problem, we invent a word. This is what gave rise to the concept of “reversibility”, a word to which people are now busy giving a meaning... Likewise, during the parliamentary debate, people talked about permanent storage and reversible disposal, then an amendment was tabled, talking about “sub-surface storage”. The problem is that the “sub-surface” does not exist; you’re either on the surface or underground!

**Storage is a technical solution that is valid for 50 to 70 years above ground. As to deep geological disposal, it consists of burying waste at a depth of 500 metres in rock, with reversibility being envisaged for a limited period only – one or two hundred years, perhaps three.** Those who talk about shallow underground (or “sub-surface”) disposal mean disposal on a hillside in a rock that guarantees security, but the notion was not included in the law for the reason I gave – the mining code refers only to above ground and underground.

**Philippe Herzog, President of Confrontations Europe** – The international comparisons show that the weak points of the French solution, as underlined by Bruno Sido, are the concentration of research on a single site and the choice of the “top-down” solution. This means that acceptability has to be gained once everything has been decided, and that is far from easy as we have seen. We are now trying to get the people of Champagne on board by turning them into the champions of a clean environment – and why not?

As to the mutual interest of Europeans, it requires more than a grouping of Member States. **I regret the failure of the Lamoureux “package”. The proposal may have been rudimentary but it should have been worked on and refined. Directives are incentive frameworks, not prohibitive frameworks.**

If we consider things from a socio-economic standpoint, the acceptability of nuclear power presupposes that security is reliable in other countries. How, though, can we create security without a regulatory body? And what about the modernisation of power plants in Eastern Europe? What will the countries of central and eastern Europe do if there is no sharing of resources, no common programme? The question remains unresolved. Will they turn to Russia? That’s open to doubt given the state of their relations with their great neighbour. We cannot be content to leave this black hole. The situation that is casting a blight over the nuclear industry. Moreover, **the costs of research should be shared. It is not good for each individual country to launch its own research programme. If Russia, which wants control of the whole industry so that it can become world champion of energy supplies, has better solutions, it would upset many a national programme.** In conclusion, we have to maximise our considerations on mutual European interest.

If we do not, national research programmes will be subject to many ups and downs.

**Fernando Naredo, Vice-President (Europe) of BNFL Westinghouse** – The current American administration is doing a lot more for nuclear power than the previous ten ever did. However, Yucca Mountain should have been taking in waste some time ago and this was not the case, leading to expense and disputes between the producers and the Government. When could Yucca Mountain have become operational and what indemnities has the Government had to pay to electricity companies in the past, or will it have to pay in the future?

**Jacky Rousselle, Engineer, EDF** – The management of nuclear materials is part of the overall management of resources and a comprehensive review of all methods is therefore required. We must keep in mind the idea of our Belgian friends, who talk about reversibility for short-lived low-level waste (this represents the largest volume of waste) while France is planning nothing but irreversible disposal for this category.

Moreover, Finland is currently storing spent fuels without reprocessing. Is this an irrevocable option?

**Georges Rubinstein, Professor, Institut supérieur de gestion** – The acceptability of radioactive waste management is part and parcel of the more general acceptability of nuclear energy as a whole. Yet the media give more space and air time to opponents of the industry than to those who support it because it is much easier to sell fear than science and much easier to spread anxieties than give a platform to those who would like to correct generally-held views. **The right of response must be exercised, for example if television channels show footage of people laying across railway tracks when Areva is taking a convoy of reprocessed waste to Germany even though the law prohibits the disposal on French soil of waste from other countries!** These people should be taken to court!

We should also learn as much as we can from the operation of natural reactors discovered in the uranium seam in Oklo (Gabon), a phenomenon that is of major interest for research into the deep geological storage of radioactive waste. Equally, we should make available throughout Eastern Europe the technology required for deep geological storage. Finally, I would remind you that the International Atomic Energy Agency (IAEA) has organised an inspection mission, on a voluntary basis, to check on the security of nuclear facilities.

**François Bertault, Project Leader, CNDP** – If you want to, we can discuss disposal or storage while claiming that new words or concepts have been invented but it just so happens that, during the public debate, the question was raised again and again of whether we should trust geology or society. And the

response to this question governs our preference for one solution or another. In fact, there is nothing that should be just swept away and ignored. The people in Meuse and Haute-Marne are left wondering, and the same questions are being raised in the UK. **Is this the best way of gaining acceptance for research, giving the impression that one solution has already been chosen and that the other has been abandoned? Would it not be preferable to have two strings for our bow and continue research so that we can reach a decision based on better understanding in fifteen years' time, making a real choice that we will be able to explain to people?** This is what came out of the public debate on the issue but it is not the most obvious feature of the law.

**Yves Durrieu, *Economist at the Centre européen des entreprises de service public*** – I am rather concerned to see that, from one conference to the next, transmutation is discussed less and less even though, if the research reaches a successful conclusion, this would greatly increase the acceptability of nuclear power. And as this is long-term high-cost research, it should be undertaken on European Union level.

**Philippe de Villemeur** – Much has been said about acceptability. Often, there is a tendency to consider as a reaction to nuclear power on the part of the general public what is actually a reaction to the existence of a de facto monopoly i.e. the monopoly of networks, which is not rational. When people are told, in the areas in which we want to build a deep geological disposal facility, that it is all about producing clean energy, we would have to be talking on a scale that corresponds to the size of the monopolies and it would have to really be in the general interest. And what would be really worthwhile is not solar energy or wind power, which we already know how to produce, but research into the accumulated storage of power. Yet there is nothing about this in any of the various programmes despite the fact that it could lead to real competition between non-networked systems and networked systems, given that renewable energies are widely dispersed.

**Claude Fischer** – I do not want to speak for the partners in the Bure operation but I think they wanted to base their choice on the features that gave Meuse and Haute-Marne the edge over competitors viz. farming and timber. The development of bioethanol may lead to concrete applications there, especially as there is a competitiveness cluster in Reims and companies ready to create projects with farmers and local towns. In fact, some of these projects are underway. All our discussions have at least brought players who are creating projects into contact with each other, not to mention inducing strong commitment on the part of leading electricity producers to implement large-scale initiatives.

It is the same people who opposed deep geological disposal and research in the facility in Bure who, when

it came to clean energy projects, complained that this would only create 30 to 40 jobs. Yet the example of Brazil, or even the South of France, shows that the development of new energies represents hundreds of jobs. The politicians are perhaps too defensive in this regard. Luckily, things are beginning to change.

**Jean-Paul Schapira, Emeritus Director of Research, CNRS** – The conclusions on separation-transmutation, part 1 of the research programme launched by the 1991 law, were drawn up by the National Evaluation Committee (CNE) of which I was a member. They were as follows. **Firstly, the use of this technique would not exonerate us from the need to carry out deep geological disposal** because it also produces waste that cannot be stored permanently above ground. **Secondly, this technology requires recourse to nuclear power over an extremely long period** since, to significantly decrease long-lived bodies, the products to be eliminated by transmutation have to be kept in a reactor for one hundred years. This poses serious technical problems as far as fuels and separation operations are concerned. The CEA has obtained some interesting results but the changeover to an industrial-scale operation is still open to doubt. Finally, of the two large categories of long-lived bodies, it is the actinids, very heavy bodies that are heavier than plutonium, which pose fewer problems of disposal, while long-lived fission products are difficult to transmute and pose problems of disposal. For many researchers, if transmutation is used, it will be with iodine 129, which has the highest residual impact, but transmutation is far from feasible for the moment.

**Robert Leclère** – Do we need one or more disposal facilities? From the French point of view, it is not politically correct to store waste in another country. **But there is the Russian offer. Should we store everything in Russia? Of course not. However, the issue deserves at least political debate** without falling into one misinterpretation or another, for it may be that certain small countries have no national solution or only a solution that is prohibitively expensive.

**Jeremy Rycroft** – Just look at an island such as Taiwan where the uneven rugged landscape makes it impossible to envisage deep geological storage. It would therefore probably be worthwhile discussing a range of disposal options for small countries.

**Alain Vassaux** – It is little-known that the CGT works very hard on the international scene, sometimes working on the edge of politics. **For years, the CGT has been working on the Russian question. It is very attached to nuclear security and radioprotection, and it denounced the operating conditions and lack of security in the RBMK power plants.** However, on the recommendations of the IAEA, and after an expert inspection by the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) for example,

substantial improvements were made to the design and operation of this type of reactor. There are, however, other reactors and the IRSN observed defects in the VVER 440 reactors. When CGT representatives hold discussions with their Russian counterparts who are fairly close to the power base, they consider these issues. During the meetings that have taken place over the past few years, they have observed a very significant change. The Russians accept the observations made. The power plants, which were previously independent, have been networked – if that had been the case before, we would probably been able to avoid Chernobyl.

**A debate was held recently on international disposal as a form of solidarity. We, at the CGT, consider that no decision has been reached.** We are particularly concerned about the dangers of transporting and circulating such products. However, in this respect, the Russians said that they had been providing disposal on a solidarity basis for the past 25 years. When the former CIS (Community of Independent States) existed, they asked themselves the same question regarding disposal in small countries such as Bulgaria, for example, whose waste is actually sent to Russia. They stated that, as far as security was concerned, it is better to have a single disposal site under the control of an international body. This is open to debate but it shows that, as far as this subject is concerned, the answers are not all black and not all white. **Reflections on this subject indirectly condition cooperation and, perhaps, research.** Cooperation between Areva and Russia is an advantage for strategic stability. We should therefore leave open a debate in which the issues go far beyond the mere management of waste.

**Bernard Dupraz** – Since the fall of the Berlin Wall, a great deal of work has been done in power plants in the former Eastern Block countries that are now part of the European Union (Czech Republic, Slovakia, Bulgaria and Lithuania) under the aegis of the European Union and the ERDB (European Reconstruction and Development Bank). The plants were placed in one of two new categories. The first category consists of power plants that could not be modernised - they were shut down or will soon be shut down, for example in two years' time for the second section of the Ignalina plant which is the same as the one in Chernobyl. The second category included modernisable plants which received significant grants from the European Union and the ERDB. Nowadays, nuclear security is given the same importance in these countries as it is in the rest of the EU.

The idea of interregional management of waste was already well underway in the “Loyola de Palacio package”. The formula in public debate was the need to advance in stages, without missing any of them. **Is it politically reasonable to envisage joint disposal or storage for several countries? Will this not result in a step backwards in all the Member States?** Personally, I believe so. Perhaps in 30 or 40 years' time, when we have shown that a given management method is perfectly acceptable, we will be able to return to the idea of pooling waste disposal but trying to move too quickly forward may end up taking us one step

back.

**Rolf Linkohr** – I completely agree with this point of view. The European Union prohibits the export of toxic waste, whether chemical or radioactive, and supports the principle which states that **each Member State is responsible for the disposal or processing of this type of waste produced in the country. This, however, does not exclude cooperation between two or three countries if they are in agreement on the joint processing of waste.** For example, if the three Baltic States built a joint nuclear reactor, they would undoubtedly consider disposing of the waste on a single site in one of the three countries. In the past, when the ex-Yugoslavia existed, Slovenia and Croatia shared a reactor on a 50/50 basis. Slovenia is now in the European Union and Croatia will be joining soon. They will then have to comply with the rules but this will not prohibit them from taking joint action. From this point of view, nuclear power does not represent a special case; the principles hold true for all toxic waste.

**Timo Seppälä** – When the Finnish government considered the question of nuclear waste 25 years ago, the decision taken at that time favoured reprocessing, with disposal in second place. However, economically, it has not been possible to maintain this position because of significant increases in costs. Furthermore, since the export of waste is prohibited, reprocessing can only take place in Finland. **But building a reprocessing plant in our country for a small quantity of waste (1,400 tonnes with a potential estimated at 5,500 tonnes) would have been extremely expensive.** Nevertheless, the principle of reversibility is such that if, in the future, we wish to decrease the quantity of radioactive waste by processing it, we can do so by recovering some of the waste that is currently being stored.

**Paul Golan** – With regard to the costs incurred as a result of the delay in opening Yucca Mountain, originally scheduled by law for 1996, they are estimated to stand at between 3 and 5 billion dollars.

The natural phenomenon mentioned in Gabon was studied as part of the research into security.

As to transmutation, it is true that there are real difficulties but the issue should be discussed because having recourse to this technique would guarantee the sustainability of the nuclear industry.

**Jeremy Rycroft** – I am in favour of joint projects. Having said this, however, we do not have to complicate matters unnecessarily. France and Finland, for example, have adopted the principle of reversibility. In the United Kingdom, the issue is not discussed. However, if by “reversibility” we merely mean that we will be leaving the disposal open for more than one hundred years, then this will in all probability also be the case in Great Britain. It is therefore useless to be locked into a system-based mindset. Likewise, as regards protection against radioactivity, the United States are counting in millions of years whereas Finland is

counting in hundreds of millions of years, apparently. But on that scale, does it really matter? **Here again, we should not be rigid. The States in Southern Europe are traditionally more Catholic and more centrist. We in Northern Europe are more Protestant, perhaps also more “rustic”. Let’s allow each to follow its own path.**

**François-Michel Gonnot** – Reversibility is a notion worth considering in greater depth and it will be discussed again in the run-up to a law which will be put to the vote in ten years’ time, when the disposal application is filed. At present, **we mean the technical possibility of removing fuel stored at depth at a cost equal to that of the disposal.** The estimated cost of the disposal facility in Meuse/Haute-Marne, according to the calculations made by producers, Andra and the Ministry during the public debate, is 5 billion euros. It is less for Yucca Mountain because it is, of course, easier to store waste on a mountainside than at a depth of 500 metres. Moreover, the management cost is estimated at 10 billion per fuel cycle i.e. one hundred years. In Bure, one billion has been spent over ten years (i.e. one hundred million p.a.) to research section 1 and slightly less for storage, making a total of approximately 2.5 billion for the three areas of research between 1991 and 2006. The cost of disposal, to be established over five or ten years, is 500 million per year and operating costs will amount to 100 million per year. We should consider things in relative terms – the cost is not so enormous over a long period of time.

**As to European policy, it should also be envisaged on a planetary scale.** China, for example, intends to control the entire sector within twenty to fifty years and build both large and small reactors with the same security conditions as the West. It will also produce these reactors, which will lead to nuclear proliferation. Moreover, the USA which has, in fact, integrated the data from the Kyoto Agreement and realised the scale of the problem that peak oil and peak gas will bring to bear on the economy as a whole, has decided to relaunch its nuclear programme. However, the United States have not built any reactors for 35 years, at home or elsewhere, and this may be a problem. It is not unreasonable to think that, when the Americans start building reactors again, they will spend what it takes but they will have to be capable of building small reactors to provide energy to the countries that need it – on condition that they control both security and waste management. **At present, Americans and Russians are engaged in a role-playing game that shares out the work while the Russians are talking about gathering waste from all the countries that obtained their original energy from the USA – except that the Russians do not have the resources required for research.** Despite this, the political initiative is important in itself.

What is the European Union doing in this situation? Jeremy Rycroft, our friend from the UK, justifiably asked us to take our time. Actually, France must remain modest within a Europe in which there have been increasing numbers of moratoria. We have to advance slowly, one step at a time, and leave the politicians to do the work required to refocus their energy policy at the right time. Then, and only then, we might be

able to define a joint energy policy. Meanwhile, research must continue, in close symbiosis with our foreign counterparts as is the case at the present time. Even if the techniques and timetables are different, deep geological disposal remains the benchmark solution. **Let us therefore take the points we have in common as a joint basis on which to design, if possible an “Energy Europe” based on nuclear power, thereby responding to the initiatives launched by Russia, the USA and China.**

**Claude Fischer** – At present, the role that Europe could play is underestimated. Because the general public perceives only the risks (or because governments make them perceive only the risks), people are worried. They are rejecting Europe and governments reflect public opinion, creating a vicious circle! **To say “Let’s not go too quickly” means taking the risk that the EU will be left far behind other countries because, if Member States do not share costs, they will not be able to achieve anything.** Meanwhile, you can be sure that Russia, which does not yet have a disposal facility, will be accelerating its research.

We are staunch supporters of the construction of Europe, a concept currently in difficulty. We believe that the process should be accelerated, without waiting for the idea to ripen, otherwise nothing will ever happen. I am therefore calling for the constitution of an “Energy Europe”. Everybody says that waste management is a fundamental condition for the nuclear policy of the future. This policy has to be thought through, otherwise how will we retain our independence in the energy sector?

What initiatives does the European Commission intend to take in this respect – crossing our fingers that it is not held back by the Member States? Ute Blohm-Hieber is ill and cannot be among us today but we are delighted to welcome Jean Coadou, who will tell us about this.

**Jean Coadou, Administrator in the Nuclear Energy / Waste Management and Transport Unit, European Commission** – I should like to congratulate the organisers of the *Entretiens européens*, a forum which makes a very useful contribution to public debate. I shall not go into details on the French law of June 2006 because it has already been discussed at length, but I congratulate those who had the political courage to produce this law and include a precise timetable. I would merely like to point out that, **through this law, France has decided to pave the way for the valorization of raw materials.** It is emphasising deep geological disposal (which has been unanimously recommended by international experts and considered by the European Commission as the best available technology) for final waste while confirming its intention to continue its research. It underlines the need for dialogue with civil society, a dialogue which took place during the drafting of the law but which has been given formal recognition in the law, a major step forward. Finally, the law lays down the “Polluter Pays” principle which is contained in Article 174 of the EU Treaty and this marks a break with the past since, until now, the principle was not applied.

What should Europe do? Can the French law serve as a model to others? It is difficult to say. Each country

has its own strategy and method. This is obvious in Finland where the situation is very different to the situation in France but which nevertheless obtains tangible results. The French law of June 2006 sets out responsibility for all types of waste, and the technical and financial aspects of the issue are dealt with in such a way as to **put the law on a par with the “nuclear package” proposed by the Commission**. The package consisted, you will remember, of a draft directive on safety of supply, a draft directive on waste management which required each State to create its own national plan, and a proposed agreement with Russia. The European Parliament accepted it but the Member States unfortunately did not follow up on the initiative. A revised proposal was then drafted but, to date, it has remained a dead letter in the European Council. We will see at the end of the year what happens to that. It is a pity that the “nuclear package” was not retained because it contained, in particular, a plan for the constitution of a joint enterprise, as planned in the Euratom Treaty, to avoid repetition of identical work and project overlaps.

This is the current situation. **The Commission is trying to advance things but the Member States remain in control**. The European energy policy is not part of the Treaty but the Member States can decide to implement it if they wish. It will exist one day but it will result from action on the part of the States and, as long as they are against it, the Commission’s initiatives will serve no useful purpose. I would stress that the Commission does not want to remove Member States’ prerogatives as far as energy is concerned. It is asking them to lay down a waste management plan with a precise timetable. A “wait and see” policy is unacceptable. It means burying their heads in the sand and is certainly not a solution. Given that, **according to a Eurobaromètre survey undertaken in 2005, 90% of European citizens are demanding a precise timetable and joint strategies led by the Commission, how much longer can the Member States ignore public opinion in their countries?** The information required should be taken from the Red Book<sup>[2]</sup> presented by NEA and IAEA, and the States should work together to solve the problem of supply and waste. The Commission hopes that the unusual, responsible and brave approach taken by France will inspire those Member States which have not yet defined or refined their strategy.

I cannot finish without paying homage to François Lamoureux, who fought relentlessly for a consistent European energy policy.

**Claude Fischer** – The fourth *Entretiens européens* conference on the management of nuclear waste is coming to an end. It has fulfilled its promises thanks to the direct, informative discussions. I should like to underline the Commission’s efforts and ask it to remain on the offensive. The States are pulling back but, in Europe, we need an institution that uses its power of initiative to further the general European interests. We shall support it and will increase debate between the players in various countries since, like today, this contributes to the formation of a European identity. You will receive the conference papers early in November and **the next *Lettre des Entretiens européens* will be published before our next meeting on**

**22nd and 23rd November 2006 in Berlin, where we will join forces with the *Centre for European Energy Strategy* to organise a European conference** on nuclear energy in Europe. It will be preceded by a dinner-debate with Claude Mandil, Executive Director of the International Atomic Energy Agency.

In 2007, our work will focus on waste management and its link to the future of nuclear power. We will look at transmutation which, given the cost of research in this sector, will enable us to think through the issues in European terms. We will also consider the societal issue and its ethical dimensions and we will, of course, take another look at the involvement of the people, and their involvement in the drafting of projects integrated into research facilities so that disposal facilities can be opened at a later date, since they constitute one of most advanced conditions of security at the present time. We have to discuss issues between Europeans because, although it is difficult to be interested in others, the Europe of today is us, all of us, and we must share our experiences.

[1] The papers are available on the *Confrontations Europe* website [www.confrontations.org](http://www.confrontations.org) and were featured in the *Lettre de Confrontations Europe No.76 "Energy, a Driving Force for Europe"*.

[2] The NEA (OECD's nuclear energy agency) and IAEA (International Atomic Energy Agency) published the edition of the Red Book entitled "Uranium 2005: resources, production and demand" on 12th October 2006.