European Nuclear Threats: Old and New

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Introduction

The last phase of the process towards enlargement of the European Union offers opportunities to strenghten the pressure for closure of the Eastern European nuclear reactors.

A majority of the current fifteen EU members are de facto nuclear free or have at least decided to step out of the nuclear era and stop using nuclear power for electricity production. Already in 1997 the EU described its policy on nuclear safety in the process towards enlargement of the Union with 10 Central and Eastern European countries.

Despite all rethorics and despite the significant budget spent on nuclear safety in the enlargement countries there has been no satisfactory reduction in risk to the environment or to the citizens of Europe to which reactors in the CEE countries pose.

In this report we describe the dangerous and inconsistent policy on the highly important issue of nuclear safety. With the report we hope to increase the knowledge, provide tools for campaigning efforts and inspiration for people to take action!

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Summary

The enlargement of the European Union has already and will continue to impact upon nuclear power. The accession of some countries was conditional upon the closure of reactors of certain designs, the RBMK and first generation of VVER 440. This resulted in agreements to close eight reactors in three countries in Bulgaria, Lithuania and Slovakia. The first two of these reactors were closed in Bulgaria at the end of 2002. However, continued international attention and assistance must be given to these three countries to ensure that the remaining six reactors are closed in line with current commitments. The closure agreements finally agreed to prior to the Helsinki EU summit in 1999 on average extended the operational life of the reactors in question by five years, over the agreements previously negotiated. This will mean that for the first time both RBMK - the same design as utilised at the Chernobyl station in Ukraine - and VVER 440-230 reactors, will operate in the EU.

The enlargement process highlights the fact that the EU does not have any specific requirements on nuclear safety standards. Consequently, agreements to increase the safety standards of other designs of reactors in accession countries could not be legally enforced following enlargement. The European Commission stated that legislation was needed to address this shortfall and at the end of 2002 they proposed two Directives. These Directives, known as the 'nuclear package' initially proposed an initial Directive to introduce obligations and general principles on the safety of nuclear installations with a commitment to introduce further legislation to establish common safety standards and control mechanisms to a guaranteed high level of safety at a later date. However, opposition from Member States is leading to either the abandonment of the Directives or their introduction with no significant power and only peer review processes addresses the regulators - with no inspections of nuclear facilities- and no intention to introduce further legislation. The initial draft of the Directive also included proposals to address the issue of decommissioning funds. Nuclear utilities are required to accumulate funds during the operation of reactors to pay for decommissioning and radioactive waste management activities once the facilities are closed. These funds must be carefully managed to ensure that in decades to come they are sufficient to cover the cost of the work necessary. However, opposition from some Member States, particularly, the French and German Governments have resulted in requirements for the independent management of these funds have now been removed from current drafts of the Directive. The second Directive on radioactive waste management proposed to accelerate programmes for the disposal of radioactive waste. Pan European dates, regardless of the current status in Member States, have been proposed. Such dates would ignore the different approaches from Member States and require deep geological disposal for high-level waste. This approach would rule out the opportunity for monitoring and potentially retrieve damaged waste, both of which are potentially necessary to reduce the future contamination of the environment.

Both proposed Directives have been justified through the Euratom Treaty. This Treaty is one of the corner stones of the current European Union and was first signed in 1957. Since then it has continued to support the development of nuclear power within the EU and has not been subject to any significant reform. Consequently, the functions of the Treaty are not subject to the same democratic controls as other EU functions, with most notably no co-decision with the European Parliament. The Euratom Treaty has particular functions to support nuclear power. In particular there is a specific loan facility that has been used to fund the development of nuclear power and nuclear facilities across Europe. Both the European Council and Parliament are currently reviewing the future of the loan facility. A proposal has been put forward by the European Commission to further extend the facility by € 2 billion. Under Euratom there is also a specific research and development fund to assist with the further development of nuclear fission and fusion. This fund is not subject to the same democratic scrutiny as the rest of the EU's research and development programmes and awards nuclear technologies 50% more funding than all other energy sources combined.

In October 2003 the EU launched its latest Inter-Government Conference (IGC) to prepare a constitution for the EU. This is supposed to streamline the current institutions and Treaties in preparation for an EU of 25 Member States. The current draft of the Constitution does not propose to reform the Euratom Treaty, but rather include it in its entirety as a Protocol. The European Parliament and some Member States have called for the IGC to address the question of Euratom reform.

During the 1990s EU Member States introduced policies to privatise and liberalise their electricity markets. The EU also introduced a Directive to unify policies for liberalisation across the Union. In 2004 Member States will be required to transpose a revised electricity market Directive to further accelerate the process. This will require com-

petition for all electricity suppliers by mid 2007 and further separation requirements for the different actors in the electricity market, in particular the legal separation of the grid operators from generators and suppliers. Such measures are supposed to increase price transparency and ensure 'a level playing field' between electricity generators. The Directive will also require that all consumers receive information about the generation mix and pollution created by electricity production.

The introduction of electricity liberalisation has impacted upon nuclear power. In the case of British Energy, in the UK, the new electricity regime has resulted in its near bankruptcy. The utility was only saved by a € 1 billion Government loan and then a restructuring package which, if eventually approved by the European Commission, additional Government subsidies totally around € 5 billion. Electricity market liberalisation has impacted upon utilities desire to construct new nuclear power stations. In the EU there are no nuclear reactors under construction and officially in accession countries there are only two - in Slovakia. Only in Finland and France is there any Government support for the construction of new reactors. This has resulted in the gradual ageing of Europe's nuclear reactor fleet and the effective phase out of nuclear power across the Union.

In recent months a number of countries have experienced supply difficulties, resulting in localised or widespread blackouts. This has increased the call for the construction of new reactors in a number of Member States. It is clear that investment in parts of electricity sector has decreased in recent years, however, careful analysis needs to be undertaken before concluding what action must be taken. But what is clear is that the blackouts were not caused by the lack of installed base-load capacity but rather the lack of co-ordination between grid operators, over-reliance on large-scale centralised production facilities and a lack of investments in the grid.

The coming decades will be a crucial period for the EU's electricity industry. Increased investment will be required to ensure security of supply and to meet the EU's environmental objectives. However, it is clear that nuclear power is not able to meet the environmental and economic considerations necessary to contribute to a sustainable energy future for Europe.

1. The enlargement of the EU

The enlargement of the European Union will lead to a twenty seven country Union, with a population of around half a billion citizens. This highly complex process will impact upon all sectors of the aspiring countries' and current Member States societies. An area that will need to be addressed and one that has been identified as a priority is that of nuclear safety. In July 1997 the European Commission published Agenda 2000, which laid out the European Commission's proposal for the enlargement of the European Union. This document made clear both the importance that the Commission placed upon nuclear safety and the timetable in which action should be taken.

"The problem of nuclear safety in some candidate countries causes serious concerns to the EU, even independently of enlargement, and should be urgently and effectively addressed. It is imperative that solutions, including closure where required, be found to these issues in accordance with the Community nuclear acquis and a "nuclear safety culture" as established in the western world as soon as possible and even before accession. Public opinion is likely to be increasingly sensitive to nuclear safety as a consequence of some nuclear power plant problems in acceding countries, and this could affect major community policy developments in this field".

However, unlike other areas nuclear safety does not currently fall under the Community Acquis, as nuclear safety standards are the competence of the national government and their appropriate authorities although the European Commission put forward draft proposals in November 2002 to introduce nuclear safety principals, initially proposed as a first step to introducing EU nuclear safety standards. This was seen as a necessary step to ensure high nuclear safety standards following enlargement. Consequently, the Enlargement process has impacted not only on nuclear operation in Accession countries but also those current Member States.

1.1 Impact in accession countries.

Agenda 2000 called for an increase in nuclear safety to a standard dependent on the original reactor design. These reactor categories are:

The first generation of reactors: the VVER 440-230 and RBMK designs.
Agenda 2000 stated that these cannot be economically upgraded to an acceptable safety standard and thus need to be closed. The reactors in question were already the subject of agreements that laid out closure dates and conditions. Agenda 2000 called for these agreements to be abided by. The reactors in question are: Bohunice V-1 in Slovakia; Ignalina 1 and 2 in Lithuania; and Kozloduy 1-4 in Bulgaria.

The second generation of reactors: the VVER 440-213 and VVER 1000 designs.
Agenda 2000 stated that the reactors of these design that are in operation or under construction could be economically upgraded to meet international safety standards. The Commission stated that an upgrading program should be fully implemented over the next ten years. This applies to Dukovany and Temelin in the Czech Republic; Bohunice V-2 and Mochovce in Slovakia; Paks in Hungary; and Kozloduy 5 and 6 in Bulgaria.

Western design reactors in operation and under-construction in accession countries.
Krsko in Slovenia and Cernavoda in Romania. In these cases monitoring and assessments need to be undertaken to ensure that the operation and construction was in line with the appropriate safety standards.

1.1.1 Closure of reactors; initial agreements:

For each reactor agreements already exist that should see the reactors closed by or close to the millennium. However, despite continual international assertions that these reactors should be closed, current agreements have or are being ignored. The existing agreements are:

Kozloduy: In June 1993, the first Nuclear Safety Account agreement was signed, which granted 24 MECU(at that time $28 million) to the Units 1-4 of NPP Kozloduy. The agreement called for the closure of Units 1-2 by the spring of 1997, when upgrading of Kozloduy 5 or 6 and the construction of the Chaira pumped storage hydroplant would

be complete. Units 3 and 4 were scheduled for closure at the end of 1998, by which time both Kozloduy 5 and 6 as well as three district heating co-generation units would have been upgraded.

Ignalina: A concrete date has never been set for the closure of Ignalina, despite the awarding of an ECU 35 million NSA grant in February 1994. The NSA agreement states that the reactors may not be re-channelled, which involves the replacing of the fuel channels and the re-aligning of the graphite moderator. This has shown to be necessary after about 10-20 years operation (depending of the power output of the reactors) and is due to neutrons distorting the fuel channel and graphite blocks. This is an expensive ($100 million/reactor), lengthy (18 months) and dirty (high workers doses) process, but it significantly increases the life of the reactor - by 10-20 years. In addition the NSA agreement requires that the licensing authorities, taking into account a detailed international safety assessment report, are required to re-assess the safety of Ignalina 1. Analysis of unit 1 undertaken by Scientech (US) and AEA (UK) and published by Lithuanian Energy Agency, suggested that regulatory action (i.e. closure of unit 1, due to the closure of the fuel channels) should occur in two to three years, dating from the summer of 1998.

Bohunice: On 14th May 1994, the Slovak Prime Minister signed a resolution which committed Slovakia to closing Bohunice as soon as Mochovce enters commercial operation, or by the year 2000 at the latest.

1.1.2 Closure of reactors; Helsinki agreements:

At the EU summit in Helsinki in December 1999 the previous commitment to two entry waves into the EU was formerly abandoned. Consequently, Bulgaria, Lithuania and Slovakia were formerly invited to begin negotiating entry into the EU. The closure of the high-risk reactors was therefore an issue that needed to be resolved in the months leading up to the summit. Bi-lateral negotiations took place between the Commission and the countries concerned. As a result of these negotiations the following dates were agreed to:

- Bulgaria: Closure of Units 1 and 2 in 2003. Closure of Units 3 and 4 in 2006
- Lithuania: Closure of Unit 1 by 2005. Closure of Unit 2 by 2009.
- Slovakia: Closure of Bohunice V-1 between 2006-8.

As can be seen in the table below, this falls short of the commitments undertaken in Agenda 2000.

Nuclear Power Plant	Reactor	Earliest agreed closure	Helsinki agreement
Kozloduy: Bulgaria.	Unit 1 and 2 Unit 3 and 4	Spring 1997 End 1998	2003 2006
Ignalina: Lithuania.	Unit 1 Unit 2	1998 2002	2005 2009
Bohunce-V1: Slovakia	Unit 1 and 2	2000	2006-8

The renegotiated timetables will now allow the operation of both RBMKs and VVER 440-230s in Member States of the EU for the first time. Furthermore, assuming that the closure plans are adhered too, it will see the EU also for the first time requiring the closure of reactors on safety grounds.

1.2 Euratom reform

The EURATOM Treaty was signed in 1957 and is one of the founding Treaties of the current European Union. It requires the European community to create the 'conditions necessary for the speedy establishment and growth of nuclear industries'. However, it has not been subject to changes in the same way that the other Treaties have. As part of the enlargement process the EU has stated that it was necessary to streamline the EU institutions to enable an EU 27 to function. Such a process must include a review of the Euratom Treaty.

The Treaty was signed in 1957 at a period of unquestioning optimism as to the role that nuclear power would or could play in the future development of the world. This was the era when Admiral Lewis L. Strauss, then Chairman of the U.S. Atomic Energy Commission, made his famous speech in which he said that it could be imagined that as a result of nuclear power electricity would be *'too cheap to meter'*. In many ways the EURATOM Treaty reflects this view as its preamble states that *'Recognising nuclear energy represents an essential resource for the development and invigoration of industry'*. As a consequence the Treaty sets about to *'create the conditions necessary for the development of a powerful nuclear industry'*.

It is absurd that as the EU has mandated the Convention and then the Inter Governmental Conference, which began in October 2003, to streamline the Treaties of the EU that it should not look at the Euratom Treaty. The need to at the very least review the functioning of the Euratom Treaty is further highlighted by the fact that:

- In July 2002, the European Coal and Steel Community - one of the other founding Treaties of the EU and the only other established to support specific technologies - expired.
- The Lisbon Summit in 2000 called for increased liberalisation of key sector such as energy. A consumer-environmental friendly liberalisation of the electricity industry requires increased transparency, fair access to grids, rights for consumers and a level playing field between generators. The Euratom Treaty, with its requirement for the community to create the *'conditions necessary for the speedy establishment and grown of nuclear industries'* contradicts the requirement for equal treatment of electricity generators.
- The Euratom Treaty is largely shielded from the scrutiny of the European Parliament, as there is no co-decision for its operational functions.
- Furthermore, the Treaty creates advantages for the nuclear industry such as Euratom Loans and a specific nuclear R&D program and has been used by the European Commission to justify their lack of action to tackle the questions of market distortion created by state aids to the nuclear industry.

1.2.1 The Convention and the review of the Euratom treaty

There were a number of submissions to the Convention that call for changes in the Euratom Treaty, made by the European Commission, Members of the Convention and the Praesidium. Despite the apparent desire to address the Euratom Treaty the draft Constitution instead called for the Euratom Treaty to remain intact as a Protocol, but with the Euratom Treaty remaining as a separate legal entity.

If this does not change:

- No changes are made to the powers of the Euratom Treaty. As a consequence the lack of democratic controls within the Treaty will remain, with no effective co-decision with the European Parliament.
- The Treaty is included within the EU Constitution and thus given increased status and potentially protection. It should be noted that Chapter IV Article 5 of the draft constitution states *'The protocols annexed to this Treaty shall form an integral part thereof'*
- The Treaty remains as an independent treaty.

Prior to the launch of the Inter Governmental Conference, on October 4, both the European Parliament and the Commission make known their positions on the Constitution and the Euratom Treaty.

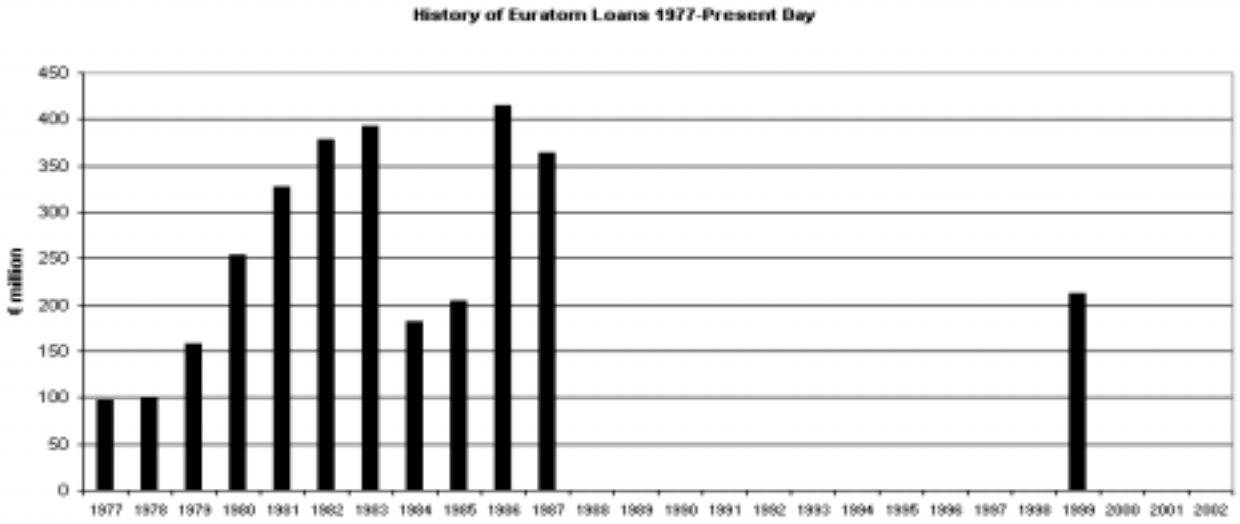
- The Commission stated that the proposed changes for the Euratom Treaty to retain its own legal personality are incomplete and further adjustments to the Constitution will be necessary. Furthermore, the draft text raises questions about the relationship between the Euratom Treaty and the Union.
- The Parliament was more critical and called for a special Euratom Treaty revision conference to repeal the obsolete and outdated Treaty.

Within the IGC a number of Member States are expected to raise the need for the reform of the Euratom Treaty to be included in a list of topics for discussion.

1.2.2 Promotional functions of the Euratom treaty

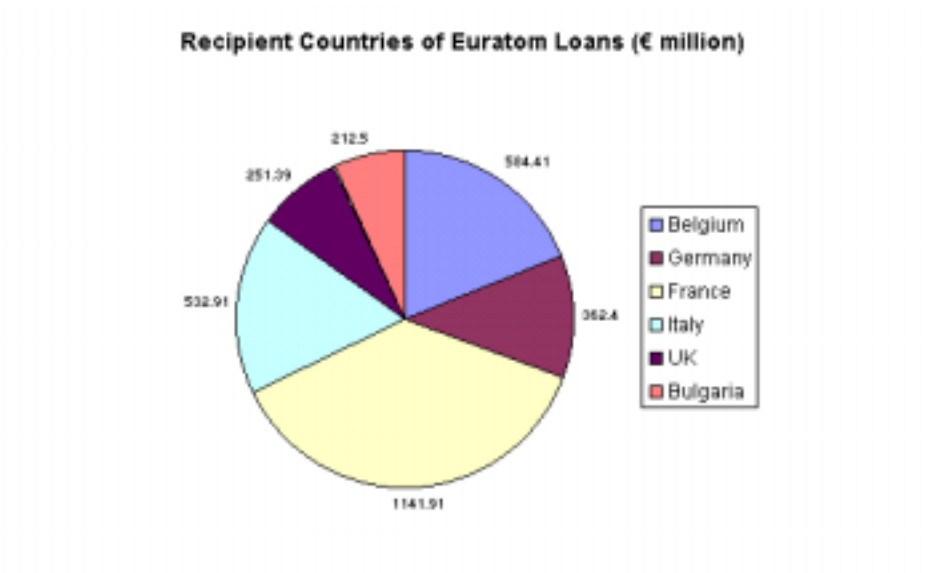
Since 1977 around € 3.2 billion worth of financial support for nuclear power has been awarded by the Euratom's nuclear loan facility. Their values are shown in the graph below.

What this shows is that the use of the loan facility has decreased significantly over the last decade or so. The only loan to have been signed in the 1990s was for work at the Kozloduy nuclear power plant in Bulgaria. Consequently, it is now more than fifteen years since a Member State has even applied for an Euratom loan.



Source: European Commission, 2003

Furthermore, it is interesting to look at the country breakdown of who receives Euratom loans. The graph below shows that France has received far more loans than any other country. In total France has received 39 separate Euratom loans totalling over € 1 billion. These have been largely used for the expansion of the French nuclear power sector, including the construction of fuel cycle facilities and even to fund reprocessing of nuclear fuel. The country recipients of these loans are shown in the next graph.



Source: European Commission, 2003

European Nuclear Threats: Old and New

The EU Ministers of Finance are currently reviewing a proposal of the European Commission to extend the Loan ceiling by a further € 2 billion. Simultaneously they are also proposing to change the scope for the type of projects that Euratom Loans can be used for, specifically relating to the enlargement of the EU. The Council's Finance working group is currently reviewing these proposals, but no date has been set when they will be presented to the ECOFIN - the EU Financial Affairs Council delegated with the decision - for final decision.

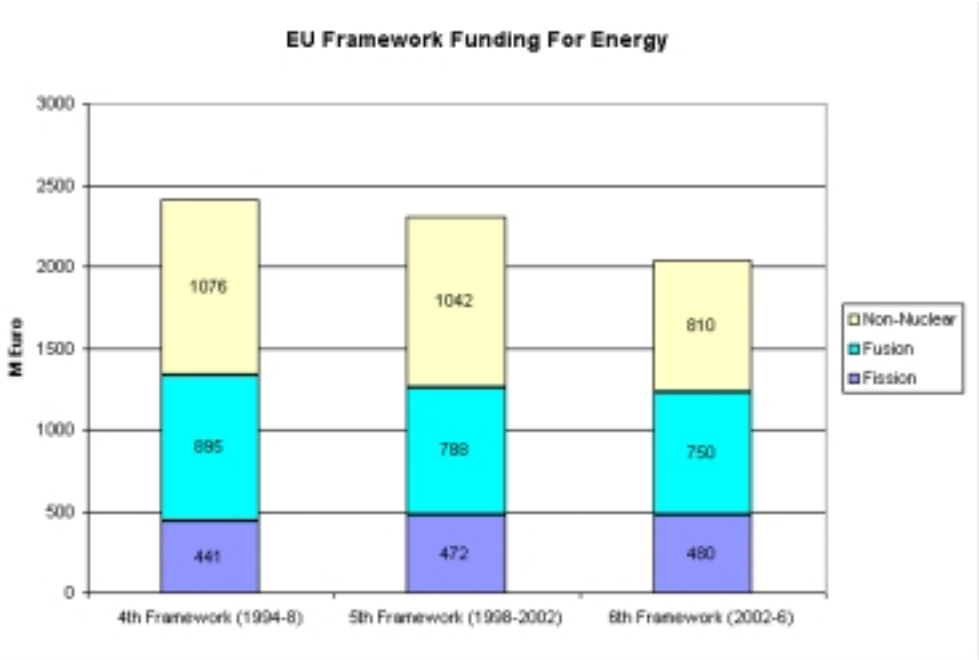
In 1994 the loan facility was extended to non-member States in CEE and CIS, however, the type of projects and the percentage of a particular project that Euratom could fund differed from that for Member States. Consequently, the change in scope is purely relating to the harmonisation of criteria for new entrance into the EU.

However, the Commission also claim that the scope changes will allow to 'prioritising' projects that increase the safety of reactors and funding for the use for decommissioning of nuclear facilities or for research reactors. Such claims are more to do with public relations than substance as Euratom loans can already in theory be used for decommissioning facilities or research reactors, as they can be used for *'the purpose of financing investment projects relating to the industrial production of electricity in nuclear power stations and to industrial fuel cycle installations'*. Attempts within the Commission to restrict lending to nuclear safety upgrading projects failed as it is said that it is not possible to exclude any projects that are supported by the Treaty in general.

This lack of restriction, coupled with project approval for loan resting solely with the European Commission, mean that Member States and the Parliament have absolutely no control on what projects will be funded if the ceiling is increased.

In addition the Euratom Treaty oversees the operation of research and development. Consequently, the EU has two framework programs, one for nuclear research and development and one for all other aspects (Food, Transport etc). The latter EU Framework program is subject to co-decision by the European Parliament. However, for the Euratom Framework Programme no such oversight exists. As can be seen in the graph below nuclear, fission and fusion, research has remained relatively constant in recent programs, while conventional energy has seen a decline of 20%. What this graph clearly shows is that **nuclear technology receives more than 50% of all energy R and D budgets**.

Furthermore, the levels of funding for nuclear fusion may well increase in the 7th Framework (2006 - 2010) program. In May 2003, the Commission published a Communication on Nuclear Fusion to co-ordinate with decisions on the location and schedule for the construction of the International Thermonuclear Experimental Reactor (ITER) - the next generation of fusion reactors.



1.3 Commission proposals in the nuclear package

At the end of April 2002 the EU's Vice-President Loyola de Palacio announced in the European Parliament that the time had come for *'common [nuclear] standards and control mechanisms which will guarantee the application of the same criteria and methods in the whole of enlarged Europe'*.

On November 6, 2002, the Commission's college finally discussed and adopted what became known as the 'nuclear package' which encompassed legislation on safety standards and radioactive waste management strategies. At the time of the publication the Commission stated that '*to avoid any difference of treatment between the current Member States and the new Member States, the legal regime will need to be operational on the date of the enlargement of the Union, i.e. 1st January 2004*'.

In January 2003 the Commission published revised versions of the draft directives, following consultation with the Article 31 expert group. The revision of the Directives was necessary as the Commission proposed the new legislation under Article 31 of the Euratom Treaty. This article relates to health and environmental protection and required the consultation with a group of experts. The January 2003 draft makes some significant changes in the draft legislation and weakens the proposed legislation, in particular on the safety Directive, to such an extent that it will have little or no impact on the safety of nuclear facilities in the EU.

The European Commission is proposing to significantly increase the powers of the EU to regulate nuclear facilities. While everyone would like to see measures introduced that would lead to a significant increase in safety standards across the EU, it is important to assess what changes the proposals will actually require and what impact they will have.

The enlargement of the EU highlighted the fact that there is no specific legislation in the EU to ensure nuclear safety standards. The Commission's logic is that once accession countries have joined the EU there is no mechanism to ensure that new Members, or in fact existing Members, operate their facilities at an acceptable safety standard. This is why it was initially proposed that the legislation be enforced in Member States by the time accession countries join the Union.

The November 2002 draft clearly stated that the directive on nuclear safety principals would be a framework directive and therefore that further, presumably more far reaching, daughter directives would be introduced that would lead to the original intention of Ms. de Palacio, namely EU wide nuclear safety standards. However, the January 2003 draft removed this suggestion and the Commission have categorically stated that this is not a framework Directive. The exact changes are shown in the text box below.

November 2002 Draft Submitted to Article 31 Expert Group	Final Proposal Adopted by Commission January 2003
Recital 10: In order to attain the Community objectives regarding radioprotection mentioned above, it is essential as a first stage to define the basic obligations and general principles on the safety of nuclear installations in this framework Directive. The establishment of common standards and control mechanisms will at a later stage complement this in order to guarantee a high level of safety that takes account of technological changes.	Recital 10: In order to attain the Community objectives regarding radioprotection mentioned above, it is essential as a first stage to define the basic obligations and general principles on the safety of nuclear installations.

It is therefore clear that the directive will not require the setting of even basic EU nuclear safety standards, but rather *'setting out basic obligations and general principals guaranteeing a high level of safety of nuclear installations on the basis of which common safety standards will be adopted in due course'*. The draft directive then states that *'Each Member State shall take appropriate steps to ensure that in the course of all practises directly related to nuclear installations due priority is given to nuclear safety'*. The main mechanisms that the Commission proposes to guarantee a high level of safety are:

- Each Member State must ensure it has a safety authority which is independent from bodies that promote or utilise nuclear energy,
- The safety authority shall regulate and supervise safety of nuclear installations,
- Each Member State shall require the operator to run the facility in accordance with 'common safety standards',
- Each Member State shall take the appropriate steps to ensure adequate financial resources are available to support the safety of facilities.

One of the key issues for the directive is how it will be verified. Article 14 clarifies this issue. It states that Member States shall submit to the Commission lists of experts who may then be called upon to inspect only the activities of the nuclear regulator. However, even these experts must have prior approval from the safety authority in the Member State in which the inspection is taking place. Furthermore, the Commission shall inform the Member State concerned prior to the inspection, *'the subject matter, the purpose of the inspection and the date on which it is to begin and the names of the authorised persons'* - so no surprise visits. Finally, it is unclear if the inspection reports will be made public - early drafts of the draft directive said they would remain confidential, but this was deleted in the final version and it doesn't state if they will be made public or not. The formal reporting to the Parliament and Council is restricted to a report every two years on the application of the directive.

It can be concluded that the draft directive does not offer any significant demands on Member States. Furthermore, all Member States and Accession countries, who have operating nuclear power facilities are already Members of the International Atomic Energy Agency's Convention on Nuclear Safety, which makes the same requirements as that of the proposed directive, namely:

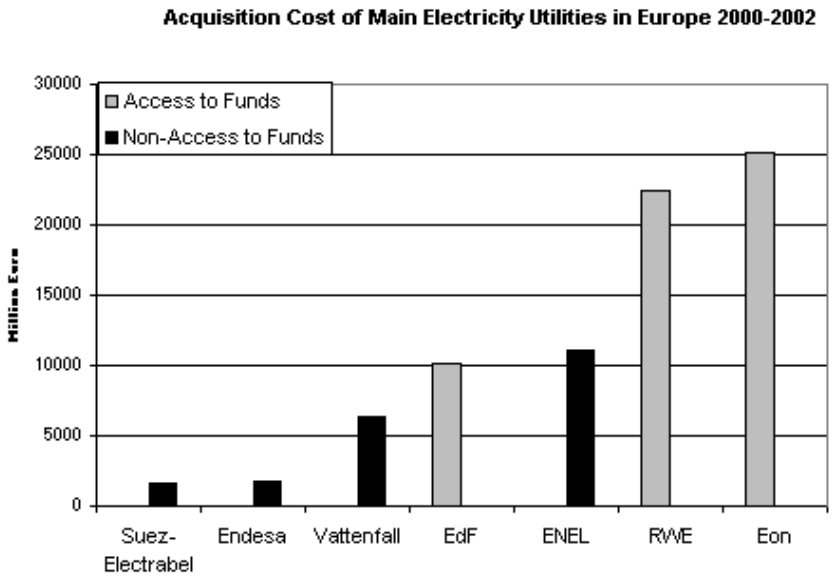
- There should be sufficient separation between the regulator and any other body or organisation that promotes or operates nuclear power plants,
- The regulator framework shall establish applicable national safety requirements and regulations,
- Each contracting party shall ensure that all organisations relating to nuclear installations shall give priority to nuclear safety,
- Each contracting party shall ensure that there are adequate financial resources to support the safe operation of nuclear installations.

It is therefore clear that the draft Directive makes few significant additional requirements on Member States or accession countries than that of the Convention on Nuclear Safety. The main difference being that the Safety Convention applies only to nuclear power plants, while the Commission's draft directive applies to all civilian nuclear facilities. Despite this, the directive is likely to receive little support from those Member States that operate nuclear power plants as they may well see the directive as only repeating the demands of the Safety Convention. *"Non-nuclear"* Member States are unlikely to support the proposal as it fails to introduce binding standards for nuclear power plants as they had hoped.

In an annex of the draft Directive on nuclear safety the Commission have included a proposal to take action on the issue of radioactive waste and decommissioning funds. For a number of years the Commission has been considering legislation to regulate the use of decommissioning funds. In a 1998 Commission publication it was stated:

'Different situations exist among the Member States for the financing of decommissioning, e.g. simple provision in the accounts allowing reinvestment of the collected funds for other than decommissioning purposes, segregation of collected funds outside the sphere of the company, or a complete State organization and management of decommissioning by separate specialized, mostly publicly owned companies. Moreover, the amount of yearly funding required, the requirements as to when and how decommissioning has to be accomplished, and the applied calculation methods and discount rates differ substantially between Member States. This situation could lead to distortion and discrimination between now competing nuclear electricity producers from different Member States. Decommissioning costs are clearly seen as part of the electricity production costs.'

The key issue is accessibility to these funds. In some Member States such as France and Germany, the nuclear ope-rators retain control of the funds they must set aside for decommissioning and waste management. While in others, such as Spain, Finland and Sweden, the funds are managed by a separate legal entity. Therefore in some countries decommissioning funds may be used by the utility for investments, either in their existing facilities or for market acquisitions. It is already clear that the same companies which could have access to their decommissioning funds are also those that are most active in purchasing other electricity or energy companies. The graph below highlights the extent to which utilities who do not have separate - or segregated funds - accounts for decommissioning and waste management activities have been active in the purchase of other European utilities.



Source for acquisitions, EdF Annual Report 2002

Therefore the European Parliament, in its first reading of the Electricity Market Directive in March 2002, proposed an amendment that sought to address the market distortion.

The Commission rejected the Parliament's amendment claiming that they agreed on the importance of the issue, but rejected the intention of inclusion of this issue within the electricity market directive. Rather they stated that a directive specifically addressing this issue would be prepared.

Instead of this, the issue has finally been addressed in an annex of the directive on nuclear safety guidelines. In this it states:

'The assets of the funds are to be used only to cover the costs set out in paragraph 2 [decommissioning and spent fuel management costs] above in line with the decommissioning strategy and may not be used for other purposes. To this end the decommissioning funds shall be duly established with their own legal personality, separate from the operator of the installation. If exceptional and duly justified reasons make such legal separation impossible, the fund could continue to be managed by the operator'.
While the first part of the paragraph goes some way to meet the requirements of the Parliament's amendment, the second sentence completely undermines the whole intent. There is no definition of what 'exceptional' circumstances are and no indication who shall judge the justification for the exception. Such a loophole totally undermines the whole purpose of restriction on the use of decommissioning funds.

The draft directive on the management of spent nuclear fuel and radioactive waste is clearly the most demanding of the two proposed pieces of legislation. There are three main areas that are addressed.

Firstly, the proposed legislation insists that the only option for the disposal of high level radioactive waste (HLW) is deep geological. This is against the current policy of a number of Member States who either wish to explore other options or have already decided that retrievable (above- or underground) storage is their preferred option. Furthermore, the Directive makes no mention of the need for waste to be monitored and retrieved if necessary, which is an essential part of ensuring that the environmental and human health is protected in the long term. Without such mechanisms there is a danger that radioactive waste will leak into the environment with little or no chance or rectifying the situation.

Secondly, the Directive proposes clear timetables for the disposal of radioactive waste, namely:

- Authorisation for the development of appropriate disposal sites should be granted no later than 2008,
- Authorisation for the operation of sites to dispose of low level radioactive waste should be completed by 2013,
- Authorisation for the operation of sites to dispose of high level radioactive waste should be completed by 2018.

However, it should be noted *'the council may decide, on a proposal from the Commission, to modify these dates in the interest of enhanced nuclear safety within the European Union'*.

The timetables that are proposed are totally unrealistic, especially for the operation of a disposal facility for HLW. Even Finland, which is said to the most advance programme for the disposal of HLW, will not have an operational facility before 2020. Furthermore, the setting of any fixed timetable for waste disposal undermines the processes for site selection, public consultation and scientific analysis. Therefore, it is inappropriate to establish any binding timetables for the operation of radioactive waste facilities.

Finally, on nuclear waste export the draft directive states *'the [waste management] programme may include the exports of radioactive material of spent fuel to another Member State or third country, if such exports are fully in compliance with existing EU legislation'*. Many fear that this will result in the construction of regional radioactive waste dumps in the EU or the export of waste to Russia or Kazakhstan. In this country the Parliament is proposing to approve changes in the law to allow the importation of nuclear waste, similar to the changes in the Russia law in 2001. The Kazakh authorities hope that the importation of waste will earn around € 30 billion.

1.4 Conclusions

As currently drafted the two Directives will not have the desired effect to reduce the risk of environmental contamination by radionuclides. The safety principals Directive will only add to the reporting requirements of nuclear regulators, rather than require new standards of operation or design. If the EU wishes to introduce legislation to reduce the risk of a nuclear accident then it must require binding nuclear safety standards which are higher than that current deployed in Member States. Therefore, the minimum that should be introduced is a requirement for all nuclear facilities to reach a 'state of the art' standard as adopted by the European Council in 1998, which would require an increase in safety standards in most nuclear facilities in the EU. Such a proposal would almost certainly result in an increase in nuclear safety through an enlarged EU.

The legislation on decommission funds will not result in any changes in current practice. The loop-hole within the legislation will allow those utilities that wish to retain control of their decommission funds continuing to do so and thus continue this market distortion and risk the availability of funds when needed.

The waste management Directive is proposing the wrong approach to dealing with the disposal of radioactive waste. The Commission has identified lack of political will as opposed to technical and safety issues, as the reason why there has been little progress on the disposal of radioactive waste. However, the real issue is public confidence. The communities most potentially affected by the disposal of radioactive waste must be given the correct information and time to draw their own conclusions about disposal in their neighbourhood. Instead of embracing this situation and assisting to address it the Commission's proposal do the opposite and try to reduce the review of technical options and curtail debate. This will have the opposite effect that the Commission want and if adopted will lead to more delays in the final operation of disposal facilities.

1.5 Current debate

Since January 2003 discussions on the package have taken place within the Atomic Questions Working Group (AQWG), a committee of the European Council. This group consists of nuclear experts from Member States. Within this group there is considerable opposition to the proposed Directives. As a result of discussions two approaches have emerged on how to proceed with the legislation.

Non-Binding Legislation: In September a proposal was circulated from the Finish, Swedish and UK Governments to replace the draft Directives with non-binding legislation, such as a Council recommendation. This would require only consultation between Member States and the Commission with no legally binding actions. The Belgium and German Governments have subsequently supported the proposal. As the legal justification for the Directives is Article 31 of the Euratom Treaty, it requires adoption by qualified majority voting. If these five countries remain in opposition to the Directives they can block their introduction.

Revised Directives: In response to opposition to the current drafts from a majority of Member States a revision of

the text has occurred. The latest versions, of October 14th, significantly reduce the requirements of the Directives. Some of the changes include:

- Safety Principles: The proposals for verification of the functioning of the national safety agency have been downgraded to a review process. Furthermore, there remains no inclusion of sanctions or other measures for non-compliance.
- Decommissioning Funds: The annex on decommissioning and radioactive waste management has been removed and inserted into the text of the Directive. Accompanying these changes is the removal of even the limited requirement for segregated funds. Thus enabling the status quo to continue.
- Waste Management: The most controversial timetable for the establishment of high level repositories has been removed. However, the priority for deep geological disposal remains.

The European Parliament is scheduled to debate the draft Directives - the January 2003 versions - in November and December 2003. Draft Committee reports suggests that the Parliament will also require significant changes in the Directives for their approval. But, as the Parliament does only has a consultative role due to their limited oversight of all Euratom issues, their possibilities to change the Directive are slim.

2. Liberalisation

In 1996 the EU adopted legislation requiring the partly liberalisation of the electricity industry. This was implemented by Member States in 1998 and requires the gradual opening up of the different sections of the electricity industry to competition. In 2003 the Directive, along with similar legislation on the Gas market was adopted and must be transposed into national legislation in all States, both current and accession countries, by July 2004. This will place a number of requirements on the operation of electricity companies, in particular in the following ways:

- All non-domestic consumers must be able to choose their energy supplier by mid 2004 and domestic consumers by mid 2007,
- Increased separation that requires 'ownership' unbundling between the operators of the grid and energy suppliers or generators,
- Greater monitoring of market concentration to be undertaken by the national regulators and the European Commission,
- A requirement that all electricity bills contain information about the environmental damage caused by the generation mix used by the energy supplier (CO2 and radioactive waste).

2.1 Consequences of market liberalisation

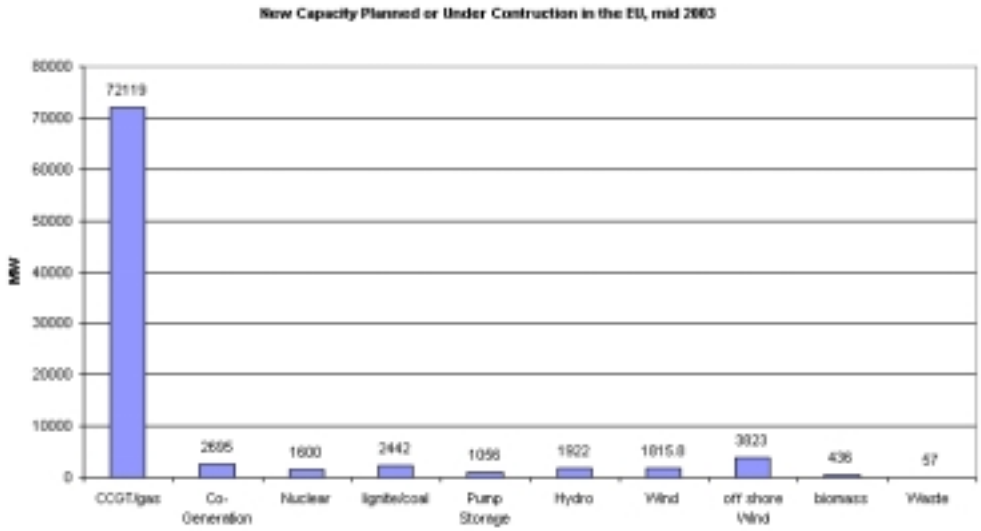
Big fish, small pond

The opening of the electricity markets have allowed and resulted in significant mergers and acquisitions between electricity companies in EU countries. In the preceding years most international attention was targeted at Asia, but due to the currency collapse and the liberalisation process in the EU, Europe became the region of the world with the most international trade in electricity companies. Over the past six years the seven dominant companies have spent € 100 billion on European acquisitions.

Many believe that these seven dominant firms will increase their market control in the power sector and will further strengthen their position as these companies, or their strategic partners, dominate the gas sector. Mergers not only threatens the stability of the current market but sets a trend in super mergers between different utilities and underlies the national desire to built up 'national champions' to defend the strategic interests of the nation State.

2.2 Fuel choices

The liberalisation of the EU's electricity market and the rules on construction of new facilities has benefited natural gas to a remarkable degree. Currently over 80% of all new generating capacity are Combined Cycle Gas Turbine or natural gas powered station.



The reason for this 'build only gas' philosophy is three fold:

1) The price of construction a gas fired power stations is cheaper and quicker than the alternatives. A nuclear power plants costs around $2000/kWh; a coal station around $1000/kWh, but a gas station only around $500/kWh. Furthermore, as gas station will take around 3 years to build while a nuclear up to 10 years. Therefore investors have to put up less and receive a return on their investment much quicker.
2) The gas fired power stations tend to be made up of smaller units that are more flexible and can be turned on and off to both follow demand and price. Thus increasing their attractiveness.
3) They produce less CO2/kWh than coal and don't produce nuclear waste, thus are more environmentally attractive.

It is widely expected that Member State's and accession country's use of natural gas will increase significantly in the coming years. This increase will occur both as a result of an increase in demand within the Union and gas being used as a replacement when the older, nuclear and coal, power plants are closed.

2.3 Nuclear

Within the current EU there are no reactors under construction, the last was completed in France in 1999. The only firm proposal for completion is in Finland, where following approval from the Government and Parliament in 2002 the utility concerned, TVO, is proposing to select a reactor design by the end of 2003. Early indications are that TVO will choose the European Pressurised Water Reactor (EPR), which is a Franco-German reactor yet to be built.

In France, 2003 should see the development of a new energy policy. Already the Industry Minister has stated that she believes that this should result in the ordering of EPRs in France, however, this view is not universally shared with many calling for a delay in new reactors due to France's overcapacity of existing generation.

However, other than these two examples no current Member State is considering the construction of new reactors. In accession countries, a proposal for the construction of new reactors is also the exception. According to the International Atomic Energy Agency (IAEA) only Slovakia has reactors under construction, Mochovce 3 and 4 and even here there is some doubt whether active construction is occurring. In future Member States, Romania is constructing the Cernavoda 2 reactor, but is still awaiting approval for financing from the Euratom Loan facility.

Less firm plans for the construction of other reactors in new or future Member States of the EU are reported, including: in Bulgaria, for the completion of the Belene; in Lithuania for a replacement for the Ignalina station; and in Romania for the completion of reactors 3, 4 and 5. However, in all these cases no firm schedule or technical and financial details have been made public.

3. Status of nuclear in current member states

3.1 Belgium

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
7	5,760	-	-	44.74	57

Belgium has a comprehensive nuclear program which, in addition to its seven reactors has well-developed fuel cycle facilities, including fuel fabrication - in particular MOX fuel- and a large research facility.

The country's power sector is dominated by Electrabel, which was formed in 1990 from the merger of three utilities. In 1995 Electrabel combined forces with the public company Societe Cooperative de Production d'Electricité (SPE) to form a new company Societe pour la Coordination de La Production et due Transport d'Electricité (CPTE), which controls 96% of the generation capacity.

The Belgium power program is also unusual in the small age range of its nuclear fleet. All of the reactors became operational within a ten-year period. This has already created problems about the simultaneous ageing of the power plants, the converging of part replacement schedules and the timing of the phase out of the power plants - and will continue to do in the future. Furthermore, the replacement of the steam generators in a number of the reactors has increased the capacity of the power plants by around 10%.

Since the completion of the last power plant in 1985 successive Governments have acted to limit the role of nuclear power in the country. In 1988 the Government cancelled the construction of a fifth reactor at the Doel nuclear power plant. This was followed in February 1992 by government confirmation of an indefinite moratorium on the construction of nuclear power plants in the country. In 1999 a new Government was elected which for the first time contained the Green party as part of the ruling coalition. Within a few months it announced that the operating lives of the reactors would be limited to 40 years. The Government and Parliament adopted the proposal and it will lead to the phase out of nuclear power in Belgium between 2015-25. In 2003 a new Government was elected, without the Green partners of the old administration. However, to date there appears no indication that the current administration will overturn the phase-out law.

The spent nuclear fuel produced by the country's power stations has been sent to the Cogema's La Hague reprocessing plant in France. However, in 1993 the Government decided that the reprocessing of nuclear fuel and direct disposal should be given equal weight. As a result of this decision the post 2000 contracts, signed in 1991, were suspended in December 1993. Despite this cancellation and its own use of plutonium in MOX fuel, Belgium has built up a significant surplus of plutonium. Current estimates suggest that this is around 40 tonnes.

Research into the disposal of high level radioactive waste is currently underway at the Mol facility, with investigations, jointly with France, Germany and Spain, into the suitability of clay. Spent nuclear fuel is currently stored in facilities on the sites of the nuclear power plants.

3.2 Finland

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
4	2,656	-	-	21.44	30

Finland is the only country in the European Union that has plans to construct a new nuclear power reactor. The Government and Parliament have given their approval for the proposal and if ordered and built the reactor would be the fifth in Finland. The other four are located at two sites, Loviisa (where there are two VVER 440-213 reactors) and Olkiluoto (where there are two BWR reactors).

The Loviisa reactors are currently the only Russian designed reactors in operation within the European Union and were supplied by the Soviet firm Atomenergoexport, who continue to supply nuclear fuel. Finland stopped sending its fuel to Russia in 1996, soon after Finland joined the European Union. In 1998 the company Fortum was created by the merger of the Government utility - which owned Loviisa (IVO) - and the oil and gas company Neste. Fortum is majority owned by the Finnish Government, with the remaining shares owned by Teollisuuden Voima Oy (TVO) -the owner of the Olkiluoto nuclear power plants.

In January 2002 the Finish Cabinet agreed, by 10 to 6, to put a decision to construct the country's 5th reactor before Parliament. In May the Parliament approved the proposal by 107-92, as result the Green Party left the Government. TVO is currently reviewing bids for four reactor designs and is expected to chosen one by the end of 2003.

TVO claims that the decision to move ahead with the nuclear application will help Finland meet, along with renewable energy, their Kyoto commitments and ensure that there is sufficient domestic production capacity to bring stable and predictable electricity prices. Somewhat surprisingly, TVO also claim that nuclear power's low production costs - and in particular low fuel costs - make it suitable for the open Nordic electricity market. This claim goes against the Swedish experience, where the drop in the Nordic electricity price has resulted in the electricity price falling below production costs of the nuclear power plants. As has been discussed previously, nuclear power plants are very susceptible to decreases in electricity prices given their large upfront costs.

Following the 1996 decision of the Government to stop sending spent fuel to Russia all used fuel is now stored at the nuclear power plants. In 2001 the Parliament endorsed the selection of the Olkiluoto site for the development of the country's high level waste, subject to approval by the national regulator. Investigations are currently ongoing and under optimistic scenarios the facility will be operational by 2020.

3.3 France

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
59	63,073	-	-	415.50	78

European Nuclear Threats: Old and New

France's nuclear program began in the 1950s, initially in the form of military projects and then via the building of reactors for civilian use. The first reactor to be built expressly to produce electricity was started in 1952 at the Marcoule facility. During the 1960s Electricité de France (EdF), the Government run utility, took over operations and began ordering a new design of reactors: the PWR. In the 1970s, France embarked on a massive nuclear power program of PWRs. All of the reactors in this series were built by Framatome, under a license agreement from Westinghouse adapted to the French context, at the end of the 1970s. This included:

- 1970: six reactors were ordered (two for Fessenheim and four for Bugey).
- 1974: after the 1973 oil crisis, sixteen 900 MW reactors were ordered.
- 1975: 4 orders for 1300 MW PWR reactors.
- 1976: 12 additional 900 MW reactors were ordered.
- 1976: launch of fast breeder program Superphénix-1 (1200 MW).

In the 1980s, the PWR program continued. The problems encountered in the development of fast breeder reactors led the authorities to abandon the launch of Superphénix-2.

- 1979-1983: orders for 16 new 1300 MW reactors.
- 1984: orders for two new even more powerful PWRs (series N4, 1450 MW) at Chooz.

In 1998, one of the major symbols of the French nuclear program and the reasoning behind France's massive reprocessing industry, the Superphenix, was finally abandoned. According to the 'Cour des Comptes' [Government Accounting Office] Superphenix cost € 9 billion by the time EdF finished paying interest at the end of 2000. In addition significant running costs (€ 130 million per year) are being spent to preserve the facility including the expense of heating sodium in order to keep it in a liquid form. The smaller research reactor, the Phenix, however, continues to operate and is used for research into the use of plutonium fuels.

At present, EdF operates all of the 58 PWRs that were built (although 12 include foreign electricity companies among their minority shareholders - these shares may rise as EdF complies with the EU Electricity Market Directive and increases competition in the French electricity market). Today, France has the second largest installed nuclear capacity in the world (second to the USA) and EdF is the largest producer of nuclear generated electricity. This nuclear power over-capacity allows EdF to export electricity massively to its European neighbours (114 TWh in 2002 - 27% of total production).

Framatome ANP have for a number of years been developing their next generation of reactor, the European Pressurised Reactor (EPR). In November 2000, under pressure from the Green coalition partners, the French Prime Minister, Lionel Jospin announced that now was not the right time to decide whether or not to order an EPR. This postponement was said to be the cause of a 20% reduction in the workforce at the Framatome ANP headquarters in Paris.

In early 2003 the Government announced a wide-ranging public and political debate on energy policy. However, some Non-Government Organisations specialising in energy policy development have boycotted the formal process due to concerns over the procedures and pre-ordained decision on new nuclear power. The Parliament is scheduled to debate the issue later in 2003 and Industry Minister Nicole Fontaine has said the decision on the EPR has to be taken in the spring of 2004.

France's nuclear industry has induced a very high level of vertical integration in the fuel cycle. Although natural uranium is now no longer extracted in France, all of the other stages in the cycle are carried out on French territory: from conversion to reprocessing and manufacturing plutonium-based fuel. Clearly, France originally developed this option of the later stages of the cycle for its military needs, then for its fast breeder program. Since the abandonment of that program, a part of the separated plutonium has been re-used in the form of MOX (Mixed Oxides) fuel in PWRs. France has a number of operating reprocessing plants since 1966, 1994 and 1989 respectively. France also operates two MOX fuel manufacturing plants (mixed uranium and plutonium oxides from reprocessing): the ATPu facility at Cadarache and the MELOX facility at Marcoule. Cadarache was closed in July 2003 but will re-open for the fabrication of US MOX test fuel.

These reprocessing and MOX plants have been, or are still, operated for both French and foreign clients (Australia, Belgium, Germany, Japan, Netherlands, Spain, and Switzerland). France, via COGEMA, now occupies a central position internationally in the increasingly controversial plutonium industry.

Spent fuel is sent to La Hague for either reprocessing or for storage. Under the Nuclear Waste Law (also known as the 'Bataille Law') of 1991 three different research routes for the disposal of high level waste are to be investigated. The results of this comparison, between indefinite storage, deep geological disposal and transmutation and partitioning are expected in 2006.

3.4 Germany

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
19	21,283	-	-	162.25	30

There are currently 19 reactors in operation: 13 PWRs and 6 BWRs. The German nuclear industry has tried a number of other designs all of which have largely failed or been abandoned. These include:

VVERs: The re-unification of Germany resulted in the closure of all Soviet-designed reactors, the five VVER 440s at Greifswald (four 230 designs and one 213 reactor), and the non-completion of the partially built VVER 440-213 and VVER 1000 reactors at Greifswald and Stendal respectively. The VVER 440-230 reactors were closed soon after unification. No decision was immediately taken on the VVER 440-213 and VVER 1000 reactors, but the German Safety Agency, the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS), made detailed assessments. These assessments outlined the redesign and backfitting work necessary for the project to be awarded an operating licence in Germany. Following this technical assessment expected costs were calculated and the reactors were offered to Western German utilities, however, the offer was not taken up and the projects subsequently abandoned. Their closure was and has been seen as a benchmark for the safety of the VVER reactors as the standards used in the assessments measured not only the viability of such reactors operating in Germany, but also by implication the whole of the European Union.

The *High Temperature reactor* (HTR) was developed at the research facility in Jülich in 1969.The Thorium-HTR in Hamm Uentrop operated only between 1985 and 1987. The project costs have risen from an initial estimate of € 341 million to more than € 2 billion, with construction time rising from an estimated 61 months to an actual 164 months. Technical problems, especially with the fuel pebbles, lead to frequent shutdowns so that the project was abandoned.

The *Fast Breeder* was intended as the product of a trilateral co-operation between West Germany, Belgium and the Netherlands. A syndicate of Interatom, Belgonucleaire and Neratom started to build the SNR-300 prototype in Kalkar in the early 70s. Although almost completed the last license needed for operation was never given for technical, economical and political reasons. On March 21 in 1991 the Fast Breeder project was finally terminated. The estimated project cost rose to € 3,5 billion.

The nuclear industry has also abandoned a series of fuel cycle facilities. The three most significant are:

Wackersdorf Reprocessing Plant was abandoned in 1989. The total project cost was estimated to have been around € 5.1 billion, of which € 2 billion was thought to have been invested and thus wasted when the project was abandoned.

Hanau MOX Facility, which was abandoned in the early 1990s after a long legal battle with the Hessen regional Government.

Morsleben Waste Disposal facility. The operation of the waste disposal site in former Eastern Germany was stopped by a court ruling in 1998 and in May 2001, final agreement was reached to abandon and begin decommissioning the Low and Intermediate waste disposal facility. By this time 35, 000 cubic meters of waste had been placed in the facility.

In September 1998, a new Government was elected comprising a coalition of the Social Democrats and the Green Party. The coalition promised a nuclear phase-out in Germany and proposed to negotiate with the national energy suppliers to shut down all remaining nuclear reactors within 20 years. In June 2001, the government and four main utilities finally signed a phase-out plan, the main points of which are:

- A fixed quantity of electricity can be produced in each reactor. This equates to an operating life of around 32 years, although "the operating life" of a reactor can be transferred between reactors.
- A ban on the construction of nuclear power plants.
- A ban on shipment of commercial nuclear fuel to reprocessing plants after July 2005.

As part of the agreement RWE, the operators of Mühlheim-Kärlich, announced that they would not restart the reactor. Furthermore the Stade reactor will be the first plant to be closed in 2003, with the others following over the next 20 years or so.

In the summer of 1998 it was revealed that in a number of cases the outside of the casks used to transport spent nuclear fuel were contaminated. This resulted in the suspension of all waste export from Germany. This was only resumed in 2001 after extensive analysis and compromise. Furthermore, the French Government refused to take any more spent nuclear fuel until some of the high level waste (HLW) accumulating at the La Hague plant was taken back to Germany. In March 2001, a third shipment of HLW was sent to the Gorleben interim storage facility. Like the first shipment there was massive protest which, despite the deployment of 30 000 police, managed to delay the waste for 24 hours. Following the HLW shipment, spent nuclear fuel was once again sent to France and the UK.

The ban on the shipment of spent fuel for reprocessing from 2005 has meant the construction of on site storage, however, this is an interim measure and a centralised store is likely, to accommodate both spent fuel and returned vitrified waste. In the longer term the Government is scheduled to have a high level waste repository in operation by 2030.

3.5 Netherlands

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
1	450	-	-	3.69	4.0

The Dutch energy market is rapidly heading for full liberalisation. In the electricity sector full liberalisation is envisaged in 2004. The country has only ever had two nuclear power plants, Dodewaard and Borssele.

Dodewaard started operation in 1969 and was a 56 MW Boiling Water Reactor. In 1992, it was envisaged that the plant would close in 1995 due to the lack of an adequate safety report and inadequate public consultation. After a revised consultation process and further discussions with plant operators and designers, the reactor was given a temporary operational license. However, it was finally closed in 1997 for economic reasons, despite the fact that € 41 million had been invested in safety upgrades that were partially completed when the decision for closure was taken.

Borssele started commercial operation in October 1973. In November 1994 the Parliament decided that the reactor should close by 2004, by a slim margin of 77-73 votes. An opinion poll conducted at the time also showed that 80% of the Dutch population was opposed to nuclear power. The Government was left with two choices: the plant should either close immediately (because safety measures were outdated) or the plant undertakes a retrofitting program in 1997. The retrofitting program would cost € 215 million and the plant would need to be open until 2007 to repay the investment. Because of the decision by parliament, a compromise was made between the nuclear power plant and the government: modernise the plant but close it before January 2004. The part of the investment that had not repaid itself by 2003 would be paid by the government (€ 32 million). In 2000 the Borssele plant began

to deny that the agreement made was legally binding in the new situation with a much more liberalised market. As a result the government started a court case in the summer of 2001. The court ruled in September 2002 that the government did indeed fail to fulfil all obligations when the decision for closure was taken and that the NPP could run as long as the license was valid. As there is no end-date mentioned in the license it was a quite confusing court rule. After several elections the current three-party coalition government decided that the reactor would be closed in 2013. The utility itself immediately announced it does not feel any legally binding commitment to this closure date and states that the reactor can run maybe up till 2040. (A life-time of 70 years…)

Both Dutch utilities operating nuclear power plants have reprocessing programmes for their spent fuel. The Dodewaard fuel has been sent to Sellafield in the UK. Starting in the 1970s, the operator of the Borssele reactor signed three reprocessing contracts with the French company COGEMA. These contracts cover the period 1970-2003. The extension of the reactors operating life has lead to consideration of further reprocessing contracts.

All returned vitrified waste and spent nuclear fuel from the research reactors will be (starting early 2004) stored at the HABOG facility in Borssele. This is built for the coming 100 years. There is no policy yet for long term storage.

3.6 Spain

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
9	7,574	-	-	60.28	26

Spain's nuclear program began under the Franco regime and the first law on nuclear power was established in 1964. Construction on the country's first nuclear power plant began in 1965 at Zorita.

A decision by the high level Ministerial Council in October 1983 resulted in the halving of the original nuclear generation program from 10,535 MW to 5,725 MW. Then in May 1991 energy minister Claudio Aranzadi announced that no new nuclear plants would be commissioned before 2000. A new electricity planning law passed by the Spanish Parliament (Cortes) in 1995 led to the definitive cancellation of the five nuclear plants whose construction had been frozen by the Socialist government in the 1984 moratorium.

In November 1998 Environment Minister Isabel Tocino presented a plan to Parliament to combat climate change. It was endorsed by Spain's National Climate Council in December 1998, and called for an extension of the operational lives of the existing nuclear plants. There is currently no fixed operating life for the reactors, rather the regulator grants renewals of the operating license. Initially these renewals are every two years, but can be extended for five or even nine years. In 2002 the country's finance ministry published a report which recommended that no new reactors should be ordered until at least 2010, furthermore, the country's first reactor is now scheduled for closure in 2007.

The only reactor to have closed is Vandellos 1, which was the site on 19 October 1989 of Spain's worst accident involving nuclear power. A fire broke out in the turbine room resulting in the operating license being suspended pending the outcome of an inquiry. When the results were published in the following spring, the regulator called for 15 significant changes to the plant. The Industry Ministry declared that the implementation of these measures would have to be paid for by the owner of Vandellos and not the taxpayer. The owner decided against this investment and in May 1990 the industry minister announced the permanent closure of the reactor.

There are a large number of owners of nuclear power plants, with ten separate companies having at least part ownership in one reactor. The Government in Spain is moving ahead with the liberalisation of the country's power sector, and requiring must faster and broad reaching change than that required by the EU's 1996 electricity market Directive.

Some spent fuel is reprocessed at the La Hague facility in France and at Sellafield in the UK. Vitrified high-level

waste is expected to start being sent back in 2010. All remaining spent fuel is either stored in spent fuel ponds or in dry cask storage facilities at the nuclear power plants. No decision on the long term strategy for high level waste disposal options is expected before 2010.

3.7 Sweden

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
11	9,432	-	-	65.57	46

The country's first nuclear power station Oskarshamn 1 was ordered in 1965 and began commercial operation in 1972. It was the first Light Water Reactor (LWR) to be built in Europe not under license from a US vendor. Over the next fourteen years eleven more reactors were constructed and began operating. Barsebäck-1 was closed in 1998.

Following the accident at Three Mile Island in 1979, there was a referendum on nuclear power in 1980. This resulted in a proposal to only operate the reactors as long as their operating life - at that time it was assumed to be 25 years. Parliament adopted the results of the referendum, banned the construction of any more nuclear power plants and assumed a complete phase-out would occur by 2010. Following the referendum insufficient planning was undertaken and few steps were put in place to begin the phase-out. In 1995, a Government sponsored report concluded that a phase-out of nuclear power by 2010 would be economically and environmentally unfavourable.

In March 1997 the Government proposed legislation, which was ratified in June 1997, to close Barsebäck1, by July 1998, with the second unit to close three years later. Sydkraft failed in an appeal to the Supreme Court to overturn the decision, but was allowed to operate the reactor until November 1998. As compensation the state-owned Vattenfall transferred an interest in the Ringhals plant to Sydkraft. The twin unit Barsebäck-2 will continue operation under a new joint production company: Ringhals-Barsebäck, in which Sydkraft will have a 25.8% share (though Barsebäck-2 contributes only 14.5% of the capacity). If a decision is taken to close the reactor, Sydkraft will receive an increased share of the Ringhals plant. The closure date of Barsebäck-2 is unclear; a complete energy policy review will now take place in 2004. More recently, a three party agreement was reached with mandated that the continued phase-out of nuclear power would be conducted on the basis of voluntary agreements with industry, similar to the German phase out law.

Reprocessing of spent fuel is no longer considered a viable option and consequently all spent fuel is stored centrally at the CLAB facility at Oskarshamn. The country's waste management organisation is currently undertaking site investigations on two possible deep disposal sites, with approval of the local municipalities and Government.

3.8 United Kingdom

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
27	11,652	-	-	81.08	22

There are three reactor designs operating in the UK - Magnoxes and Advanced Gas Cooled reactors, both graphite moderated and carbon dioxide cooled, and one PWR at Sizewell in Suffolk. There are no further reactors planned or under construction in the UK. The oldest reactors, the Magnox reactors, are now closing. Bradwell closed in March 2002, and the earlier closer of Calder Hall - March 2003 - and Chaple Cross - march 2005, was announced in May 2002. The closure of all remaining Magnox reactors is envisaged by 2009.

The decision to abandon new construction followed a failed attempt to privatise the nuclear power industry along with the rest of the electricity supply industry in 1990. The AGR reactors and Sizewell B were finally privatised in 1996 under the ownership of British Energy, although ownership of the Magnox reactors was transferred to British Nuclear Fuels Ltd (BNFL), and remains in public hands.

The most controversial part of the UK's nuclear industry is undoubtedly BNFL, the owner of the Sellafield reprocessing plant in Cumbria. The controversy surrounding the company has largely centered on its environmental record and performance, although broader safety, economic and proliferation issues have also caused concern. Most recently, concern has focused on the discovery that BNFL had falsified safety data on MOX fuel rods made for export to Japan. A subsequent inspection of the Sellafield site found that safety levels were *'only just tolerable'*. The company received Government consent to open a new MOX fabrication facility, the Sellafield MOX plant in October 2001. In May 2002, the German utility E.on signed contracts for the production of MOX.

BNFL is wholly owned by the UK Government, with the Department of Trade and Industry holding all but one share in the company. The Treasury owns the remaining share. Despite this, BNFL is meant to function as an independent Public Limited Company.

BNFL also has reprocessing contracts for its THORP plant at Sellafield with a number of other countries, including Germany, Japan, Switzerland, Spain, Italy, Netherlands and Canada. The contracts include the return of the separated plutonium to the country of origin, although the extent of the return of other nuclear wastes created by reprocessing remains undecided. In addition, Magnox fuel from the exported Italian and Japanese reactors has been reprocessed.

British Energy owns and operates eight nuclear power stations in the UK, totalling nearly 10.2 GW of nuclear capacity. This fleet contains 14 Advanced Gas Reactors (AGRs), built between 1976 and 1989 and one Pressurised Water Reactor, at Sizewell completed in 1995. In addition in the UK, BE operates a 2 GW coal station at Eggborough and is investing in the construction of a 50 MW offshore wind farm. BE is also active internationally, having invested in nuclear power plants in Canada and the United States.

BE has serious economic problems. This has been exacerbated by, but not caused by the low price of traded electricity as a result of the introduction of a new electricity trading regime (NETA). The wholesale price of electricity has fallen by approximately 40% over the last few years. As BE is a public company the impact of lower profits and fears on the future of the company has had a direct result on the share value. At their low point in September 2002, BE shares were worth 3.5p each, at there high point, in 1999, they were worth over 744 p. At the time of the privatisation in 1996, the company was sold for 1.3 billion British pound (€ 2.1 billion) and in the following years its value, along with the share price, rose until it was worth around 4.6 billion British pound (€ 7.6 billion).

In order to avoid the bankruptcy of the company the British Government made available a € 1 billion loan to British energy in later 2002. Then a restructuring package was proposed which saw the Government giving direct aid for waste management activities. In total it is expected that this will cost the British taxpayer around € 5 billion. Consequently, the European Commission in July 2003 announced that it would begin an investigation into the proposed restructuring package, this may take up to a year.

The industry would like to build deep dumps for much of their low and intermediate wastes. Following the rejection of their application to build the first phase of such a dump in 1997, there are no proposals about where this should be done, or when. Similarly, there are no plans to site or build a dump for High Level Waste in the UK. However the UK government has launched a public consultation process on nuclear waste management which will continue until 2007. This process does not assume, like previous consultations, that nuclear waste will be buried underground.

In July 2002, the UK Government announced plans to establish a Liabilities Management Authority (LMA), which will be responsible to government with a specific remit to manage the storage and disposal of radioactive waste. The establishment of the LMA is thought to be a necessary step in the route to the partial privatisation of BNFL. If established the LMA will take on responsibility for 48 billion British pounds (€ 80 billion) of radioactive wastes from BNFL, British Energy and military sources.

4. Nuclear power programmes in future member states

4.1 Bulgaria

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
4	2,722	1	1000	20.22	47

Bulgaria has one nuclear power plant in operation, Kozloduy. It consists of 6 units. First four of them are VVER 440-230 and the last two - VVER 1000-320. Both types are Soviet design, the first one - from the 1960's. The first unit started its operation in 1974. The next ones were switched on to the electricity grid in 1975, 1980, 1982, 1988 and 1993 respectively.

As a part of its strategy for keeping units 3 and 4 in operation after 2006, the Nuclear Regulator has issued long-term licenses for operation of those units for a period of 8 and 10 years respectively. Until that time the units operated on a basis of yearly permits.

On December 31, 2002 units 1 and 2 were closed down. It was done under the agreements between Bulgaria and EU for the closure of units 1-4. The formal decision for the closure was taken by the Council of Ministers at December 19, 2002. The closure of the next couple of reactors (No 3 and 4) is envisaged for 2006. Nevertheless, the Bulgarian authorities may be ready to break this agreement by using a number of technical and legal arguments. The decommissioning process is supposed to be supported financially by two existing funds - Bulgarian Fund for the closure of nuclear facilities and International Support Decommissioning Fund, set up by the EU and managed by the EBRD. In addition the Kozloduy NPP also should use some of its own resources.

Despite the international agreements and physical and financial steps taken in the direction of decommissioning there is a strong political consensus that the closure should not happen. For more than a year different political parties - both from inside and outside the Parliament, those in power and in opposition - promoted steps for "defending" the units from closure and argued that the closure would be a 'national betrayal'. Very recently the Chairman of the Parliamentary Commission on Energy again declared that the *'fight for saving units 3 and 4 at Kozloduy NPP is a national priority'.*

To fulfil this goal Kozloduy NPP has implemented a programme for upgrading the safety of units 3 and 4. That programme includes a construction of a special system ('jet-whirlwind condenser') to deal with possible accidents that involve release of radioactivity. The modernisation of units 5 and 6, financed through loans from Euratom, US and Russia is expected to be completed before the end of 2006.

The fuel for the reactors is imported from Russia on the basis of a framework agreements. The average yearly needs of fuel are 210 elements for the VVER 440 and 110 for the VVER 1000. In 2002 the number of the imported elements is 306 in total, of which 116 for the VVER 1000 and 190 for the VVER 440. There is a facility for processing low- and medium- radioactive waste that produce solid waste.

There are three legal documents on which the management of the radioactive waste (RAW) and spent fuel is based: The Convention on safety in management of spent fuel and management of RAW, The Law for the Use of the Atomic Energy for Peaceful Purposes and the National Strategy for safety management of spent fuel and RAW. The radioactive waste in Kozloduy is divided in low-and medium level radioactive waste (both in liquid and solid form) and high-radioactive waste (spent fuel). According to the national legislation spent fuel is not defined as 'waste'.

Spent fuel is stored at Kozloduy in two kinds of facilities. After being stored between 3 -5 years in the pool (Bassins for Cooling Fuel, BOC) at the power plant itself it goes to the Facility for Spent Fuel (FSF).

Basin	BOC 1	BOC 2	BOC 3	BOC 4	BOC 5	BOC 6	FSF
Capacity (elements)	704	727	728	726	610	610	168
Spent fuel (elements)	325	357	376	324	402	320	140 (126+14)

To gain more capacity the spent fuel is stored too dense (too close to each other) - a clear violation of safety rules.

The previous Chairman of the Committee for Use of the Atomic Energy for Peaceful Purposes (now Agency for Nuclear Regulation) denied during his service period to issue a license for the operation of FSF. That time the FSF was functioning on the basis of an interim (yearly) permit. The current Chair of the Agency has issued such a license in 2001 after some measures for seismic stability of the FSF had been finished and accepted by the relevant authorities. Again, some measures that were implemented in order to increase the capacity (compact storage) raise the question whether the safety is the main principle in the operation of FSF.

Export of spent fuel to Russia was a regular practice until 1988 on a "zero" price base. It was stopped after the political changes in 1989. In the period of 1998-2002 at least three times Kozloduy NPP has exported spent fuel to Russia on the basis of framework agreements between Bulgaria, Romania, Ukraine and Russia. The known transports are: 1998 - 8 containers VVER 440 spent fuel, 2001 - 8 containers VVER 1000 and 2002 - 8 containers that include 96 elements VVER 1000 spent fuel.

The issue for the export of spent fuel is one of the most non-transparent issues. Today, under the slogan of the 'fight against terrorism', secrecy has risen further.

Problems:

- Apparently there will be not enough space to storage spent fuel in the near future, so the negotiations with Russia were accelerated by the present government. Yet, the questions such as safe transportation (all aspects of the problem), prices, non-proliferation, sending back the high radioactive substances from the reprocessing, etc. remain unsolved;
- The first bidding procedure for the construction of a dry storage for spent fuel was terminated, thus postponing the change of the approach in spent fuel management. The new bidding procedure was opened in June 2003 with two new conditions - doubling the capacity of the facility and a new bidding procedure.
- Despite the implementation of several rehabilitation measures, there are still problems with accidental leakages. These mainly happen at the pools were spent fuel is stored until it is moved to the FSF.

As a part of its plans to 'compensate' the closure and decommissioning of units at Kozloduy NPP, the Bulgarian government has proposed to 'unfreeze' the construction of Belene NPP. The construction of Belene was stopped in 1990 after mass protests of the citizens of the nearest town of Svishtov and the environmental movement of Ecoglasnost. Nevertheless, the construction was only stopped as a part of a moratorium. After the moratorium was imposed, the delivered equipment was stored and maintained on the site of the Belene NPP. Officials said it will be possible to utilise a large portion of the equipment for the continuation of the construction works.

The officials and nuclear industry representatives stated that already 40 % of the construction works for the first unit (1000 MW, VVER, Soviet design) are completed and more than $ 1 billion had been spent for the construction. However, there are no official documents dated before January 1990 available to verify these figures. Moreover, part of the construction works that has been done is associated with additional infrastructure such as railroad connection, blocks of flats, hospital in Belene. Those eventually could be used for many other projects, but not only for NPP.

The decision to restart the project was taken by the government in December 2002. The selection of contractors and investors is scheduled for the first half of 2004 after the completion of technical and economic surveys that will determine the type of the reactor to be used.

Five companies have already notified the Bulgarian authorities of their interest to participate in the project - Skoda (Czech Rep.), AECL (Canada), Framatome (France) Atomenergoexport (Russia) and Westinghouse (US). AECL proposed a 700 MW CANDU reactor. Yet unnamed Canadian bank is ready to give a credit for the CANDU reactor. Skoda has proposed a joint venture with the national power utility and an export credit line from Czech banks. Atomenergoexport wants to build the first unit following the initial design schemes and offered also construction of additional 3 or 4 reactors. Both Skoda and Atomenergoexport cited 2008 as the launch target. Westinghouse seeks to establish a joint venture with the Bulgarian state and a nuclear fuel supplier.

According to the Minister of Energy, Mr. Milko Kovatchev, the technology that would be selected should guarantee at least a 40 years functioning unit. In September 2003 the Bulgarian Ministry of Environment and Waters has notified the Romanian government for the beginning of the EIA procedure for Belene NPP.

Bulgarian officials stated also that they will not give up with Belene NPP *'regardless of what political decision will be made on Kozloduy 3 and 4'*.

4.2 Czech Republic

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
6	3,468	-	-	18.74	25

There are four reactors, all VVER 440-213s, currently operational in the Czech Republic, sited at Dukovany in Southern Moravia. In addition, two VVER 1000 reactors are in operation at Temelin, in Southern Bohemia. Both nuclear power stations are owned by the Czech Electricity Utility (CEZ) which has majority (67%) state ownership. The privatisation of CEZ has been halted after two rounds as the bids were not large enough and uncertainties surrounding the status of Temelin raised further concerns. Another round is not foreseen before 2003 with interest being shown by French, German, British, Italian, Belgian and US buyers. However, the most likely buyers are EdF or E.On. Since late 2000, CEZ has retained a majority share in the transmission grid operator REAS, and six of the eight regional electricity distribution and service companies that supply and distribute electricity to the final consumers. Halfway 2002, these distribution firms were incorporated into CEZ, while the state bought out REAS again.The two others (South Moravian and South Bohemian electricity companies) are majority owned by E.On and the Austrian Energie A.G.

Relative to other Soviet designed reactors the VVER 440-213 has a good operating record and Dukovany is no exception. Since the early days of their operation the reactors have been exposed to international attention. Between 1984-1986, Siemens of Germany was involved in the supply of equipment to all units. Proposals were put forward in 1990 to replace the original instrument and control technology with one built by Siemens/KWU. Although delays have occurred it is expected that this will still happen. In 1998, CEZ announced that a substantial 35 billion CZK (€ 750 million) modernisation program would be undertaken by 2005. The upgrading program is designed to extend the life of the reactors from 30 to 40 years. This will enable the last reactor at the station to be closed in 2027.

In 1980 it was proposed to construct four VVER 1000 reactors at Temelin. The reactors were ordered from the Soviets in 1982. Following the political changes in November 1989 the situation was reviewed and in 1990 the project was reduced to two reactors. Originally it was expected that each reactor would be constructed in 60 months, with the first construction permits being issued in November 1986 on a total budget of around 28 billion Czech Crowns.

In March 1994, the US Ex-Im Bank approved a decision to guarantee a loan of $ 317 million for work performed by Westinghouse Electric Corporation. However, it was only at the end of October 1996 that the Czech Government finally approved the state guarantee. $ 280 million was loaned by CitiBank International and the remainder through Belgium's Generale de Banque. The CitiBank received a credit guarantee from Ex-Im. In addition a credit Guarantee

was given by the Belgium export credit agency, Office National du Ducroire. Further investment was covered from CEZ reserves, freed by credits from - amongst others - Deutsche Bank, Bayerische Landesbank and World Bank for emission reduction from coal fired power plants.

The project to complete the Temelin nuclear power plant has been afflicted with considerable delays and cost overruns. These problems have been caused by the political, social and economic changes in the Czech Republic, the bidding procedures and securing financing, but most recently due to the technical problems that have arise as a result of the design changes. Construction started in 1983, with plans to start operation in 1991. The cost and time overrun problems significantly increased from 1993, when CEZ contracted Westinghouse to implement certain safety upgrades. The unexpected and serious technological complications resulting from the combination of different Russian and American components and technologies stalled the project during the 1990s. The accumulated delays now amount to 5 years and the cost overruns are 30 billions CZK (€ 900 million). The total budget is estimated by the IEA to be around 110 Billion CZK. The necessary re-routing and retrofitting of the cabling system in order to comply with Western standards has proved to be one of the most costly and difficult ongoing problems at the Temelin plant. Estimates of the amount of cabling needing reinstallation have continually increased even within a relatively short period of time. An additional 300 holes for the cabling had to be drilled through the existing concrete structure, which further added to the cost and delays.

Unit 1 of the Temelin nuclear power reached criticality in October 2000. However, even at this late stage problems were coming to light over construction malpractice and equipment defects. It was said that these were ignored due to the commercial and political pressure of getting Temelin operating. In January 2001, problems were reported in the turbine of Unit 1 that only increased until it was decided to overhaul the turbine installation completely in May 2001. The reactor was supposed to come back into operation in July 2001 and into full commercial operation in September, a period that was delayed by another month. At that time a new testing phase of the turbine started, which ran into further delays because of problems in the turbine and valves in the secondary circuit. In addition CEZ is under pressure from its international customers, as CEZ is a major exporter of electricity to the EU. However, two of its key clients, E.ON and RWE, have pulled back from CEZ, due to domestic market and political pressures in Germany. CEZ has tried to compensate for this loss of export by selling electricity to Serbia. Nevertheless exports in 2001 and the first half of 2002 are lower than planned. In early 2002 the second unit at Temelin was completed and went critical. Since the opening both Temelin reactors were forced many times to a (partial) shutdown due to technical problems. Temelin1 has had to deal with already 51 incidents.

All spent fuel is current stored on the sites of the reactors. It is anticipated that a deep geological disposal facility for HLW will be operational by 2065.

4.3 Hungary

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
4	1,755	-	-	12.78	36

Hungary has four VVER440-213 reactors at one operating nuclear power plant at Paks, close to the river Danube in the centre of the country south of Budapest. Construction started on the reactors between 1974 and 1979 and they became operational between 1983 and 1987. The Hungarian and Soviet Union governments first reached agreement on the construction of a nuclear power plant in Hungary in 1966. One of the primary motivations for the project was to utilise the Hungarian uranium deposits and thus decrease energy import dependency. However, Hungary never developed its own uranium enrichment facility and had to rely on the Soviet Union and then Russia for its fabricated fuel as well as for its fuel disposal. Paks is owned by the State under the company name of Paks Nuclear

Power Plant Ltd. The Hungary Electricity Board Ltd (MVM) owns 99% of the shares, with the remaining shares owned by the local authorities.

In July 1998 MVM stated that they were considering applying for the extension of the operating life of the reactors for a further twenty years above the original 30-year design life. This would allow the reactors to operate through until 2032-2037. The licenses for Paks are awarded for ten-year periods by the Hungarian Atomic Energy Agency (HAEA). The HAEA awarded ten-year operating permits to Paks units 1 and 2, in 1997 and to units 3 and 4 in 2000.

Throughout the operating life of the Paks reactors Western firms have been involved in upgrading and training programs. These include IVO (now Fortum) of Finland, the Spanish firm Tecnoatom and Siemens. In September 1996 Siemens was awarded the € 20 million contract for the installation of new computerised instrument and control equipment, to be installed in each reactor between 1999 and 2002. This contact is part of a 60 billion Forint (€ 250 million) investment plan proposed by MVM. This program is expected to increase the output of the station by 10-15%. According to HAEA the majority of this project is safety-related, but is also expected to increase the output and potentially the lifetime of the reactors.

At the end of February 1999 the State owned Hungarian Power Companies (MVM Rt) announced that two smaller gas fired power plants had been chosen, in preference to an expanded Paks, for satisfying medium term demand needs. The gas stations were a 191 MW gas fired combine cycle combustion turbine and a 110 MW co-generation plant. Paks initially put in three bids for the construction of a VVER 640, Westinghouse AP 600 and Candu 6 by AECL.

On April 10, 2003, a serious incident occurred during the cleaning of the fuel elements in the second unit of Paks. As a result of insufficient oversight and inappropriate actions a majority of the 30 fuel elements in a 'washing' machine were severely damaged and radioactivity was released into the environment. Simultaneously, the crane needed to remove the elements was unavailable and consequently the temperature continued to increase. The incident was discovered when a sudden increase of Krypton-85 was detected inside the cleaning equipment and in the reactor hall. As a result ventilation systems were deployed and the noble gases were released to the environment through the ventilation stacks. Later an attempt was made to open the lid of the washing container but one of the pulleys of the crane broke and the lid was only partially opened. The incident was initially classified at level 2 (‘incident’) of the International Nuclear Event Scale (INES), but later reclassified to level 3 (‘serious incident’).

On April 16 a team managed to fully remove the lid and using visual inspections ascertained that the damage was much more severe than they thought earlier. Although the camera could only inspect the very upper part of the container later video inspections revealed that most of the elements had been damaged. The extent of the fuel damage was why the incident was reclassified as level 3 of the INES scale.

In June 2003 the results of an IAEA inspection were made public. The agency concluded that the Hungarian safety authorities had underestimated the safety significants of the fuel cleaning system and consequently a license was issued without sufficient reviews and assessments. Furthermore, the contractual team undertaking the work had worked without proposed supervision, without sufficient training and operating and emergency procedures were not sufficiently developed. The reactor is still not in operation six months after the accident.

Spent nuclear fuel is no longer sent to Russia for reprocessing and consequently it is stored at the Paks site. There are currently no proposals for the development of a high level waste repository.

4.4 Lithuania

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
2	2,370	-	-	12.90	80

The Ignalina NPP consists of two units of RBMK-1500 type reactors. The unit 1 of Ignalina NPP was commissioned at 31 December 1983 and unit 2 on 31 August 1987.

The RBMK is a graphite moderated boiling water reactor. The RBMK is a channelized type reactor - the reactor has a 11.8 m diameter and a 7 m high core of graphite blocks penetrated with 2052 channels, 1661 of which are pressure tubes. The remaining core channels contain control rods or various types of instrumentation. Each fuel channel contains a stack of two fuel bundles. The nuclear fuel assemblies of the RBMK type reactors are changed without shutting down the reactor. This is possible only for channel type reactors. It is possible to disconnect one of them at a time from the reactor cooling system, change the fuel assembly, and then reconnect the channel.

The design capacity of the RBMK is 1500 MW. However, after the disaster at Chernobyl, the capacity of the Ignalina NPP was reduced for safety reasons. Recently both reactors at Ignalina NPP are running at maximum of 1250 MW.

The design lifetime of the RBMK-1500 is projected for 30 years with the replacement of all fuel channels after 15 years. So, according the design, operation of unit 1 and unit 2 at Ignalina NPP can last until 2014 and 2017 respectively. However, after Chernobyl, international attention was directed towards the RBMK reactors and at the beginning of the 1990s they were considered as extreme dangerous by international experts.

To support earlier closure of these highrisk units, the EC and G7 initiated the Nuclear Safety Account (NSA) administrated by the European Bank for Reconstruction and Development (EBRD). In February 1994 the Lithuanian Government signed the NSA Agreement by which it committed itself not to extend the lifetime of either reactor at Ignalina NPP beyond the time at which its fuel channels should be replaced. Later on, during negotiations on EU Accession, dates on closure of these nuclear units were agreed - 2005 for unit 1 and 2009 for unit 2.

The Ignalina NPP was planned as a part of the integrated Soviet north-western energy system and probably had a role in the Soviet military complex (plutonium production). The planned capacity of the plant was 6000 MW (4 units of 1500 MW each). However, only two were commissioned. Construction of the third unit was stopped in 1989 due to public protest. The RBMK reactors were built exclusively in the territory of former Soviet Union (while VVER were exported to other Soviet satellite states) due to the capability to produce weapons grade plutonium by reprocessing of the fuel. It's clear that the fuel cycle (from uraniummining to the reprocessing of spent nuclear fuel) during the Soviet times was an integrated part of Soviet strategic interests. Of course all data related with nuclear industry was secret. After Lithuania became independent the country got Ignalina NPP as a heritage but lost all contacts with the Soviet nuclear and military industry except for the fuel supply.

The fuel used in the Ignalina NPP is imported from Russian Joint Stock Company TVEL. It's a company within the nuclear complex of the Ministry of the Russian Federation for Atomic Energy. TVEL is a state-owned holding monopoly, which manufactures and supplies fresh nuclear fuel to nuclear reactors in Russia and worldwide.

After removing spent fuel assemblies from the reactor they are being placed in the special pools under a layer of water, located in the same buildings as the reactors. At present about 7,600 spent fuel assemblies are accumulated at unit1 and about 5,000 - at unit 2.

Almost all radioactive waste in Lithuania is produced by Ignalina NPP. Medicine, industry and agriculture makes up only a few cubic meters low radioactivity waste per year. The radioactive waste at Ignalina NPP consists of solid and liquid waste. Approximately 99% of the radioactivity in waste, is contained in spent fuel. All nuclear waste is stored in relevant facilities inside of Ignalina: short lived radioactive waste storage, medium lived radioactive waste storage, long lived radioactive waste storage and liquid radioactive waste storage tanks. In order to ensure safe decommissioning of Ignalina NPP it's necessary to manage all radioactive waste of all levels. With the financial support of EU and G-7 some pre-decommissioning projects for unit 1 were prepared and some of them are under implementation, some foreseen for the nearest future.

Pre-decommissioning projects related with nuclear waste management at Ignalina NPP unit 1:

1. Interim spent fuel storage facility;
2. Waste management and storage of long lived radioactive solid waste;
3. Cement solidification facility for spent ion exchange resins;
4. Waste management and storage of short lived radioactive solid waste;

Implementation of the interim spent nuclear fuel storage facility has already started. In 1993 an international tender for the construction of the mid term spent nuclear fuel storage facilities was announced. The German company GNB won this tender and contract on the delivery of 20 CASTOR and 40 CONSTOR steel containers for the temporary storage of the spent fuel was signed. The first container CASTOR was constructed in May, 1999. Another 19 CASTOR containers were placed one by one to the site later. Some part of the spent fuel has already been placed in available containers.

These containers will not solve the problem of the spent fuel storage. One of the important works connected with the future decommissioning of Ignalina NPP unit 1 is the unloading and location of the spent fuel. In order to ensure safe handling of spent fuel at Ignalina NPP it is necessary to construct a storage facility for in total 17,850 spent fuel assemblies. According to the pre-decommissioning plan storage should begin starting 2006.

The spent fuel can be stored in the CASTOR and CONSTOR containers for 50 years. There are no ideas for the years after this period.

In the past few years in Lithuania, decisions about power plants have been made according to the Least Cost Power Generation Plan produced by the Ministry of Economy. The current Least Cost Plan was produced in 1999, to evaluate decisions about the closure of Ignalina NPP unit 1. It shows that on the past assumptions, no new capacity will be needed till 2010, and refurbishment of existing capacity at Elektrenai and Vilnius and Kaunas CHP is more economic to meet existing demand, than to build a new plant. Current studies show that no new generating plant would be needed until after 2010, around when unit 2 should close according to the EU. Recent studies by OECD also show that a new nuclear plant would be the most expensive option compared with oil and gas.

4.5 Romania

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
1	655	1	655	5.11	10

Cernavoda NPP is the only nuclear power plant in Romania with one CANDU 6 type reactor in operation. As early as 1979, Canada's export credit agency, the Export Development Corporation (EDC), provided a $ 1 billion loan to Romania for construction of the nuclear station. Construction has started in 1980. At the time, Romanian dictator Ceaucescu had grandiose dreams of building five or more reactors, but these plans collapsed through lack of funds. It was only late 1996 when the reactor started commercial operation.

The choice for CANDU technology by the Romanian Dictator was taken not on technical and economic grounds, but mainly for political reasons in order not to make Romania dependant on other countries for the import of enriched uranium fuel. This kind of fuel is not needed in the case of CANDU reactors, which can use natural uranium fuel coming from Romanian mines. Therefore, the Ceaucescu allowed the establishment of a close partnership with the Canadian nuclear industry since the 80s. Since then Canadian procedures and standards have been regarded as reference guidelines for the new Romanian nuclear industry.

Since the 1990's Romania is going through the process of decentralisation in its energy sector and creation of open market. The nuclear power plant is operated by 'Nuclearelectrica' company which was established in 1998 as a result of the important restructuring measures taken by the Romanian Government. By Decision No. 365/1998 of the government of Romania, the Romanian Electricity Authority (RENEL) was restructured and new entities were created as follows:

- Companion Nationala de Electricitate S.A. (National Power Company) abbreviated CONEL, further split to three separate entities responsible for conventional energy production, transportation and distribution,
- Societatea Nationala 'Nuclearelectrica' S.A. (National Nuclear Company 'Nuclearelectrica') and
- 'Regia Autonoma pentru Activitati Nucleare' (Autonomous Company for Nuclear Activities) with three subsidiaries, no legal persons - Heavy Water Plant, Institute for Nuclear Research and Centre for Nuclear Projects Engineering.

Three branches were further created at the 'Nuclearelectrica' to share responsibilities within the company:

- 'CNE PROD', operates the Cernavoda NPP Unit 1 and the auxiliary services;
- 'CNE INVEST', in charge with the Unit 2 completion and units 3 to 5 preservation;
- 'FCN - Pitesti', the nuclear fuel fabrication plant

Cernavoda NPP has been working quite steadily over the year since late 1996, when it started commercial operation. The unit have been showing load factor over 85%, which is high though one should mind technical specific of CANDU reactors able to change fuel without stopping the reactor. Over these years Cernavoda was producing some 10% of overall produced electricity and also supplying heat to the town of Cernavoda. Same time electricity demand was falling down in Romania, until last year when it has stabilised, leaving Romania with 11,700 MW overcapacity (roughly half of the installed capacity).

Major outage of the Cernavoda reactor happened in August 2003 because a record drought left insufficient water to cool down the reactor. The reactor was out of operation until September 17 when the Danube water raised to a sufficient level.

Romanian choice of the CANDU technology was based on the idea of closed fuel cycle to insure its independence. The country has a number of uranium mines, some of them are out of operation now and expecting closure.

Fuel bundles are fabricated at the FCN Pitesti - the nuclear fuel plant started in 1985, with a capacity of 90 tonnes/year and supplies CANDU-6 type fuel. According to Nuclearelectrica the plant can double the output with minor investments.

'PROMAG-PROD' company produces heavy water for CANDU reactors and other applications. Having a production capacity of over 180 tons/year PROMAG-PROD is among the biggest producers in the world and also working for export.

Each year the Cernavoda unit 1 produces 6,000 spent fuel bundles which are stored in the Spent Fuel Pool located in the service building on-site. In 2002 a contract to construct an intermediate spent fuel dry storage facility was signed with AECL Canada. The Storage will accumulate up to 300,000 fuel bundles for a period of 50 years.

According to the provisions of Law 111/1996 on safe conduct of nuclear activities, a law on radioactive waste management and decommissioning was elaborated. The draft law, entitled 'Law regarding the management of nuclear spent fuel and radioactive waste, in view of their final disposal', was prepared being in the process of approval. The draft law proposes to establish a national competent authority for spent fuel and radioactive waste management. The agency will be responsible for all relevant decisions as to the sites, design and construction of nuclear waste deposits.

Romania is in the process of identifying its approach to the final disposal of nuclear waste. Special research was launched to make an assessment of potential options. Geological disposal was considered to be the most effective solution and much of the research is focused on identification of the appropriate site. Export of the nuclear waste to Russia for final disposal is also considered. However, minding history of Romanian nuclear energy which aims to be independent, one might expect that deep geological disposal will be most favoured.

State plans to upgrade the Short Lived Low and Intermediate Level Waste and spent Sources Repository Baita-Bihor and assessing the possibility of its extension to accommodate all the decommissioning waste from the research reactors.

Romania considers development of the nuclear sector as strategically important. Completion of Cernavoda unit two considered to be a priority at the *'he National Strategy for the Development of Romanian Energy Sector on Medium Term 2001-2004'*. However, the document was harshly criticized by the European Commission in the energy chap-

ter of the Regular Report on Romania of November 2001 because of the lack of any realistic and clear priority in the paper and the complete absence of any strategic vision.

Construction of the five reactors on Cernavoda site were started in the early 1980s. Officially today it is unit 2 which is under construction and units 3 to 5 are in preservation. The Romanian government has approved financing Cernavoda 2 and has issued a financial counterguarantee on commercial and political risks for foreign investors, public lenders and insurers involved in the project. The whole package was ratified by the Romanian parliament at the beginning of January 2002. Financing for the project is expected to come from Euratom and the export credit agencies (ECAs) of Canada, Italy, France and the Unites States. Completion of Cernavoda 2 is expected to cost $ 750 million (€ 650 million).

The financial conditions implemented for unit 1 will also be applied for unit 2. This means that the Romanian government has committed itself to buying equipment and material only from Canadian and Italian companies, which will also provide technical assistance. In particular, ANSALDO ENERGIA from Italy is in charge of the balance plant. The management team consists of representatives from state-owned SNN Nuclearelectrica, AECL and ANSALDO.

The Financial Package for Cernavoda 2 NPP

ECA	Amount
EDC (Canada)	€ 231 million
SACE (Italy)	€ 118 million
COFACE (France)	€ 23 million
Eximbank (US)	€ 21 million
Roman. Dev. Bank	€ 25 million
Credit Lyonnais	€ 9 million
Euratom	€ 223 million

Cernavoda 2 is the last project that could benefit from Euratom support before the proposed extension of the Euratom loan ceiling. As a matter of the fact, Euratom is considering to concede Romania a € 223 million loan, the exact amount of money which is left and not committed in Euratom's treasury.

4.6 Slovakia

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
6	2,408	2	776	17.95	55

Slovakia has two nuclear power plants, Jaslovske Bohunice and Mochovce. Bohunice has four operating nuclear reactors and Mochovce has two.

Outside of Russia, Bohunice was the first nuclear power plant within Eastern Europe and the NIS. In 1958 construction started on the A-1 reactor. This was a gas cooled heavy water reactor that began commercial operation in 1972, but was closed in 1977 following a partial meltdown of the core. In the 1990s decommissioning began at the plant, it is estimated that it will cost 12 billion Sk (€ 270 million).

The two V-1 reactors (VVER 440-230 design) have a nominal design life of 30 years and therefore are expected to

close in 2008-12. According to the information from UJD SR (Nuclear Regulatory Authority), V-1 started the operation in 1980. At this time UJD stated the V1 life-time was 30 years, i.e. up to 2010. These reactor designs are classified as first generation and as such are targeted for early closure by the international community. As part of the agreements for the proposed funding of the completion of the Mochovce nuclear power plant (see below for further details), the Slovakian Government signed a decree in May 1994. This committed Slovakia to closing V-1 as soon as Mochovce entered commercial operation, or by the year 2000 at the latest. Despite this, in April 1999 the Government formally announced that the 2000 closure deadline had been abandoned and that the reactors would operate as long as they were safe. No alternative plan for closure was drawn up. The Government also argued that an increase in electricity demand in Slovakia made the closure of the reactors impossible. In reality, however, Slovakia started in 2000 to export electricity, mainly to the Czech Republic and Hungary, and this export has significantly increased in 2001.

Between 1991-3 V-1 was subject to what has been called a small backfitting program. This involved the implementation of 81 safety measures and cost around 2 billion Slovak Koruna (Sk) (45 million Euro). The program continuously passed into the big backfitting program (so-called gradual reconstruction) which started in 1993 and finished in June 2000. The reconstruction was done by the consortium of Siemens and VUJE, Slovak Nuclear Research Institute. It's costs increased by 30% and finally reached 8.5 billion Sk (200 million Euro). As part of the accession process negotiated in the run up to the Helsinki EU Summit in 1999, agreement was reached on the closure of Bohunice V-1, by 2006 (1st reactor) and 2008 (2nd reactor). However, even these dates look uncertain. In July 2001, Slovak Nuclear Regulatory Authority agreed with the V-1 further operation after the large backfitting program has finished, stating the V-1 operational safety "is good, comparable with nuclear units of the same vintage operated in the developed Europe countries". Subsequently, the regulator awarded, in 2001, a ten year operating licence for the 1st V-1 unit as opposed to the normal annual license previously awarded. The IAEA has performed several missions and consultations to Bohunice during 2000-01 and backed the Slovak government in its decision to keep the plants operating.

The both Bohunice V-2 reactors (VVER 440-312 design) were opened in 1984 and 1985

Construction of Mochovce started in 1982 but gradually stopped in 1990 due to a lack of funds, at which time there were four reactors under-construction. In 1991 the Czechoslovakian Government asked the EBRD to consider funding completion of units 1 and 2 (VVER 440-213). In 1992 Electricité de France (EdF) began an extensive audit of the existing plant infrastructure and equipment with the Slovak electricity utility (SE, formerly SEP). Bayernwerk AG also became involved in the project and proposed that they provide funds, expertise and a completion guarantee to finish Mochovce to international safety standards.

In May 1994 the project sponsors made a formal request that the EBRD and one of the potential co-funders Euratom consider financing the completion of units 1 and 2. The project sponsor was a company called EMO a.s. which was jointly owned by SE and EdF. EdF had control over the company with 51% of shares; it was proposed that EMO might later also include the Russian Ministry of Atomic Energy (MINATOM) and Bayernwerk. EMO was to repay the loan by leasing the plants to SE once the project was complete. The estimated cost of this project was some € 700 million Euro. The funding for the project was expected to come from a variety of national and international sources including the EBRD/Euratom, French and Germany Export Credit Agencies and the Slovakian Government. Despite opposition from outside and inside the EBRD, the Bank's Board of directors was scheduled to discuss and vote on the project in March 1995. A number of countries, led by Austria, were expected to vote against the pro-ject. However, a week before the Board discussion the Slovakian Government asked for the project to be suspended. The project was formerly withdrawn from the Bank on the 5th September 1996. The Slovakian Government removed the project because it claimed that it found the conditions that the EBRD and other Western funders were placing upon them 'unacceptable', and that more advantageous contracts were possible.

Towards the end of 1995 a second series of financial and construction consortiums was prepared which were eventually to complete Mochovce. The new consortium was reportedly able to complete the project for € 560 million, 30% less than the previous estimate. The new consortium included French, German, Czech and Slovak banks, and included export credit guarantees from their governments. The general contractor for the project completion was Czech Skoda with Siemens and Framatome delivering safety equipment. EdF also became involved as in June 1996 they signed a technical assistance and co-operation agreement with Mochovce. Despite the originally stated costs, the completion finished at minimum 35 billion Sk (about € 820 million).

In April 1998 the first fuel was loaded into unit 1 of Mochovce. SE claimed that the safety standard of the reactor was based on analyses from the IAEA, the French nuclear protection and safety institute (IPSN) and the German reactor safety authority (GRS) joint venture Riskaudit and that 70% of the measures recommended had been imple-

mented. The operation started in August 1998. The second unit was initially scheduled for completion in April 1999, but was delayed and started operation in January 2000.

In November 1998 Economy Minister Ludovit Cernak visited Mochovce and said that the third and fourth reactors of the Mochovce should not be completed. After hard fight inside the country (State administration, political parties, economic-political lobbies, NGOs) in April 2000, the Slovak Government approved the resolution/decree stating that it does not agree with providing of the State guarantee in any form to the Mochovce 3-4 completion. Given the financial situation of SE this practically means the project cancellation.

Slovakia will be the only EU country in May 2004 with reactors said to be under construction, however, the uninterrupted completion of even these appears unlikely. The current restructuring and partial privatisation of SE will impact upon the completion of reactors 3 and 4.

4.7 Slovenia

Operating Reactors		Reactors Under Construction		Electricity Produced in 2002 (TWh)	% of total electricity Produced
Number	Installed Capacity (MW)	Number	Installed Capacity (MW)		
1	676	-	-	5.31	41

Slovenia has one Westinghouse 632 MW reactor situated on the banks of the Sava River, 75 km from Ljubljana located at Krsko. The reactor is in a unique position in that it is owned jointly by two countries, Slovenia and Croatia, each having a 50% stake, with each supposed to receive half the electricity produced. In 1974 an agreement was signed between Elektroprivreda of Croatia and Savskega elektrarne of Slovenia giving each partner the right to 50% of the electricity produced and making legal provisions in the event that either partner withdrew or caused delays in construction. In December 1974 Tito laid the first symbolic parts of the foundation. Despite the reactor going critical in September 1981, commercial operation was not achieved until 1983, due to regulatory and technical problems.

Since its operation, two significant safety reviews have been undertaken at the plant. The first was the International Commission for Safety Analysis of Nuklearna Electrarna Krsko (NEK - the reactor's owner and operator). The Commission was paid for by the governments of Austria, Italy and Slovenia and published their report in 1993. This made 74 recommendations on technical and procedural changes required to increase the safety operation of the plant, which were made mandatory by the Slovenian authorities. At the end of 1995 degradation of the two steam generators was detected and led to a decision to replace them. Delivery of the Siemens/Framatome replacement units occurred in 2000 and cost € 105 million. NEK undertook a 6% power uprate (45 MW) along with the new steam generators.

The Slovenian Government has a long-term policy of phasing out nuclear electricity and it is therefore not anticipated that any more nuclear power plants will be constructed. In October 1995 a proposal in the National Assembly calling for a referendum on the shutdown of Krsko was defeated following the withdrawal of support by the Liberal Democracy of Slovenia Party.

In 1998 a dispute occurred over the non-payment of bills - especially the surcharge for decommissioning and waste disposal - and the tariffs being charged by NEK to the Croatian utility. This led in early August to NEK cutting the 300 MW of supply to Croatia and the subsequent export of electricity from Slovenia to Italy. However, the dispute over commercial arrangements is a small part of a much bigger dispute. In July 1998 NEK announced that it planned to finance the replacement of the steam generators by itself and declared that the Croatian utilities did not own half of Krsko. However, in July 2001 an agreement was reached by which a 50:50 split in ownership was confirmed with a similar division of costs and output, with the establishment of a new company Elesgen. However, the official decommissioning strategy, which the Croatian side disputed, was not included in this agreement and the decision is not likely to be taken before the plants' closure.

Appendix: the European Union at a glance

History

The earliest beginning of the present European Union was the creation of the European Coal and Steel Community (ECSC) in 1951. This was followed in 1957 by the establishment of the European Economic Community (EEC) and the European Atomic Energy Community (Euratom). Those three treaties had the purpose to support co-operation between European member countries. Earliest (founding) members were Belgium, France, Germany, Italy, Luxembourg and the Netherlands. In 1972, Denmark, Ireland and the United Kingdom joined the Community, followed by Greece in 1981 and Spain and Portugal in 1986. Last members that entered were Austria, Finland and Sweden (1995), making up a total number of 15 Member States.

European Union

The European Union (EU) was established, as a kind of successor to the EEC, by the Treaty on the European Union, which came into force in 1993. With the official creation of the European Union a complex and political difficult program was started: a monetary union, new common policies, a common foreign and security policy, etc. Decision-making in the EU is a complicated story in which several institutions are involved. Besides, it is in the process of reform, necessary because of the accession of (at least) 10 new Member States. The main institutions are: the Council of the EU, the European Council, the European Parliament, the European Commission and the Court of Justice.

Council of the European Union

The Council of the EU is the main decision-making institute. It is made up of Ministers from the 15 Member States. At each meeting of this council, the 15 Ministers discuss a certain topic: foreign affairs, environment, agriculture, etc. In case of an environment meeting of the Council, the Environment Ministers of the 15 Member States will attend. The Council of the EU enacts legislation (regulations, directives and decisions) and acts as a legislature. The European Parliament is involved in preparing new legislation in co-operation with the Council. The Presidency of the Council of the EU rotates every six months to a new Member State.

Decisions by the Council of the EU are made either unanimously, by a simple majority or by a qualified majority (62 votes out of a total of 87). France, Germany, Italy and the United Kingdom have 10 votes each; Spain has 8; Belgium, Greece, the Netherlands and Portugal 5 each; Austria and Sweden 4 each; Denmark, Finland and Ireland 3 each; and Luxembourg 2. The system of qualified majority voting is applied to most areas, such as employment, public health, customs, research programmes. Unanimity is only required for issues of "constitutional" importance (amendments to treaties or accession of new Member States) or certain "sensitive" areas such as taxation. There has been a move from unanimous voting to qualified majority voting since the Amsterdam Treaty of 1997 extended the scope of qualified majority voting to new areas. The decision-making procedure of the Council of the EU is difficult and discussed over and over.

The European Council

Is not a body but the name of the meeting of the Heads of Governments of the Member States. Since 1974, the European Council meets at least twice a year as a discussion board for important issues. Major political initiatives are launched at the European Council meetings. The Council is also used for settling controversial issues not resolved by the Ministers of the Council of the EU. The meetings of the European Council are well known because of big media coverage and political conflicts being discussed at a high level. The European Council can be more or less seen as a discussion platform for the EU countries where important agreements are made on future policies of the EU (whereas subsequent legislation is made by the Ministers of the Council of the EU).

The European Commission

The 20 members of the European Commission are appointed by the 15 Member States (2 each for France, Germany, Italy, Spain and the United Kingdom, and one each for the others). The European Commission has to ensure that directives and regulations taken by the Council of the EU will be implemented by the Member States. If necessary the Commission can bring a case before the European Court of Justice to enforce the implementation. The Commission has also a right of initiative and can intervene in the legislative processes between the Council of the EU and European Parliament. The European Commission can come up with proposals (developing a policy) and

sent it to the Council of the EU for the further procedure (making binding legislation). The European Commission has significant powers in relation to common policies in areas such as research and technology.

The European Parliament

It is quite difficult to explain the real power of the European Parliament. It has less power than usually in national governments, although it has improved in the last years. European Parliament elections are held every five years and it has currently 626 seats, elected by the people of the Member States: Germany (99), France (87), Italy (87), United Kingdom (87), Spain (64), Netherlands (31), Belgium (25), Greece (25), Portugal (25), Sweden (22), Austria (21), Denmark (16), Finland (16), Ireland (15) and Luxembourg (6). In the Parliament, political rather than national groups are organised, for example Christian-Democrats, Conservatives or Greens. Plenary sessions of the Parliament are held in Strasbourg and Brussels is the meeting place for the 20 different committees.

The Parliament shares officially the legislative function with the Council of the EU: it has a hand in the drafting of directives and regulations and putting forward amendment proposals. But its "joint decision-making powers" are limited. The power of the Parliament is limited to specific areas and it can only reject (by absolute majority) a proposal of the Council of the EU in its entirety. The same applies to budgetary issues. It can adopt a budget or reject it and if rejected, the whole procedure begins again from scratch.

The Court of Justice

The 15 judges and 9 advocates-general of the European Court of Justice (located in Luxembourg) have to judge whether EU regulations are interpreted and implemented in line with the applying treaties. For example, it may rule that a Member State has failed to act on an obligation under a directive.

EU Enlargement

The enlargement of the EU will result in changes in decision-making structures. The European Council in Nice (France) in December 2000 reached agreement on the enlargement process. Among these decisions were: extension of areas for qualified majority voting (in place of unanimous voting); new weighing of votes of Member States in the Council of the EU, because of the arrival of new states; and new allocation of seats in the European Parliament.

The total number of votes in the Council of the EU will increase from 87 to 321. The weighing of votes has changed. For example, presently Germany has 10 votes and will have 29 votes in the future Council. All present Member States will have more votes, but the new accession countries will also gain votes in the Council, varying from 3 for Malta to 27 for Poland. Qualified majority voting will be set at 232 votes, but there are special conditions as well for the total amount of states required to adopt a decision (either a majority or two thirds of the members). Besides, a Member State can request that in case of qualified majority voting by Members such a decision will represent 62% of the total population of the EU. If the real population does not sufficiently (62%) represents the supporting Member States, a decision must be rejected.

The European Parliament will increase from 626 to 732 seats. Almost all present EU states will loose some seats (except for Germany and Luxembourg) and new Member States will vary from 3 for Malta to 54 for Poland.

The Laeken Summit in December 2001 called for the creation of a new structure for the EU. As a result a European Convention was established to draft a new Constitution for Europe.

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The World Information Service on Energy (WISE) was founded in 1978 and is based in Amterdam, the Netherlands. The Nuclear Information & Resource Service (NIRS) was set up in the same year and is based in Washington, US. NIRS and WISE joined forces in 2000, creating a worldwide network of information and resource centers for citize ns and environmental organizations concerned about nuclear power, radioactriev weaste, radiation and sustainable energy issues.

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EURATOM?
NO THANKS


ENERGIA NUCLEARE?
NO GRAZIE


ATOMIC POWER?
NO THANKS


ATOOMENERGIE?
NEE BEDANKT


ATOMIVOIMAAKO?
EI KIITOS


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¿NUCLEAR?
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