Euratom Supply Agency

Annual Report

2001

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OVERVIEW

Supply of nuclear fuels to the EU utilities continued steadily during the year. Availability of natural uranium does not pose a problem in the immediate future and uranium deposits worldwide are adequate to guarantee the sustainability of the industry in the long term. In spite of increased nuclear power production, the need for nuclear fuel has not grown much due to large improvements in fuel technology over the years. Therefore the capacity of plants covering the different stages of the fuel cycle - conversion, enrichment, fabrication and reprocessing - in the Community and worldwide, continue to exceed current requirements.

Continued attention is required to ensure security of supply to the users: firstly, an imbalance remains between current world production and demand for natural uranium, with a large proportion of supply being made out of inventories; secondly, the nuclear fuel cycle industry has witnessed a great degree of concentration resulting in reduced numbers of suppliers. Due to the long lead times to bring additional natural uranium production to the market and the fact that difficulties with one of the major suppliers of conversion or enrichment may not be discounted, the Supply Agency recommends the utilities to maintain an adequate level of strategic inventories to be used in case of temporary disruption of supplies. Furthermore the Supply Agency continues to recommend the utilities to contract for most of their requirements with primary suppliers and diversify their sources.

The policies or restrictions on the uranium from the New Independent States (NIS) tended to disappear gradually as the large imports of cheap uranium diminished and the difficulties created thereby became less of a threat to the stability of the market and the long term security of supply. As a result, the distinction between the prices for NIS and non-NIS material tended to disappear. However, in view of their potential impact on the enrichment market, sales of Russian enrichment in the EU, as well as Russian imports in the USA, remained regulated for the time being.

USEC's action against Eurodif and Urenco for alleged dumping and countervailable subsidies unfolded during the year with rulings against the two EU enrichers. The result has been a temporary distortion of the market and higher prices for enrichment, particularly in the USA. The parties announced their intention to appeal, therefore the uncertainties on the enrichment market will continue during 2002.

The European Commission's Green Paper "Towards a European strategy for security of energy supply", published at the end of 2000, raised considerable interest. It opened a large debate on the geopolitical, economic and environmental aspects involved in securing the European Union's energy supply and promoted a discussion on the role of each energy source, including nuclear energy.

Power shortages in several parts of the world, fluctuations in the price of fossil fuels, the need to reduce greenhouse gas emissions, the good performance of existing nuclear power plants as well as better public acceptance, led to renewed interest in nuclear power generation in the USA and other countries. Plants which had been shut down are due to restart, projects which had been on hold for many years are being revived and new projects are under consideration or being implemented. This contrasts with the situation in the EU where only in one country, Finland, the government endorsed a project for a new plant.

CHAPTER 1 - GENERAL DEVELOPMENTS

ENERGY SUPPLY

In 2001, 143 nuclear power reactors with a total net capacity of 123 GWe were in operation in the European Union. The nuclear electricity generated[1] in the Community continued to increase and amounted to 846 TWh or 34% of the total (compared to 815 TWh in 2000). If fossil sources had been used instead, some 300-600 million tonnes of CO_2 would have been emitted to the atmosphere for the same energy production (depending on the substitution mix).

Electricity generated by nuclear plants worldwide amounts to some 16% of the total. Over the last few years, upgrades and better performance of the plants world-wide, denoted by average capacity factors reaching unprecedented levels, have resulted in an increase in output equivalent to that of the power generated by many new plants. The competitiveness of nuclear generated electricity continued to improve.

The fears raised in the last few years by electricity market deregulation, that some nuclear plants would not be able to compete, did not materialise. In fact, plants were not closed on industrial or commercial grounds, on the contrary, plants which had been shutdown in the United States and Canada were re-started and plant projects that had been on hold were revived.

POLICY DECISIONS IN THE MEMBER STATES

The future role of nuclear energy continued to be discussed and subject to further legislation in several Member States[2].

In Belgium it was announced that the political agreement to consider phasing out after a 40 years reactor lifetime would be proposed as a law.

In Finland the construction of additional nuclear capacity continued to be considered as part of the strategy to meet the targets of the Kyoto protocol on the reduction of the green house gas emissions. The utility TVO submitted an application for a decision in principle for the construction of a 1000-1600 MWe LWR plant[3].

In Germany the nuclear phase out programme was clarified through an amendment to the Nuclear Power Act which defined the amounts of electricity to be produced based on an estimated output for the plants over a 32 years lifetime. The act provides also for shipment of spent fuel for reprocessing to be terminated by mid-2005 and for interim spent fuel storage facilities to be built at reactor sites.

In the Netherlands a legal dispute continued between the Government and EPZ, the operators of the Borssele nuclear power plant. The utility considered that there was no arrangement to close the plant in 2003.

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[1] Source: International Energy Agency

[2] Developments are described in more detail in the Member States' contributions in Chapter 4.

[3] At the beginning of 2002 the Government decided favourably on the principle of building a fifth nuclear plant in Finland but a final decision by the Parliament is pending.

Following the decision to phase out nuclear power generation in Sweden, the decommissioning of Barsebäck 1 started with the removal of fuel from the reactor at the end of the year but demolition works will not start until 2020. The closure of Barsebäck 2 remains conditional upon the availability of an alternative renewable energy source, the final decision was postponed to a later date.

In the United Kingdom the Prime Minister commissioned a review of the longer term, strategic issues surrounding energy policy for the UK, with the aim of setting the objectives for its energy policy to 2050. The review looked at the range of energy supply options (including nuclear power) in an open and inclusive way. The review was published in February 2002 and the Government plans to hold a public consultation on key policy questions brought out by the review, a process that will lead to a White Paper in the Autumn of 2002.

DEBATE ON THE EUROPEAN COMMISSION'S GREEN PAPER

In last year's report the Supply Agency referred to the adoption by the European Commission on 29 November 2000 of a Green Paper "Towards a European strategy for security of energy supply". This paper was intended to open a large debate on the geopolitical, economic and environmental aspects involved in securing the European Union's energy supply and to promote a discussion on the role of each energy source, including nuclear energy.

During 2001 the European Commission received a large number of comments on the Green Paper. Although the subject matter is quite broad and concerns all energy sources and energy demand issues, the future role of nuclear energy in the context of the limitation of carbon dioxide emissions has been one of the high profile subjects of the comments. In view of the number of responses, the Commission extended the period for comments until 15 February 2002.

The Supply Agency's Advisory Committee also adopted and submitted an opinion (see Annex 4), in which it welcomed in general the Green Paper and stressed that nuclear energy is to be considered as a sustainable energy source which is instrumental for attaining the Kyoto Protocol goals. The opinion further points to the competitiveness of nuclear energy, the abundant uranium resources, the maturity of the industry and the technical feasibility of safe disposal of high level wastes. It considers that the EU institutions should have a role in the promotion and development of nuclear energy at the European level and should not enact legislation which would impede the choices of Member States in this field.

On 15 November 2001, the European Parliament adopted a resolution in which it "welcomes the statements in the Commission Green Paper on security of energy supply regarding the important contribution of energy efficiency, nuclear energy and the development of renewable energy sources" in achieving the goals of the Kyoto Protocol. It recommends "that the Commission take the necessary measures to ensure that current human resource levels in the nuclear sector do not shrink to such an extent as to jeopardise the existence of the valuable wealth of knowledge and experience in the field of safety and security of operating reactors, decommissioning or waste management".

The European Parliament also called upon all EU institutions to “encourage the shift towards zero-carbon emission fuels for power, notably electricity generation from nuclear energy, hydrogen for transport fuel from biomass, hydroelectric, solar and wind energy sources. This could be achieved both by removing existing legislative obstacles and by making them subject to a specific EU-wide exemption from all excise duties, energy taxes or climate levies”.

In an opinion of 30 May 2001 the Economic and Social Committee stated that “it is difficult to see how the EU can in future meet the challenges of climate change and ensure energy supply at reasonable prices without nuclear power continuing to make at least its current contribution to electricity production”.

A variety of comments were received from the industry and its organisations, civil society, academic circles and environmental non-governmental organisations, supporting or opposing the use of nuclear power. Several companies and organisations active in the nuclear industry or in electricity production in general have submitted supportive comments, highlighting, in particular, the argument that without maintaining nuclear power at its present level the EU can simply not achieve the Kyoto objective of limiting carbon dioxide emissions. The need for nuclear research and for solutions to the waste management issues have also been underlined.

INTERNATIONAL RELATIONS

BILATERAL NUCLEAR CO-OPERATION AGREEMENTS

There were no particular developments in 2001 concerning the Agreement with Canada. Trade involving Canadian origin uranium continued normally.

In the framework of the Agreement with Australia, an Article XIII consultation was held in June 2001 in Canberra, Australia, between European Commission and Australian officials. Both sides reviewed the operation of the Agreement and concluded that it continued to be operated satisfactorily.

The Supply Agency and the Commission continued to consult with Australian, Canadian and Russian authorities with the aim of trying to resolve the impediments preventing the retransfer of Australian and Canadian obligated depleted uranium to Russia for re-enrichment.

Also trade involving US origin material continued normally, and no new developments concerning the Agreement with the United States can be reported.

Under the Euratom/US agreement, a mechanism providing for advance generic consent for re-transfers of nuclear items subject to the agreement is in place based on a list of destinations outside the EU which includes most of the Community’s nuclear trading partners. Advance generic consent for re-transfers to Japan and Switzerland of plutonium, including plutonium contained in mixed oxide fuel, is maintained under this Agreement. Applications for retransfer consents falling outside the generic consents provided for under the above Agreements are handled by the Supply Agency. During 2001, 3 such re-transfers were approved.

BILATERAL RELATIONS IN THE NUCLEAR FIELD WITH OTHER COUNTRIES

Relations with the Russian Federation remained stable in 2001. No new steps were taken towards a possible trade agreement covering nuclear trade.

During the year the Commission opened the negotiation process with the Government of Uzbekistan for an Euratom agreement for co-operation covering nuclear material transfers.

No new developments can be reported concerning possible agreements with the Ukraine and Kazakhstan.

Four more rounds of negotiations on a possible nuclear co-operation agreement with Japan were held in the course of 2001. The successful completion of the negotiations at the last round, in October in Tokyo, is expected to pave the way for the formal adoption of a draft agreement by the European Commission. Next, this draft agreement will need to be submitted to the European Council for final approval.

LEGAL DEVELOPMENTS

USEC ANTI-DUMPING PETITION AGAINST EURODIF AND URENCO

On 7 December 2000, USEC filed petitions with the US Commerce Department's International Trade Administration (ITA) and the International Trade Commission (ITC) against Eurodif S.A. and Urenco Ltd. It was alleged that the imports of low enriched uranium from France, Germany, the Netherlands and the United Kingdom were being sold at less than fair value in the United States and benefited from unfair subsidies in their home markets, which materially injured or threatened with material injury the US domestic enrichment industry.

In January 2001 the ITC voted that there was a reasonable indication that the US industry was threatened with material injury and the ITA was allowed to continue the anti-dumping and countervailing duty investigations.

In May the ITA made preliminary determinations on countervailable subsidies. The US Customs Service started requiring cash deposits or bonds in the amounts of the rates found in ITA's preliminary determination on enriched uranium imports from the four Member States concerned.

In July, the ITA issued preliminary determinations that LEU from France and the United Kingdom was being sold at less than fair value (LTFV) in the USA and established antidumping duties. The ITA also determined that LEU from Germany and the Netherlands was not being sold at LTFV and therefore was not subject to a duty.

In December, the ITA announced its final determinations on the cases. It established that there was a final subsidy rate of 2.26% for imports of LEU from Germany, the Netherlands and the United Kingdom and a rate of 13.21% for imports of LEU from France.

ITA also made final affirmative determinations in the antidumping investigation of LEU from France with an antidumping margin of 19.57%. However the ITA determined that sales of LEU from Germany, the Netherlands and the United Kingdom were not dumped in the United States.

It should be noted that the above duties apply to the value of the LEU. The effective duty in terms of the value of the SWU contained in the LEU is therefore some 50% higher.

For Urenco the 2.26% countervailing duty would normally terminate as of the end of 2003 as the DOC had determined that Urenco had received a non-recurring subsidy with an average useful life of 10 years, expiring in 2003.

The Commission and the Supply Agency continued to follow the case very closely in order to assist the companies and the respective Member States, and regretted the decisions. The Supply Agency is rather concerned that USEC's action will make the access of the EU enrichers to the US market unduly more difficult, particularly for Eurodif, and it will therefore distort competition. It was reiterated that USEC's problems are mostly of its own making due to its commercial and industrial decisions, as well as the unfavourable strength of the US dollar relative to the euro.

The final outcome and impact is still unclear, as all parties are considering the possibility of appeals in the Court of International Trade.[1]

Table 1: ITA decisions on Antidumping (AD) and Countervailing (CVD)

<table>
<tr><th>Company (Country)</th><th></th><th>AD</th><th>CVD</th><th>Total</th></tr>
<tr><td rowspan="2">Eurodif (France)</td><td>Preliminary</td><td>17.52</td><td>13.94</td><td>31.46</td></tr>
<tr><td>Final</td><td>19.57</td><td>13.21</td><td>32.78</td></tr>
<tr><td rowspan="2">Urenco (Germany, The Netherlands, United Kingdom)</td><td>Preliminary</td><td>3.35 (a)</td><td>3.72</td><td>7.07 (b)
3.72 (c)</td></tr>
<tr><td>Final</td><td>0.00</td><td>2.26</td><td>2.26</td></tr>
</table>

Notes:
(a) For the United Kingdom only. De minimis for Germany and the Netherlands
(b) For the United Kingdom
(c) For Germany and the Netherlands

[1] On 22 January 2002 the ITC by a vote of 4-0 issued a final affirmative finding of injury or threat to USEC by imports of LEU from the four EU Member States. ITC's determinations were transmitted to the US DOC, which subsequently issued duty orders.

CLAIM AGAINST THE US-DOE FOR SWU OVERCHARGING

In June 2001, the United States Court of Federal Claims issued a decision which held that the US Government breached the Utility Services Contracts (USC) under which the Department of Energy provided uranium enrichment services to nine plaintiffs by improperly including certain costs in the price charged for such services. The Plaintiffs argued that, as of Fiscal Year (FY) 1993, Environmental Restoration Costs were no longer appropriate costs of DOE to be recovered through the USC price. Accordingly, Plaintiffs sought and after trial were awarded, damages of $22/SWU for all SWU purchased from DOE at the USC base price of $125/SWU from October 1992 through June 1993. The US Government has appealed this decision.

The initial nine plaintiffs had also argued that DOE improperly included in its prices amounts for imputed interest on DOE's cancelled Gas Centrifuge Enrichment Project (GCEP). The plaintiffs discovered that whilst DOE in 1985 wrote off from its books the costs related to GCEP and from 1986 removed such costs from the USC price calculation, DOE did not exclude the imputed interest on these written-off costs from the price. This overcharging would have taken place between FY1986 and 1993. Similarly the plaintiffs discovered that certain costs of producing high assay enriched uranium had been written off by DOE in 1991 but were nonetheless included in the SWU price for FY1992 and 1993. However, the Court of Federal Claims did not take account of the merits of these claims, ruling that they were raised late in the case and that the Government did not have adequate time to prepare its defence.

After consulting with the EU utilities, the Supply Agency joined with other plaintiffs in filing an action against the DOE in the US Court of Federal Claims for recovery of Environmental Restoration charges, imputed interest on GCEP, and high assay costs that were improperly included in the charges of SWU for two EU utilities. The Supply Agency was the formal party to the USC for one of these EU utilities.

The case has been stayed by the court pending a decision by the US Court of Appeals for the Federal Circuit in the Government's appeal of the decision by the US Court of Federal Claims.

OTHER DEVELOPMENTS

SITUATION IN THE CANDIDATE COUNTRIES APPLYING FOR EU MEMBERSHIP

As far as nuclear fuel supply is concerned, the accession of the Candidate Countries is not expected to create particular difficulties. The smooth integration of Candidate Countries' existing supply arrangements is guaranteed by Article 105 of the Euratom Treaty which states that the Treaty provisions shall not be invoked so as to prevent the implementation of agreements or contracts concluded before the new Member States' accession. Such agreements or contracts only need to be communicated to the Commission within 30 days after accession.

Nuclear safety in Candidate Countries is an issue of concern and therefore the position of the European Union has been oriented towards enhancing nuclear safety prior to their entry into the EU of the Candidate Countries' nuclear reactors, and obtaining the commitment to close those reactors not meeting high safety standards.

Austria and the Czech Republic reached an agreement on 29 November 2001 over their dispute on the start-up of the Temelin nuclear power plant, after an international expert review and under mediation by the European Commission. The issues could be resolved within the framework of the “Melk Protocol” whereby Austria and the Czech Republic agreed to a safety review process before commercial operation of the plant. The agreement resolved a delicate problem for the accession of the Czech Republic to the EU.

In Bulgaria, the reactors 1 to 4 of the Kozloduy NPP are subject to early closure commitments of this country, contained in the Understanding signed on November 1999 between the Government of the Republic of Bulgaria and the European Commission. Units 1 and 2 will be closed down before the year 2003. The definitive closure dates for Units 3 and 4 will be decided in 2002; it is the European Commission’s understanding that these closures will take place in 2006 at the latest. Bulgaria has concluded a Grant Framework Agreement with the European Bank for Reconstruction and Development (EBRD) as manager of the Kozloduy International Decommissioning Support Fund.

Lithuania decided, in the frame of the adoption in 1999 of the National Energy Strategy, that Unit 1 of the Ignalina NPP will be closed down before the year 2005, and that the precise date of the decommissioning of Unit 2 shall be solved in the update National Strategy Energy in 2004. The EU has expressed its expectation that its closure should occur by 2009 at the latest. The Lithuanian Parliament has ratified a Framework Agreement with the EBRD for the formal implementation of the Ignalina International Decommissioning Support Fund.

The Slovak Government decided in September 1999 that Unit 1 and Unit 2 of the Bohunice reactors will be closed down in 2006 and 2008 respectively, and signed the Grant Framework Agreement with the EBRD who acts as manager of the Bohunice International Decommissioning Support Fund.

Nuclear power stations are in operation also in Hungary, Slovenia and Romania. For the group of seven Candidate Countries using nuclear energy together, nuclear electricity accounted in 2001 on average for nearly one-third of electricity generation. And whilst a number of plants could be expected to be closed down in the near term, it may be noted that new nuclear power reactors are under construction in the Czech Republic, the Slovak Republic and Romania.

MERGERS AND ACQUISITIONS

The most obvious consolidations in the nuclear fuel cycle and power production industries took place in previous years. But also 2001 witnessed a number of important transactions.

A new holding company, Areva, was officially launched in September in France. The new company will group together CEA-Industrie, Cogema, Framatome ANP and FCI (Framatome Connectors International) operations. In the nuclear sector the new company will provide services in all aspects of power generation from uranium mining, fuel cycle, power plant construction to site clean-up and decommissioning.

Strong competition and liberalisation of the electricity market promoted further consolidation amongst utilities, inter alia:

- French EDF acquired a 34% stake in EnBW, Germany, the acquisition was approved by the European Commission subject to conditions;
- Vattenfall Sweden acquired majority shareholding in HEW Germany (over 70%);
- E.ON, Germany's second largest utility acquired UK's PowerGen, making the company one of the largest electricity suppliers in the EU. The deal is yet to be approved by the regulators.

ELECTRICITY MARKET LIBERALISATION

On 13 March 2001 the European Commission adopted a set of proposals for the completion of the internal electricity and gas markets. These proposals have inter alia as their objective to open up the electricity markets fully by 2005 by bringing forward the liberalisation schedule, by reinforcing the conditions which encourage real and fair competition, and by introducing a genuine single market while offering the best guarantees of security of supply and consumer protection. Discussion on the adoption of these proposals is still going on in the framework of a co-decision by the European Council and the European Parliament.

The European Commission's Communication "Completing the internal energy market" concluded that the initial experience in terms of implementing the electricity Directive has been encouraging. In terms of market opening, the vast majority of Member States are going further than legally required and many have decided to progressively move to full market opening.

Furthermore, a clear majority of Member States have chosen structural measures accompanying market opening that are most likely to promote effective competition. In fact, most Member States have opted for regulated third party access, an authorisation procedure for new generation capacity, full legal unbundling of transmission system operators and the creation of independent regulatory authorities.

At this stage, therefore, practical experience has already shown that further improvements and efforts are necessary to guarantee a smooth operation of the electricity market.

One of the main issues to tackle is the different market opening between Member States. This situation will continue unless further corrective actions are taken, and has given rise to significant concerns among most Member States and market players. The reciprocity provisions of the electricity Directive has been designed, on a temporary basis, to address the issue of quantitative imbalance in market opening.

However, experience in the electricity market has shown that such a clause may not be able to address all aspects of creating a real level playing field between Member States and operators.

STORAGE OF SPENT NUCLEAR FUEL IN RUSSIA

The Russian authorities continued to develop a regulatory framework for the import of nuclear spent fuel for processing and long term storage. The amended Russian legislation opens the possibility for storage of spent fuel subject to subsequent return to the country of origin and for reprocessing of spent nuclear fuel without its subsequent return upon special decision from the Russian government.

However, further actions are still required before offers may be made to interested customers. These include changes to the regulatory and legal basis, government to government agreements and revitalisation of the Russian enterprises which would be receiving foreign spent fuel.

NEW NUCLEAR GENERATION AND POWER PLANT PROJECTS OUTSIDE THE EU

The revival of nuclear power generation received considerable political attention and press coverage during the year. The targets of the Kyoto protocol on the reduction of the greenhouse gas emissions, the situation created by the power shortages in California, the instability of oil prices, the increased competitiveness of nuclear plants, amongst other factors, renewed interest in nuclear energy, in spite of some countries pursuing the announcement of a phasing out policy.

The US National Energy Plan, published on 16 May, centres on the same main issue in the field of energy as that affecting the EU, as set out in the Green Paper: the growth of dependence on external sources for energy supply. The US Administration calculates that energy requirements of the US economy will grow by 30% over the next twenty years.

The objectives of the energy policy concentrate on the reduction of external dependence and diversification, in order to get energy to consumers in sufficient quantities and at reasonable prices. To achieve this, the policy acknowledges the need for a federal approach in areas such as the building of power plants and planning distribution lines.

A green light is given in the Plan for the development of nuclear energy. In the face of the need to raise the share of fossil fuels (producing greenhouse gases), nuclear power regains its respectability. The US Administration is resolved to tackle the nuclear energy taboo, a stance reinforced by the pro-nuclear speech given by President Bush in Minnesota on 17 May at the presentation of the Plan.

The justification for this is based largely on the fact that nuclear power does not produce CO_2 emission. In the short term, the Plan gives clear blessing to extending the life of nuclear power plants currently in production[1]. In the long term, it opens the way to reviving the nuclear opinion in the USA.

[1] All nuclear power plant operators have filed applications for extension of life from 40 to 60 years; some reactors have already obtained authorisation from the Nuclear Regulatory Commission.

Other countries, like China, India and Russia are considering a revival of their nuclear power programmes. India announced its intention to start the construction of the Kudankulam nuclear power plant (two Russian VVER-1000 reactors) in 2002.

In Canada, Ontario Power Generation and Bruce Power planned to restart several reactors which had been shut down. Electricity shortages in Brazil renewed interest on the Angra 3 power plant project.

CLIMATE CHANGE

On 19 July an agreement was reached in Bonn at the extended sixth conference of parties of the United Nations Framework Convention on Climate Change (COP-6) on the principles for the implementation of the “flexibility mechanisms” (“emission trading”, “joint implementation” and “clean development mechanism”). These agreements were translated on 10 November into detailed provisions at COP-7 in Marrakesh.

On the ability for nuclear energy to benefit from credits generated by the “clean development mechanism”, the developed countries agreed to refrain from using emission reductions generated from nuclear projects to meet their commitments in the first period (2008-2012).

CHAPTER 2 - NUCLEAR FUEL, POLICIES AND MARKETS

NUCLEAR FUEL CYCLE

NATURAL URANIUM

Natural uranium supply continued steadily during the year. Most of the supply to the EU utilities continued to take place under long term contracts.

In 2001, the Supply Agency's average price for deliveries under multiannual contracts rose moderately; however, when expressed in US dollars it remained stable because of the continued appreciation of that currency against the euro. The relative stability of the prices for deliveries in the multiannual contracts category reflects a certain inertia for this type of contract, as well as market stability.

The amount of uranium delivered under spot contracts was one of the lowest registered in recent years. Spot price indicators, as published in the trade press, increased from some \$7.00/lb U_3O_8 at the beginning of the year to about \$9.50/lbU_3O_8 in December.

As the policies or restrictions on natural uranium from the New Independent States (NIS), except for Russia, were eliminated in the EU and USA, and Russian natural uranium does not seem any longer to exercise significant pressure on the market, the distinction between prices for NIS and non-NIS material tended to disappear. As a result the leading organisations that publish uranium prices decided to stop the publication of a separate price which applied to NIS origin uranium (excluding Russian downblended HEU feed).

In 2001, total worldwide natural uranium production amounted to some 37,000 tU, a modest increase when compared to 35,000 tU in 2000.

Canada maintained its status as the world major primary producer, with some 11,300 tU reported to have been produced during the year. The McArthur River mine reached its nominal annual production capacity of about 7000 tU, while the start up of Cigar Lake was postponed and is not due to take place before 2005.

Australia produced 7700 tU, an increase of some 5% relative to 2000.

Russia appears to be reducing its role of major direct supplier of natural uranium to western markets due to its considerable domestic demand, diminishing production and inventories already committed as sales.

However, it remained the major secondary supplier through the downblended HEU material and re-enrichment of tails, particularly for western enrichers. Russia was reported to have taken an interest in the production of Kazakhstan and Uzbekistan.

EU production continued to decrease. In 2001, Community domestic supply to the EU utilities represented some 5%. With the announced closure of the last French mine during the year it will become virtually non-existent in future.

Compared to the total worldwide needs of some 60,000 tU/year, primary production remains well below consumption. Current production covers only just over half of requirements, the balance continued to be made up by stockpiles and recycling. The main secondary sources were stocks from utilities, suppliers and governments, re-enrichment of depleted uranium (tails) in Russia and a reduction in requirements due to the use of uranium from reprocessing and plutonium in mixed oxide fuels (MOX).

Table 2: Natural uranium production in 2001

Country	tU	share %
Canada	11,250	30
Australia	7,700	21
Niger	2,900	8
Russia	2,900	8
Namibia	2,700	7
Uzbekistan	2,350	6
Kazakhstan	2,250	6
South Africa	1,150	3
United States	1,100	3
Other	2,950	8
TOTAL	37,250	100

Source: Production level estimates by OECD(NEA)-IAEA, "Uranium 2001: Resources, production and demand", to be published May 2002. Figures rounded to 50 tU.

CONVERSION

Supply of conversion services to the utilities continued steadily during the year and capacity, world-wide and in the Community in particular, continued to exceed requirements. But the closure of the BNFL conversion plant could create a shortage of conversion capacity in Europe which over time could give rise to a significant increase in material transports between Europe, the USA and Russia.

In early 2001 BNFL announced its decision to cease sales and marketing of conversion services immediately and stop all uranium hexafluoride (UF_6) production at its Springfields plant by March 2006. The decision was influenced by the depressed market, at the time, and the fact that Magnox fuel production will cease sometime after 2005. As the production of Magnox fuel and UF_6 share some of the same manufacturing plants it would be uneconomic for the company to continue the UF_6 conversion business beyond 2006. BNFL intends to honour its existing customer commitments and entered into an agreement with Cameco whereby the Canadian company will purchase BNFL’s unsold uranium hexafluoride conversion production.

The withdrawal of BNFL represents a capacity decrease of 6000 tU as UF_6/year, leaving only three major western producers (Comurhex, ConverDyn, Cameco) and Russia. Although this represents a rationalisation of the market and no shortage is expected in the near term, it gives greater importance to the conversion component of secondary sources of supply, particularly the Russian downblended HEU.

Published prices for conversion services continued to increase throughout the year from some US$3.50 to 5.50 at the end of the year, reversing a serious decline which started in 1997 threatening the viability of the industry. Published conversion prices in Europe tended to be somewhat higher than in the USA.

ENRICHMENT

Supply of enrichment (separative work) to the utilities continued steadily. Enrichment capacity world-wide and in the Community in particular exceeds current requirements. As for natural uranium most of the supply to the EU utilities continued to take place under long term contracts.

At the end of the year 2000 USEC filed a petition with the US government for alleged dumping and subsidies against Eurodif and Urenco (see also Chapter 1). The action, which unfolded during 2001, had a significant impact on the market in the near term, caused difficulties to the EU enrichers and unfavourably affected trade relations.

The enrichment prices indicators published in the trade press increased from some $80/SWU to over $100/SWU during the year. This increase took place against the background of the trade disputes in the US, which created uncertainties on the imports of enriched uranium from Europe leaving USEC in a privileged position. The number of new enrichment contracts in Europe was relatively small and not sufficient to draw conclusions on price trends, but price fluctuations were smaller than those observed in the USA due to more stable market conditions.

In France, the CEA announced that research on the SILVA atomic vapour laser isotope separation process will cease by 2003. Instead, the CEA intends to resume R&D work on gas centrifuge technology, which had been suspended in favour of SILVA. This follows USEC's decision in the same sense. The centrifuge process appears to be emerging as the preferred industrial enrichment technology for the foreseeable future.

Urenco continued to expand gradually its enrichment capacity in the EU. At the end of the year Urenco informed the US Nuclear Regulatory Commission (NRC) that, together with US partners in the Louisiana Energy Services (LES) Partnership[1], it intends to submit an application during 2002 for a licence to build and operate an enrichment facility in the United States. The Partnership intends to start the process of site selection and pre-application discussions with the NRC early in 2002. The first cascades of the new enrichment plant could begin operation in 2006 if the NRC licence could be obtained by 2004.

After abandoning the research on AVLIS, USEC considered the possibility of using European or US[2] centrifuge technology for the construction of a new enrichment plant in the US.

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[1] The composition of the partnership in the new venture is yet to be announced. It is recalled that during the nineties Urenco and its partners (Duke Power, Northern States Power, Louisiana Power and Light and Fluor-Daniel) applied for the construction and operation of an enrichment plant to be built in Homer, Louisiana. The application procedure dragged on for several years and after considerable expense the partnership decided to abandon it in 1998.

[2] The USA had a project for a Gas Centrifuge Enrichment Plant but it was abandoned in 1985.

It was reported that USEC has concentrated on US centrifuge technology and might seek to license and construct a commercial centrifuge plant in 2006 to start production by 2008-2009. The capacity of the plant would increase at a rate required to replace the existing gas diffusion plant and the enrichment component of the downblended Russian HEU.

Questions remained on USEC's performance and viability while it continued to search for a settlement with Tenex on the commercial conditions for the enrichment component of the downblended HEU and for a replacement technology for the gas diffusion enrichment plants. After deciding to terminate production at Portsmouth and to concentrate operations at the Paducah plant, the enrichment component of the downblended HEU became a very important source until new enrichment capacity is built in the US. Adding to the difficulties of the company, it was reported that the class action lawsuit brought against USEC and a number of the financial underwriters of its privatisation in 1998 entered the substantive phase. The class action filed in the name of a number of shareholders, which lost money by investing in the company, alleged misrepresentation of adverse facts during the initial public offering.

FABRICATION

Fabrication facilities continued also to provide adequate coverage of the utilities' needs. Mixed oxide (MOX) fuel fabrication continued steadily in Belgium and France.

In October 2001 the UK Government gave formal approval to commence operation of the British Nuclear Fuels plc (BNFL) Sellafield Mox Plant (SMP). Following the approval by the UK Government as to the justification of MOX manufacture as a practice, a number of challenges were initiated in the UK Courts and the International Tribunal of the Law of the Sea in an attempt to overturn that decision and prevent BNFL's Sellafield MOX Plant (SMP) from operating. These challenges were unsuccessful, however, and in December 2001 the UK's Nuclear Installations Inspectorate granted permission for plutonium commissioning to commence, and plutonium bearing materials have now been transferred into SMP.

The Siemens MOX fabrication plant at Hanau received approval to start the dismantling process (see the section on Germany in Chapter 4). This plant was estimated to be 90% complete when the decision was taken to mothball it in 1995.

The Japanese Ministry of Economy, Trade and Industry (METI) laid out new conditions for fuel imports in Japan, which applied to fuel already under fabrication in Europe. In addition, actions by the Japanese authorities have delayed MOX fuel loadings, which will impact to some extent utilities and fuel fabricators. It is understood that the Japanese Government and the utilities remain committed to loading MOX fuel in Japan and are taking action to promote support within Japan.

REPROCESSING

Reprocessing of irradiated fuel continued at the plants at La Hague in France and Sellafield in the United Kingdom.

The industry welcomed the decision by the German Government to authorise the resumption of shipments of spent fuel and high level waste between Germany and both France and the United Kingdom. German spent fuel transports had been suspended since 1998 following cask contamination incidents.

SUPPLY OF MATERIAL FROM THE NEW INDEPENDENT STATES (NIS)

NATURAL URANIUM DELIVERIES[1]

The NIS countries remained the largest source of supply of natural uranium to the EU though their share decreased noticeably. In 2001, EU utilities took delivery from this source of about 4100 tU as natural uranium or feed contained in EUP, including 270 tU as a result of exchanges but excluding re-enriched tails (RET; see table 3).

The lifting of restrictions in the USA on natural uranium originating from Kazakhstan and Uzbekistan reduced the pressure for the sale of NIS origin material in the EU. Most transactions for the supply of Russian natural uranium are linked to enrichment contracts.

The Supply Agency concluded 4 new supply contracts for NIS uranium during the year, for about 1350 tU (including natural uranium feed equivalent contained in EUP) to be delivered over the period 2001-2005. In addition, 3 new supply contracts for the delivery of 760 tU as re-enriched tails in 2002-2004 have been concluded.

Russia was the largest NIS supplier, providing some 3050 tU including 200 tU as a result of exchanges. In addition, some 1050 were delivered to EU utilities following the re-enrichment in Russia of tails on behalf of European enrichers (see table 3).

PHYSICAL IMPORTS OF NIS ORIGIN MATERIAL

Total physical imports from the NIS of natural uranium, re-enriched tails and feed contained in EUP remained stable at some 8600 tU in 2001 (8700 tU in 2000).

As in 1999 and 2000, Russian physical exports to the EU were essentially in the form of feed contained in EUP or re-enriched tails (natural UF_6 equivalent) for western enrichers. NIS natural uranium imports reduced from some 4000 tU in 2000 to about 3200 tU in 2001 due to a drop in the imports from Kazakhstan and Uzbekistan. For the period 1992-2001, imports of natural uranium and feed contained in the EUP from the NIS as well as tails re-enriched in Russia for EU enrichers amounted to a cumulative total of 114,000 tU. From these, 47,500 tU were delivered to EU utilities during the same period (see table 4).

It should be noted that the studies and analysis of NIS imports mentioned here relate strictly to the commercial use and destination of the material. All such imports are subject to Euratom and, as applicable, IAEA safeguards while on the territory of the Member States.

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[1] Data concerning the acquisitions of natural uranium or feed and their origins are based on information communicated to the Supply Agency by EU utilities or their procurement organisations

Table 3: Russian supply of natural uranium and feed contained in EUP to the EU

Year	Deliveries (1)	Exchanges (2)	subtotal (1+2)	Re-enriched tails (3)	Total (1+2+3)	Total as % of supply
1992	1,800	900	2,700	0	2,700	23
1993	1,700	600	2,300	0	2,300	19
1994	1,700	500	2,200	0	2,200	16
1995	4,300	200	4,500	0	4,500	28
1996	5,100	700	5,800	0	5,800	36
1997	3,900	500	4,400	--	4,400	28
1998	3,900	600	4,500	--	4,500	28
1999	3,500	400	3,900	1,100	5,000	34
2000	4,200	0	4,200	1,200	5,400	34
2001	2,850	200	3,050	1,050	4,100	29
Total	32,950	4,600	37,550	3,350	40,900	28

Note: For 1997 and 1998, re-enriched tails are included under Deliveries because quantities were small and could not be shown separately for confidentiality reasons.

Table 4: Physical imports by EU operators, and acquisitions by EU utilities of natural uranium and feed contained in EUP from the NIS (tU)

Year	Physical imports	Acquisitions(1)			
		Quantity tU	as % of supply(2)	incl. RET(3)	incl. RET as % of supply(2)
1992	9,500	2,700	23		
1993	12,100	2,700	22		
1994	12,200	4,500	32		
1995	12,100	5,200	32		
1996	17,600	6,800	43		
1997	12,200	5,000	32	--	--
1998	11,600	5,600	35	--	--
1999	9,400	5,100	34	6,200	42
2000	8,700	5,800	37	7,000	44
2001	8,600	4,100	29	5,100	37
Total	114,000	47,500	33		

Notes:
(1) Acquisitions cover deliveries to EU utilities including exchanges but excluding re-enriched tails except for 1997-1998 as explained under (3).
(2) Supply to EU utilities covers total deliveries to EU utilities under purchasing contracts during the respective year.
(3) Deliveries of re-enriched tails (RET) to EU utilities started in 1997 but were negligible (<1% of total supply) during the first two years. For confidentiality reasons they have been included under "acquisitions" for 1997 and 1998. The figures for 1999 and 2000 include RET acquired as a result of exchanges.

SECURITY OF SUPPLY

Under the present circumstances, no major difficulties are anticipated in the supply of nuclear fuels in the near term. However, the supply and demand for natural uranium and the capacity and availability of the plants concerning the different stages of the fuel cycle need constant monitoring to maintain an adequate level of security of supply.

Massive sales of Soviet and later Russian uranium, the entry of Kazakhstan and Uzbekistan in the market, reduction of utilities' and government inventories and expansion of low cost production, amongst other factors, made the prices for natural uranium drop by more than 50% during the nineties (see Annex 3). The prices tended to become dictated by the lowest rather than the highest cost source. The drop in price, as well as the market saturation caused by excess inventories, led to mine closures, reduced exploration and the postponement of new mine projects.

While there is no shortage of uranium deposits worldwide, the imbalance between current world demand and production of natural uranium is not sustainable in the long run. The lead time needed to adjust production levels to requirements may cause future periods of instability on supply and/or prices.

The rationalisation and concentration, particularly on the conversion industry, gives also some cause for concern. Although nominal capacity is enough to cover world requirements, when BNFL terminates production in 2006 there will be only four major suppliers world-wide. Disruption of the output from one of them may possibly create temporary shortages.

The situation with enrichment is considerably better from an EU standpoint. There are two enrichers with four plants in the Community with a capacity largely exceeding requirements. In the US, projects for one or two new enrichment plants appear promising. However, for the time being, this strategic industry counts only four major suppliers worldwide. Problems with one of them could also affect the existing balance.

For several years the Supply Agency has been recommending the maintenance of stocks of nuclear fuel to avoid the negative effects of supply disruption or shortages. The adequate level of the strategic inventory depends on the risk assessment based on each utility’s specific circumstances such as the size of reactor requirements, contractual portfolio, options and the diversification of sources of supply. It should not be dictated solely by financial considerations, particularly at a time when financial charges may be outweighed by price increases.

Therefore the Supply Agency continues to recommend EU utilities to keep a level of strategic inventories, at all stages of the fuel cycle, consistent with their circumstances. In the case of natural uranium, the equivalent to at least one to two years forward requirements, beyond those of material in processing (“pipeline”), is in general advisable. Furthermore it is recommended that utilities cover most of their needs with diversified primary production sources at equitable prices.

THE POLICY OF DIVERSIFICATION OF SOURCES OF SUPPLY

The Supply Agency continued to apply a policy of diversification of sources of supply in order to ensure that the EU does not become over-dependent on any single source, as described in previous Annual Reports.

After appropriate consultations the Supply Agency amended its policy in the sense of allowing further purchases of fresh production of natural uranium from Kazakhstan and Uzbekistan by the EU utilities. Other elements of the policy remained unchanged.

Considering that the pressure on supply of Russian natural uranium is decreasing, the Supply Agency is considering, in consultation with the industry and its Advisory Committee, to further relax its policy.

The Supply Agency will continue to monitor all sources of supply and, in particular, the total supply from NIS that is by far the largest source as a group. It will reconsider the policy if the global quantity for the group is considered to be too high with regard to the long term security of supply.

SUPPLIES DERIVED FROM DISARMAMENT OF NUCLEAR WEAPONS

ENRICHMENT

USEC continued as executive agent for the disposal of the enrichment component of LEU resulting from the downblending of Russian HEU according to the US-Russia HEU Agreement. Under this agreement USEC purchases the enrichment component and transfers to TENEX a quantity of natural uranium equivalent to the LEU feed component. 904 t LEU derived from 30 t HEU were reported to have been delivered in 2001, as scheduled, bringing the total deliveries since the beginning of the programme to 4147 t LEU derived from 141 t HEU (out of the 500 t HEU foreseen).

Negotiations between USEC and Tenex on the terms of future supplies were reported to continue throughout the year without reaching a conclusion. USEC’s role remained controversial and a number of large US utilities pushed for a more active role possibly by the creation of a second executive agent for the HEU agreement. However, the results sought through these initiatives did not materialise.

On the US side the government declared 174.3 MT HEU as surplus military material. USEC is involved in the disposition of 14.2 MT of HEU in the form of UF_6 (with an enrichment of 75% in U_{235}) and 50 Mt of HEU in the form of oxide and metal. USEC reported that up to the end of 2001 15 MT of HEU had been delivered for downblending and 157.2 MT of LEU had been produced.

NATURAL URANIUM FEED

The sale of the natural uranium feed corresponding to the LEU delivered to USEC is subject to a commercial agreement concluded in 1999 between Cameco, Cogema and RWE Nukem on one side and Minatom and Tenex on the other. This agreement gave the western companies the right to purchase from Tenex part of the natural uranium feed component derived from the downblended Russian HEU.

The option may be exercised for total annual deliveries up to 9200 tU. However sales to end users in the USA are limited by US legislation to an annual quota[1].

In 2001 an amendment was made to the commercial agreement whereby the three western companies effectively agreed to convert the annual purchase options into minimum purchasing commitments. The companies agreed to purchase quantities of natural uranium at least equal to their quota shares each year for the period 2002 through 2013. The quotas are approximately 20,400 tU for both Cameco and Cogema and 6900 tU for RWE Nukem. Tenex has retained the balance, approximately 31,500 tU, for sales through its agent Global Nuclear Services and Supply (GNSS) over the same period.

It was announced that the amendment to the agreement was intended to make its implementation and future supply more predictable. The amount of natural uranium feed remaining unsold will be returned to Russia to be held in a special monitored inventory, it may be used either as blend stock with HEU or for purchase by the western companies in the commercial agreement.

It is recalled that in the EU, the sale of the HEU feed component to the utilities is not subject to specific restrictions. However, considering the logistical situation and cost of transportation to Europe, it is expected that most of the material will be sold in North America. No sales of this material to EU end users were recorded in 2001.

Given the current deficit between world production and requirements for natural uranium, the HEU feed will play a very important role in future supply. Its orderly disposal will be essential to avoid market disturbances.

MOX FROM MILITARY PLUTONIUM

In September 2000, an agreement was signed between the United States and Russia on the disposition of 34 tonnes of weapon plutonium by each party. A special Working Group was established, in which the Commission was represented, with the aim of preparing a disposition programme. The group reached a consensus on a paper for the Russian plutonium programme for the G8 Summit in Genoa (Italy) in July. However no breakthrough on the financing was reached during the year.

Financing of the Russian programme, estimated at some US$ 2 billion, remained one of the most difficult problems as the donor countries were not prepared to finance it to such an extent. Several commercial financing schemes, including the sale or leasing of MOX to western utilities, continued to be considered.

Beyond the availability of funding, the implementation of the programme in Russia in the medium term would be facilitated by the utilisation of equipment from the mothballed Siemens MOX fabrication plant at Hanau, Germany, which would be exported to Russia. However, in the absence of a firm decision on the matter, Siemens started the process to dismantle the plant and that being the case the Russian programme may suffer further delays.

[1] The quota started at 769 tU equivalent in 1998, reached 3077 tU in 2001 and continues to increase up to 7690 tU in 2009 and remains at this level until 2012. In 2013, the last year of the agreement, it will be limited to 6000 tU

In the US, the Department of Energy (DOE) confirmed that it would also concentrate its efforts on disposal of the surplus military plutonium through its use in MOX, and that it would not pursue other alternatives (including the immobilisation route) for the material which might be used as nuclear fuel. A MOX Fabrication Fuel Facility will be built in the USA for the purpose by a consortium composed of Duke Engineering & Services, Cogema and Stone & Webster (DCS).

RESEARCH REACTORS FUEL CYCLE

Research reactors continued to be supplied regularly with fresh fuel during the year.

At the end of the year Russia completed the review procedure of a draft framework agreement for possible supply of HEU for the JRC reactor at Petten in the Netherlands. The European Commission Joint Research Centre (JRC) confirmed to the USA its intention to convert the High Flux Reactor (HFR) to LEU but will need HEU until the conversion is completed.

The new German research reactor FRM-2 in Garching continued to wait for the third and final partial licence to start operation. The Federal Ministry of Environment and Nuclear Safety (BMU) decided to hold the licence on the basis that it requires further information on the safety case.

International co-operation continued in order to find new processes which would allow the fabrication of fuels and targets with LEU to replace HEU without major penalties to the operators. Test results are encouraging but it will take several years before the research will be complete and the new fuels will be licensed and deployed.

It is recalled that the policy which allows the return of spent research reactor fuels to the US-DOE is due to expire in 2006 and is not expected to be renewed, therefore it is becoming increasingly urgent to establish alternatives, particularly for LEU silicide fuels currently used in research reactors which cannot be reprocessed at present. For those operators of research reactors who will not be able to return their spent fuel to the US, offers by Russia could provide a potential solution (see also the section on Storage of spent nuclear fuel in Russia, Chapter 1). Such a solution, respecting current legislation, could be particularly interesting for those countries which do not have an established nuclear power programme and no repositories in which to dispose of their very limited amounts of irradiated fuel.

Cogema continued to offer to reprocess HEU fuels by diluting them with commercial LEU fuels at its plant in La Hague.

The European Parliament adopted the new Euratom research programme for the years 2003-2006 with particular support for research on thermonuclear fusion. The programme covers also areas as radioactive waste management and reactor safety.

CHAPTER 3 - EU SUPPLY AND DEMAND IN 2001

This chapter aims at presenting an overview of supply and demand for nuclear fuels in the European Union. As before this is based on information provided by the EU utilities or their procurement organisations concerning the amounts of fuel loaded into reactors, estimates of future fuel requirements, and on quantities, origins and prices of acquisitions of natural uranium and separative work.

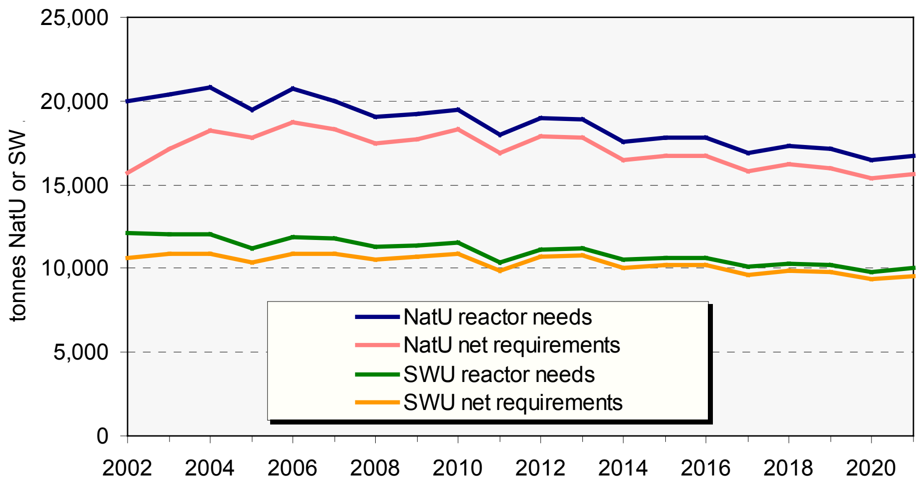
FUEL LOADED INTO REACTORS

During 2001, about 2800 tU of fresh fuel were loaded in EU reactors (including Magnox reactors) containing the equivalent of 20,300 tU as natural uranium and 11,100 tSW; most tails assays were in the range of 0.25 – 0.35 %. This represents an increase of more than 10% relative to last year.

REACTOR NEEDS / NET REQUIREMENTS

Estimates of future EU reactor needs and net requirements for uranium and separative work, based on data supplied by EU utilities, are shown in graph 1 (see Annex 1 for the corresponding table). Net requirements are calculated on the basis of reactor needs less the contributions from currently planned uranium/plutonium recycling, and taking account of inventory management as communicated to the Agency by utilities.

Graph 1: Reactor needs and net requirements for uranium and separative work



Average reactor needs for natural uranium over the next 10 years will be 19,700 tU/year, while average net requirements will be about 17,600 tU/year. Relative to 2000, average future reactor requirements decreased by some 1200 tU/year on average.

Average reactor needs for enrichment over the next 10 years will be 11,600 tSW/year, while average net requirements will be in the order of 10,700 tSW/year. Relative to 2000, future enrichment needs decreased by some 600 tSW/year.

NATURAL URANIUM

CONCLUSION OF CONTRACTS

The number of contracts and amendments relating to ores and source materials (essentially natural uranium) which were dealt with in accordance with the Supply Agency's procedures during 2001 is shown in table 5. Transactions totalled approximately 22,100 tU, some 3700 tU of which were the subject of new purchase contracts by EU utilities (spot and multiannual). Amendments to existing contracts resulted in an increase of some 1200 tU of the total quantities contracted.

Table 5: Natural uranium contracts concluded by or notified to the Supply Agency (including feed contained in EUP purchases)

Contract Type	Number	Quantity (tU)(1)
Purchase (by a EU utility/user)		
- multiannual (2)	4	2,500
- spot (2)	9	1,200
Sale (by a EU utility/user)		
- multiannual	0	0
- spot	5	300
Purchase-sale		3,500
- between EU utilities (Spot)	2	
- between intermediaries (3) (Multiannual)	3	
- between intermediaries (3) (Spot)	5	
Exchanges and loans(4)	20	14,600
TOTAL (5)	48	22,100
Amendments to purchasing contracts (6)	7	1,200

Notes:
(1) In order to maintain confidentiality the quantity has been indicated only when there were at least 3 contracts of each type, but all quantities have been included in the total.
(2) Multiannual contracts are defined as those providing for deliveries extending over more than 12 months, whereas spot contracts are those providing for either only one delivery or deliveries extending over a period of a maximum of 12 months, whatever the time between the conclusion of the contract and the first delivery.
(3) Purchases/sales contracts between intermediaries - both buyer and seller are not EU utilities/end users.
(4) This category includes exchanges of ownership and U_3O_8 against UF_6. Exchanges of safeguards obligation codes and international exchanges of safeguards obligations are not included.
(5) The total includes 7 contracts of less than 10 tU each.
(6) The quantity represents the net increase (or decrease) in material contracted for.

Some 3500 tU transacted related to purchases between producers, intermediaries or between EU utilities. An additional 14,600 have been transacted under exchanges and loans. In comparison with last year, the total amounts contracted have increased but the quantity under new purchasing contracts by utilities was somewhat lower than in 2000 and relatively small when compared with the Community’s yearly reactor requirements.

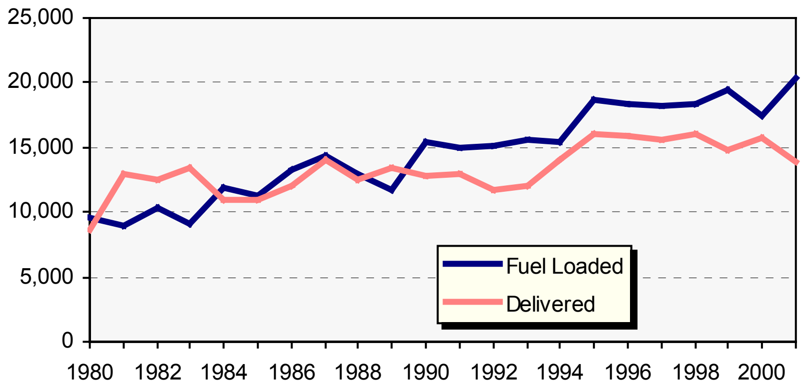
VOLUME OF DELIVERIES

During 2001, natural uranium deliveries to EU utilities amounted to approximately 13,900 tU compared with 15,800 tU in 2000. Deliveries under spot contracts represented only 4% of the total (12% in 2000).

The deliveries taken into account are those made to the EU utilities or their procurement organisations (excluding research reactors); they include also the natural uranium equivalent contained in enriched uranium purchases.

Deliveries and fuel loaded into reactors by EU utilities since 1980 are shown in graph 2. The corresponding table is in Annex 2. The difference between deliveries and the amount of fuel loaded can be explained by the use of reprocessed uranium and drawing down of inventories.

Graph 2: Natural uranium feed contained in fuel loaded into EU reactors and natural uranium delivered to utilities under purchasing contracts (tU)



AVERAGE PRICES OF DELIVERIES

The deliveries taken into account in the average price calculations are those made to the EU utilities or their procurement organisations under purchasing contracts; they include also the natural uranium equivalent contained in enriched uranium purchases. Excluded from the calculations are a number of contracts where it was not possible to establish reliably the price of the natural uranium component (e.g. some cases of enriched uranium deliveries priced per kg EUP). To calculate the average price, the original contract prices are converted (using the average annual exchange rates as published by Eurostat) into € per kgU in U_3O_8 and then weighted by quantity.

Prices for deliveries under multiannual contracts (i.e. providing for deliveries extending over more than 12 months) were expressed in 6 different currencies (€, French franc, German mark, British pound, US $, and Canadian $).

The average price of such deliveries in 2001, rounded to the nearest ¼ euro was:

€ 38.25 /kgU contained in U_3O_8 (€ 37.00/kgU in 2000).

Spot contracts are those providing for either only one delivery or deliveries extending over a period of a maximum of 12 months, whatever the time between the conclusion of the contract and the first delivery.

The spot price for 2001 was calculated on the basis of an exceptionally low total volume of only some 330 tU under 4 transactions, one of which accounted for two thirds of this quantity. Some 300 tU were delivered as UF_6 without a price being specified for the conversion component. To establish a price excluding conversion costs for these deliveries, the Supply Agency applied an estimated average conversion price of € 5.70/kgU (US$ 5.10/kgU).

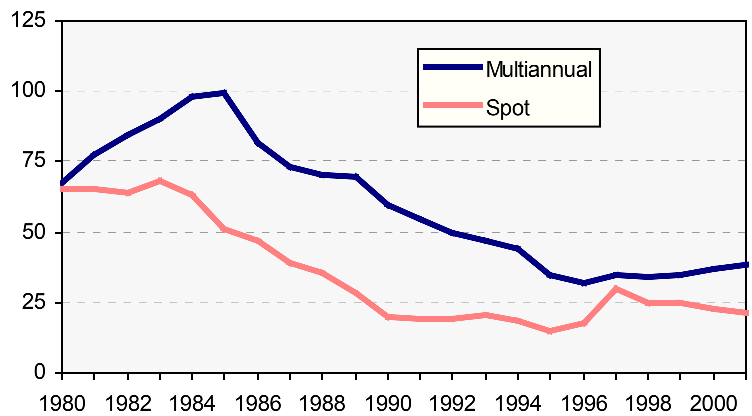
On this basis, the average price of material delivered in 2001 under spot contracts was as follows:

€ 21.00 /kgU contained in U_3O_8 (€ 22.75/kgU in 2000)

PRICE HISTORY

Graph 3 shows the ESA average prices for natural uranium since 1980; the corresponding data are presented in Annex 3 (note: the euro replaced the ECU on 1 January 1999 with a conversion rate of 1:1).

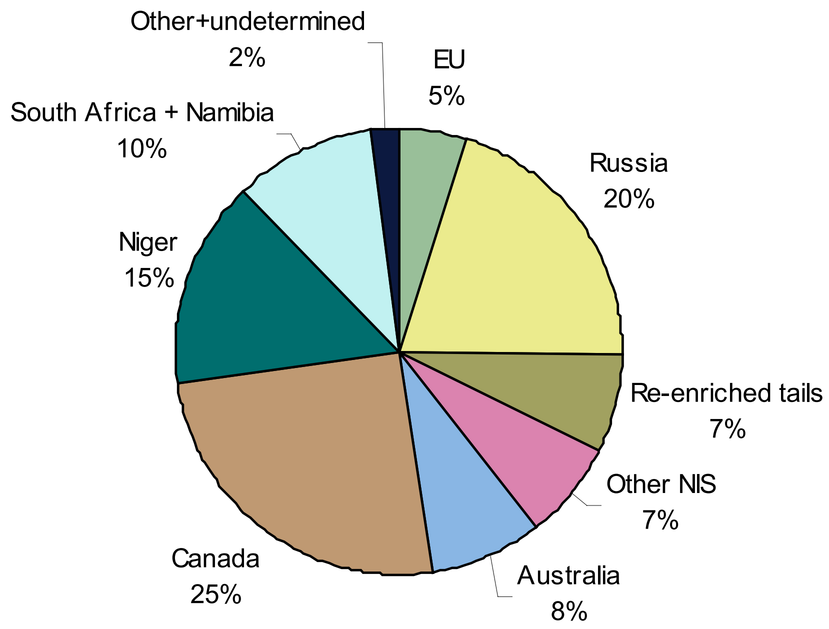
Graph 3: Average prices for natural uranium delivered under spot and multiannual contracts, 1980-2001 (€/kgU)



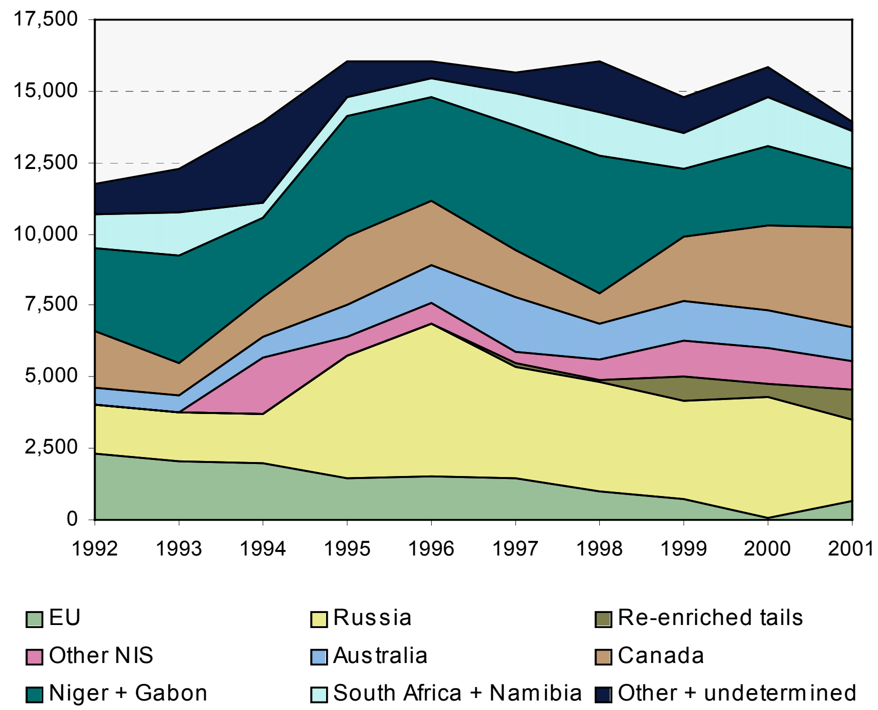
ORIGINS

EU utilities or their procurement organisations obtained in 2001 the vast majority of their supplies from 11 countries outside the EU. Supply from within the EU represented some 5%. The largest supplier was Canada, which provided some 25% followed by Russia with 20% (see graph 4). When adding the re-enriched tails, the share of Russia would amount to 28% of supplies.

Graph 4: Origins of natural uranium delivered to EU utilities in 2001 (% share)



Graph 5: Purchases of natural uranium by EU utilities by origin, 1992-2001 (tU)



SPECIAL FISSILE MATERIALS

CONCLUSION OF CONTRACTS

The number of contracts and amendments relating to special fissile materials (enrichment, enriched uranium and plutonium for power and research reactors) which were dealt with during 2001 in accordance with the Supply Agency's procedures is shown in table 6.

Table 6: Special fissile material contracts concluded by or notified to the Supply Agency

Contract Type (1)	Number
A. Special Fissile Materials	
Purchase (by a EU utility/user)	
- multiannual	1
- spot	11
Sale (by a EU utility/user)	
- multiannual	3
- spot	14
Purchase-sale (between two EU utilities/end users)	
- multiannual	0
- spot	8
Purchase-sale (intermediaries)	
- multiannual	3
- spot	26
Exchanges	4
Loans	0
TOTAL, including (2)	80
- Low enriched uranium	49
- High enriched uranium	10
- Plutonium	24
Contract amendments	10
B. Enrichment contracts (3)	
Multiannual	6
Spot	0
Contract amendments	18

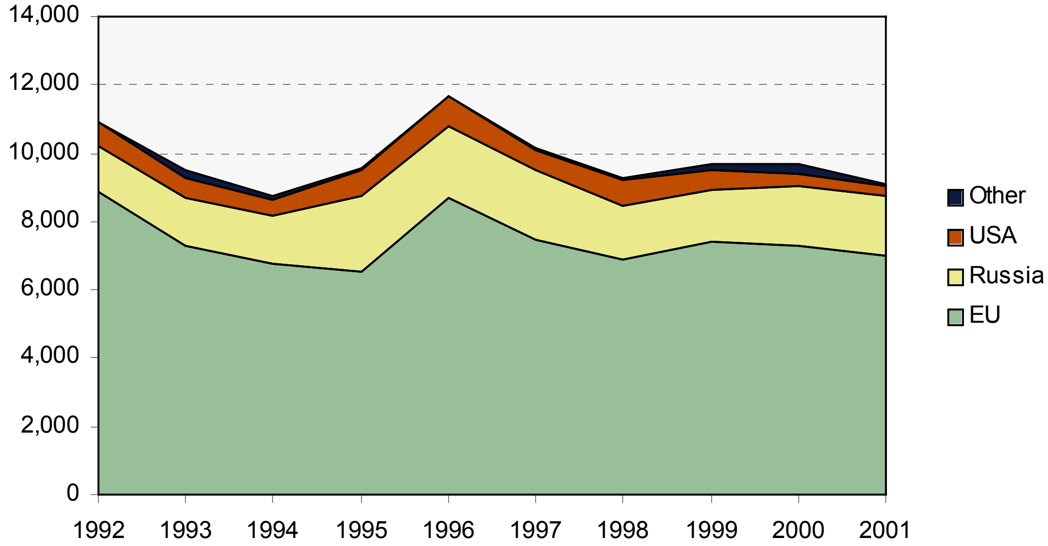
Notes:
(1) See explanations under table 5, as appropriate.
(2) Some contracts may involve both LEU and plutonium or HEU and plutonium. In addition there were 32 transactions for small quantities (Art 74 of the Euratom Treaty) which are not included here.
(3) Contracts with primary enrichers only.

DELIVERIES OF LOW ENRICHED URANIUM (LEU)

In 2001, supply of enrichment services (separative work) to EU utilities totalled approximately 9100 tSW, delivered in 1800 tLEU which contained the equivalent of some 14,600 tonnes of natural uranium feed. Some 77% of this separative work was provided by EU companies (Eurodif and Urenco). Deliveries of separative work under spot contracts were in the order of 3%.

Deliveries of Russian separative work under purchasing contracts represented 19% of the total. Supplies from the USA accounted for some 3**%.** Supply of enrichment to EU utilities by origin since 1992 is shown below.

Graph 6: Supply of enrichment to EU utilities by origin, 1992-2001



ENRICHED URANIUM FOR RESEARCH REACTORS

Enriched uranium for research reactors is normally supplied in two enrichment assays: just under 20% (LEU) and about 90% (HEU). Although the quantities involved represent a minor amount in terms of EU needs for enriched uranium, LEU and HEU supply is very important to the scientific community and for the production of isotopes for medical and industrial applications.

Supply of LEU to research reactors continued unhindered. Reactor requirements for HEU were met, but the source of future supplies continued to be the object of considerable attention (see also Chapter 2). The Supply Agency continued to provide support to reactor operators in the procurement of fuels.

PLUTONIUM AND MIXED-OXIDE FUEL

In 2001, transactions involving plutonium were again mainly related to its use for MOX fuel fabrication, and the Supply Agency concluded 24 such contracts.

The use of MOX has contributed to a significant reduction in requirements for natural uranium and separative work in recent years. However, reprocessing and the use of MOX fuels continue to face increased difficulties because of the political decisions in some countries to postpone or to abandon this solution for the management of irradiated fuels.

The quantities loaded into EU reactors and the estimated savings from the use of MOX fuel are shown in table 7. It should be noted that published figures on natural uranium and separative work savings vary considerably; here, it was assumed that 1 tPu saves the equivalent of 120 tU as natural uranium and 80 tSW.

Table 7: Utilisation of plutonium in MOX in the EU and estimated natural uranium and separative work savings

Year	kg Pu	savings	
		t NatU	t SW
1996	4,050	490	320
1997	5,770	690	460
1998	9,210	1,110	740
1999	7,230	870	580
2000	9,130	1,100	730
2001	9,070	1,090	725
	44,460	5,350	3,555

COMMISSION AUTHORISATIONS FOR EXPORT

The authorisation of the Commission is required for the export of nuclear materials produced in the Community, according to the provisions of Article 59(b) of the Euratom Treaty (and Article 62.1 (c) in the case of special fissile materials). Requests for these authorisations are submitted to the Commission by the Supply Agency.

During 2001, 2 authorisations were granted by the Commission for the export of enriched uranium.

CHAPTER 4 - DEVELOPMENTS IN MEMBER STATES[1]

BELGIË/BELGIQUE - BELGIUM

ENERGY POLICY

With respect to the liberalisation of the electricity market, the following important facts have to be mentioned: a) the general structure of the transport tariffs has been fixed; and b) the technical regulation for the management of the transport grid and its access has been drawn up.

An agreement in principle has been reached between the Belgian State and the electricity sector on:

- The financing of old nuclear facilities. As already fixed in principle in 1990, the Belgian State will continue to pay the dismantling of the old Eurochemic plant, while the electricity sector will pay the whole dismantling of the old Waste Department of the CEN·SCK and 25 % of the dismantling cost of the BR3-reactor.

- The management of the provisions for the dismantling of the nuclear power plants and for the management of the spent fuel. All provisions are to be centralised at Synatom, in which the Belgian State has a golden share, by which it can block any decision of the governing board of the company. The provisions are to be supervised by a committee of government representatives.

The law of 15 April 1994 on the protection of the population and the environment against the dangers of ionising radiation and on the Federal Agency of Nuclear Control, which has been partly in force for some years, has now come completely into force. The Federal Agency of Nuclear control, now regrouping in one entity all services which previously had some competence in nuclear safety, has now become fully operational.

NUCLEAR ELECTRICITY GENERATION

In 2001 Belgium's nuclear power plants (including the French share of Tihange 1) generated about 44,2 TWh. This is 3,4 % lower than in 2000. One of the reasons is the prolonged outage of Tihange 2 for the replacement of its steam generators. In spite of this decrease, the nuclear share in the country's total electricity production in 2001 has risen to 58,2 % (there has been a considerable decrease of the total production). The load factor of Belgium's nuclear power plants reached 88,1 %.

FUEL CYCLE DEVELOPMENTS

The production of MOX fuel by Belgonucleaire in its Dessel plant amounted to 36 tonnes in 2001, to be used in Belgian and German plants. 8 fresh MOX fuel elements were loaded in 2001 in the Doel 3 unit, bringing the cumulative total of loaded fresh MOX elements for the whole of Belgium to 104.

[1] This chapter comprises contributions made by the Member States.

Apart from the plutonium-recycling Belgium also recycles the uranium recovered from the reprocessing of its spent fuel. At the moment the core of the Doel 1 unit is completely loaded with re-enriched reprocessed uranium. Until now seven reloads have been manufactured with this type of uranium for the Doel 1 unit.

In the course of 2001 a third shipment of vitrified high level waste took place from La Hague to the temporary storage building of the Belgoprocess site at Dessel.

Work on the optimisation of the conditioning process of spent fuel continued. The studies were focused on the feasibility of the encapsulation of four spent fuel elements in a purposely designed “bottle”.

With regard to R&D on geological disposal of conditioned spent fuel and high level, medium level and long-lived waste, the extension of the existing underground laboratory is continuing. After the completion of the second access shaft, the construction of the connecting gallery between this shaft and the existing laboratory will start in early 2002. Perpendicular to this connecting gallery, a disposal gallery is foreseen. The purpose of this gallery is to demonstrate the feasibility of the underground disposal of high level waste, the concept of which will be revised before the construction works can start.

The SAFIR 2 report, giving an overview of the results obtained so far and indicating future R&D orientations, has been completed. It confirms that the disposal of radioactive waste in deep clay layers is a good technical and safe solution, but that much optimisation of this solution has still to be done.

During 2001, 204 spent fuel elements were placed in 6 dry storage containers in the interim storage building at Doel. This brings the total to 1038 spent fuel elements placed in 37 containers. At Tihange, 180 spent fuel elements were placed in the wet storage building, which brings their total to 815.

The work programme with respect to the disposal of low-level and short-lived waste has continued. Concept improvement studies of the near surface disposal were executed and the geological disposal concept in deep clay layers was further developed. The two local partnerships at Mol and Dessel and the accompaniment committee at Fleurus-Farciennes have followed very closely the activities of ONDRAF/NIRAS, in particular those with respect to siting, safety and environment. At the end of the year 2001 an overview report, describing the progress reached with the work programme, was under preparation. This report will be submitted to the government.

RESEARCH

The BR2 reactor at the Nuclear Research Centre at Mol continued its operation according to a schedule of 105 equivalent full power days. In the BR2 several scientific irradiation programmes have been executed. These relate to the safety of high burn-up MOX fuel, irradiation assisted stress corrosion cracking, power transients of BWR MOX fuel, advanced nuclear fuel studies, testing of reactor alloys and fusion materials. The BR2 has continued the production of radio-elements and silicon doping.

Several studies have taken place with respect to the behaviour of materials under irradiation in the core of light water reactors, especially the reactor pressure vessel steel. Work was also done on reactor physics, such as burn-up credit experiments and investigation of the behaviour of military plutonium in the VENUS critical facility.

The pre-design study of the accelerator driven system (ADS), called Myrrha, for multiple purposes (amongst which research on transmutation of minor actinides), is ready and is now undergoing an external review, which should be ready mid 2003. Parallel to the study several R&D-projects are being executed, mostly within the European framework programme.

In the course of 2001 three shipments of spent fuel from the BR2 reactor have taken place to La Hague for reprocessing, in the framework of a contract concluded in 1997.

DANMARK - DENMARK

The Danish energy policy is aimed at the following main objectives:

- environmental impact as a result of electricity and heat production is to be reduced considerably
- comprehensive electricity and heat conservation is expected to be implemented
- the bulk of the country's future heat demand and electricity consumption is covered by combined heat and power
- renewable energy and natural gas replace coal and oil.

Denmark has no nuclear power plants. The existing relatively small amount of Danish radioactive waste arises mainly from the operation of research reactors and from post-irradiation characterisation of experimentally produced fuel elements in the period 1970 to 1990 at Risø National Laboratory. In 2001 there were no reactors in operation at Risø National Laboratory. A 10 MW heavy water moderated reactor, DR3, used for basic research, silicon doping, and isotope production, and a small homogenous reactor, DRI, used for educational purposes, have been stopped permanently. Another research reactor, DR2, has been decommissioned to stage 2, just as the Risø hot cells used in the post irradiation studies have been.

Responsibility for the closed facilities and the remaining operating nuclear facilities, e.g. the waste management plant, will be transferred to a new organisation: Danish Decommissioning, established under the Ministry for Science., Technology. and Innovation. The organisation will take care of planning and practical work in connection with future removal of the nuclear facilities. A Danish repository for low- and intermediate level waste will be needed in this context, but at the end of 2001 there were no concrete plans for such a facility.

The remaining spent fuel from DR3 will be sent by ship to the United States according to the US policy for research reactor fuel of US origin. There are no plans for disposal of high-level waste in Denmark.

Low-level waste (LLW) and intermediate level-waste (ILW) are collected, treated and stored in two intermediate storage facilities situated at Risø. Solid LLW is compacted in drums and liquid ILW is treated in an evaporator and a bituminisation plant. Between 1/2 and 2/3 of the LLW is produced by Risø National Laboratory, the rest comes from hospitals, industry, laboratories and other users of radioactive isotopes in Denmark. At the end of 2001 about 4,750 drums were being stored in the facility for LLW. The facility has a capacity of about 5,000 drums. Decommissioning waste is expected to dominate future waste generation.

The storage facility for ILW is also used for long-lived ILW. At the end of 2001 about 130 m^3 long-lived ILW and LLW were being stored in the facility.

DEUTSCHLAND - GERMANY

The 19 nuclear power plants for general supply connected to the grid in Germany produced about 170.2 TWh of electricity (gross) in 2001. To this should be added small amounts of electricity for the railway system and heat exchange. This is the best result since the use of nuclear energy started in Germany and can be attributed to a further increase in the availability of German nuclear power plants, small increases in output and the fact that there were no outages of any significant duration, except in plants KKI 1 and KKP 2. Nuclear power's share in public electricity supply remained at about a third.

In an amendment to the Nuclear Power Act, the memorandum of understanding agreed between the German Government and the four largest users of nuclear energy in 2000 was transposed into law in 2001. The most significant features are definition of the amounts of electricity still to be produced, calculated on the basis of an estimated total lifetime of 32 years for the plants, a ban on the transportation of spent fuel elements for reprocessing from the middle of 2005, the building of interim storage facilities at reactor sites for spent fuel elements containers, and an increase in insurance cover to €2.5 billion.

The industry has made further progress with the development of a European Pressurised Water Reactor (EPR), together with the French partners, and an innovative boiling water reactor with passive components to control failures.

In April 2001, the transportation of spent fuel elements for reprocessing, which had been suspended following instances of contamination reported in 1998, could be resumed. All transports proceeded without contamination. Because of the tense situation regarding authorisation and validation and the fact that escorts were needed for protection, less than half of the originally planned transports could be carried out.

Conversely, return transports of vitrified high-level waste to the interim storage facility in Gorleben (BLG) after reprocessing in France are now routine: In spring and autumn, six containers were taken to BLG, albeit under police protection. There are now 20 containers in the store. The extent of use of the central interim storage facilities in Ahaus remained unchanged.

The URENCO enrichment plant in Gronau achieved a capacity of 1350 tonnes of uranium separation in 2001 through the addition of further centrifuges. The plant continues to operate at nearly 100% capacity. The expansion to 1 800 tonnes SWU/year continues according to plan.

As in 2001, the ANF fuel fabrication plant in Lingen, a subsidiary of Framatome ANP GmbH, ran at 100% capacity. Co-operating with the fuel fabrication plants FBFC in Romans, France, and Dessel, Belgium, Framatome ANP has been able to make all its deliveries of uranium fuel elements for BWR and PWR to its West European clients. The entire ANF fleet of transport containers for unspent BWR and PWR fuel elements has been approved under the new IAEO regulations ST-1. For this, considerable effort (testing) was necessary.

There have been no changes this year at the pilot conditioning installation (PKA) in Gorleben, which is ready for operation. At present, the use of this plant is limited to repairing damaged containers for spent fuel elements and radioactive waste.

The German government does not think that the final waste storage facility at Morsleben will be used again. Its operations are now limited to the safe storage of radioactive waste and to necessary maintenance. Plans for the decommissioning of the plant and the planning procedure necessary for this are being prepared.

There were no changes in 2001 to the status of the planning procedure for Project Konrad for the final storage of radioactive waste with negligible development of heat. The competent authorities in Lower Saxony have announced that approval will be given in March 2002.

There were no changes to the political situation of the final waste storage plant in Gorleben in 2001. The report for the year 2000 still applies with no changes; the exploratory work has been suspended and the mine has since been kept in operational order.

Work to empty the MOX processing plant in Hanau has been successfully finished on time after three and a half years. This represents the end of the first stage of closing down the plant. On 18 July 2001 the last pellets of MOX material were pressed. The following day, the sintering furnace was finally switched off. There are currently about 1.4 tonnes of plutonium in the nuclear fuel installation in Hanau, of which about 1.1 tonnes are fuel elements, which were originally intended for the fast-breeder reactor in Kalkar and no longer have any use. The first part of the approval for dismantling the processing plants and their supply and waste disposal facilities was given in May 2001.

Decommissioning at the Karlsruhe reprocessing facility has been suspended since July 2001 because of a reportable event, in which an employee of another firm illegally took radioactive material containing plutonium. The remote-controlled dismantling of the equipment in the cells of the processing building was successfully completed in February 2001.

ELLAS - GREECE

ELECTRICITY PRODUCTION

The development of the Greek energy system during the last 30 years is characterised by strong efforts to minimise the dependence of the country on imported energy sources. In the electricity generation sector this policy was implemented mainly by the exploitation of domestic lignite deposits and the development of hydropower plants along the rivers of the country. The Greek electricity system amounts to 10,419 MW of installed power stations. It consists of an interconnected system on the mainland (9,385 MW total capacity) and autonomous systems on the islands, mainly the Crete and Rhodes stations, but also many small generating facilities on other islands (1,034 MW in total).

Lignite is the main energy source used for electricity production with 4,900 MW of lignite fired power plants installed at present. Hydro and oil are the other two major alternative energy sources of the Greek electricity production industry amounting to 2,727 and 2,046 MW of installed power respectively. Natural gas has a smaller presence with 720 MW. The contribution of renewable energy sources to the Greek energy system -excluding hydro- is still limited. However a total capacity of 26 MW of wind farms has already been installed and a more intensive exploitation of wind energy is foreseen for the future. Greece has no plans for the time being to employ nuclear power.

Concerning electricity production, 66.7 % comes from lignite fired power plants, while oil and hydro amount to 17.3 % and 9.9 % respectively.

RESEARCH REACTORS

Greece has one research reactor located in the premises of the "Demokritos" National Centre for Scientific Research, within the limits of the Athens region. The Greek Research Reactor is a typical 5 MW open-pool type, light water moderated and cooled research reactor with MTR type fuel elements.

The reactor is currently operating with a mixed core of low enriched uranium fuel containing 20% of U_{235}, and high enriched uranium fuel containing about 93% of U_{235}. Spent fuel is sent to the USA under an agreement which provides for such transfers until May 2006.

Two subcritical assemblies are also being used for educational purposes at the National Technical University of Athens and the University of Thessaloniki respectively.

ESPAÑA - SPAIN

ENERGY POLICY

Spanish energy policy is based on Law 54/1997 on the electricity industry and Law 34/1998 on hydrocarbons, as well as on derivative legislation from both of them.

The policy's main thrust is gradual deregulation of the markets with a view to ensuring supply and quality, always at the lowest possible cost, while at the same time seeking to improve energy efficiency in order to reduce consumption and protect the environment.

In accordance with the above legal bases of energy policy, Spain's electricity industry has introduced the principles of freedom of contracting and freedom of establishment in power generation, transportation and distribution.

One achievement that should be mentioned in connection with energy policy in 2001 is the agreement reached between Spain and Portugal to create the Iberian Electricity Market, deregulated on 1 January 2003.

NUCLEAR GENERATION

Gross nuclear electricity production in Spain in 2001 was 63 705 GWh, or about 29 % of total national electricity production. Nuclear power plant operation has been satisfactory, as in previous years, having achieved an average load factor of 93.1% and an average availability factor of 94.8%.

During the year capacity increases were authorised of 12.41 MWe for unit II of Ascó nuclear power plant and 5.41 MWe for Vandellós II nuclear power plant, in both cases by modifications to the secondary circuit. This has brought Spain's rated nuclear power plant capacity to 7 815.8 MWe.

In 2001 the operating licences for Cofrentes nuclear power plant and the two Ascó units were renewed, in each case for ten years.

NUCLEAR FUEL CYCLE

FIRST PART

At the Quercus uranium mill owned by ENUSA Industrias Avanzadas S.A. only 35 tonnes of U3O8 were produced in 2001, as a result of residual mining activities, since by the end of 2000 production at the mine, on the same site as the Quercus plant, was considered to be over because resources which are economic at current market prices had been worked out.

The nuclear fuel plant at Juzbado (Salamanca), also the property of ENUSA Industrias Avanzadas S.A., continued manufacturing PWR and BWR type fuel assemblies in 2001 for nuclear power plants in Spain and other European countries. In that year it produced 703 fuel assemblies containing 207 tonnes of uranium: 393 fuel assemblies for PWR plants and 310 for BWR. About half of the fuel assemblies produced were exported to Finland, Belgium, Germany and Sweden.

SECOND PART

By Ministerial Order of 5 October 2001, the medium and low-level solid radioactive waste storage installation at Sierra Albarrana (El Cabril) owned by Empresa Nacional de Residuos Radiactivos S.A. (ENRESA) was granted a licence to operate until the present storage cells are filled. In the course of 2001 the site received 238 consignments of waste, placing 402 containers in storage. By 31 December 2001 there were 3 646 containers in storage and the storage space was 41% full; it is expected to be completely full by 2016.

Work at the Trillo nuclear power plant on building the facility for temporary storage of the plant's spent fuel in metallic containers is nearing completion. This work was started in December 1999. By the end of 2001 the project will be 98% finished and completion is expected by February of this year. Storage operations will begin in the course of this year once the necessary licence has been granted.

The dual-purpose metal containers (for storing and transporting spent fuel elements) to be used in the Trillo nuclear power plant's storage facility are made by Equipos Nucleares S.A. in Santander. The first two have already been made and another six are in various stages of manufacture; two are to be delivered in 2002r and the other four in 2003.

DECOMMISSIONING

The work on decommissioning Vandellós I nuclear power plant which was authorised at the beginning of 1998 is continuing. By 31 December 2001 the project was 80% complete, slightly ahead of schedule. Completion of the work authorised, meaning that "level 2" will have been reached, is planned for the end of 2002, when the estimated 30-year waiting time will begin. The most important tasks carried out in 2001 were: dismantling of active components, declassification of materials, decontamination of walls, reclassification of active zones, demolition of conventional buildings and assembly of the new reactor building protection.

In November 2001 work began on dismantling the ARGOS experimental reactor at the Catalonia Polytechnical University in Barcelona and completion is expected about the middle of this year.

DEVELOPMENT OF LEGISLATION

In July 2001 the Regulation on health protection against ionising radiation was passed by Royal Decree; together with the Regulation on nuclear and radioactive installations passed in 1999 this fully transposes Directive 96/29/Euratom laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation.

FRANCE

HIGHLIGHTS

At 31 December 2001, the French nuclear facilities numbered 58 pressurized water reactors in operation (34 of 900 MW, 20 of 1,300 MW and 4 of 1,450 MW) and one fast breeder reactor (Phénix, 250 MW).

The reorganization of the French nuclear industry structure was achieved during the year 2001.

As a first step, the merging of Framatome and Siemens nuclear activities was finalized with the creation of Framatome ANP in January 2001, which has become the world leading company for the engineering and maintenance of reactors and for the supply of nuclear fuel assemblies, especially for pressurized water reactors.

The final step has been the foundation of AREVA in September 2001, as a holding gathering CEA-Industrie, COGEMA, Framatome ANP and FCI (connectics). Concerning the nuclear industry sector within AREVA, it gathers two parts: on one side activities dealing with the front end and back end of the fuel cycle with COGEMA, on the other fuel assemblies supply and activities concerning reactors with Framatome ANP.

Research on nuclear waste management continued in 2001. Concerning studies in deep geological layers, the drilling of an underground laboratory shaft in a clay formation in Eastern France was continued. ANDRA, the National Radwaste Agency, is conducting scientific observations in order to assess the hydrological and mechanical qualities of the geological structure of this location, and it issued a first intermediate report on the progress of this research programme and set the schedule in order to present a final report to the Government in 2005.

Concerning the other waste management research programmes, the CEA demonstrated the feasibility of advanced partitioning of minor actinides, and presented a report to the Government on the concept of long term surface or sub-surface storage.

NUCLEAR POWER AND ELECTRICITY GENERATION

Gross national consumption of electricity rose to 452.5 billion kWh, an increase of 2.7% compared with 2000. The export balance amounted to 68.4 TWh (2000: 69.4 TWh). Total net production of electricity rose to 526.7 billion kWh, i.e. 1.9% more than in 2000.

401.3 billion kWh were produced by nuclear power plants, representing approximately 76% of domestic production. Thermal production from fossil fuels was 46.1 TWh, a decrease of 7.6% compared with 2000. Hydroelectric production increased by 10.8% compared with 2000 and amounted to 79.3 TWh.

As regards nuclear operation, 2001 showed an increase in availability factor, which was 81.1% compared to 80.8% in 2000.

A new daily peak of domestic consumption was reached on December 17, 2001, due to cold weather conditions, and amounted to 77.1 GW. The previous record was established on January 12, 2000 at 72.4 GW.

The programme of testing and removing vessel heads was carried forward. At the end of 2001, 41 vessel heads had been replaced.

At the end of 2001, 20 reactors were operating with MOX fuel.

URANIUM MINING

In 2001, the national uranium production amounted to 194 tU in concentrates, 39.2% down as compared with 2000. The last national mine in production was closed by mid 2001.

Production managed by COGEMA in Canada amounted to about 5,123 tU. The Cluff Lake closure is now postponed to 2002 due to the occurrence of high grade ore in 2000. McClean Mill performed at nominal capacity throughout the year. COGEMA's share of McArthur River and Key Lake production was 2,061 tU.

In Niger, the production was 2,919 tU, close to the 2000 figure.

URANIUM CONVERSION

In 2001, the two COMURHEX plants of Malvesi and Pierrelatte operated satisfactorily, and produced a little less than 12,000 t, due to a depressed market. No new project is in progress.

URANIUM ENRICHMENT

In 2001, Georges-Besse plant operated at roughly 70% of its capacity. EURODIF delivered enrichment services to more than 30 electric utilities corresponding to more than one fifth of the worldwide needs including 50% of the European uranium SWU market. Despite the trade case investigations conducted by the US Department of Commerce, EURODIF has strong technical and economical grounds to demonstrate that the case is unfounded, which may prove sufficient for the company to prevail; meanwhile it continues its business normally supplying its customers both at present and for the long term.

In 2001, the new European and French electricity regulations gave EURODIF the opportunity to diversify its electricity supplier sources including new European suppliers.

REPROCESSING

The UP2 and UP3 plants operated very satisfactorily during 2001: 733 tonnes of oxide fuel were reprocessed in UP2 and 217 t in UP3. The cumulative quantity of spent fuel reprocessed in the La Hague plants is 17,247 tonnes since 1976.

During the year 2001, the return of residues to the foreign customers (Japan, Germany, Switzerland, Belgium) rose to 544 canisters.

IRELAND

Ireland has already gone beyond the 28% requirement of the EU Electricity Directive by opening 31% of the market since February 2000. The Minister for Public Enterprise recently signed the order to increase market opening to 40%, to take effect in February this year. Full market opening will take place in 2005.

The market for "green" electricity has been fully liberalised since February 2000, with the market for electricity produced from Combined Heat and Power fully liberalised since April 2001.

Nuclear power is not used for electricity production in Ireland. Irish legislation prohibits the use of nuclear fission for the generation of electricity.

ITALIA - ITALY

No new developments were reported.

NEDERLAND - NETHERLANDS

ENERGY POLICY CONSIDERATIONS

For a number of years now, the themes of competition, energy conservation and renewable energy have been at the centre of the Netherlands government's energy policy.

Not later than 2004 all energy users will be free to chose their own energy supplier.

Competition is leading to changes in the role and tasks of the government. However, one thing is certain. Although the government is increasingly taking a back seat in the energy market, it's role is no less important. The Netherlands Competition Authority (NMa) and the Dutch Electricity Regulatory Service (DTe) see to it that the rules of the free market are followed.

In its energy policy, the government tries to balance economic and environmental interests. This means that it takes into consideration environmental problems as well as prudent management of mineral resources. Furthermore, as already mentioned in the annual report 2000 the Netherlands has committed itself to ambitious targets in order to reduce emissions of greenhouse gases.

NUCLEAR ELECTRICITY AND CONSUMPTION

The Borssele NPP was in baseload operation during the year. There were no operational events of significance, and the plant load factor reached a record of 95,3 percent (production 3,746 GWh).

The consumption of electricity in The Netherlands continues to rise by some 2,5% per annum, in 2001 it reached 103,200 GWh. some 83 % was produced by domestic electricity generation; the difference was covered by imports. The only operating nuclear plant, Borssele, contributed 4,1 % to the domestic electricity generation.

Transports of spent nuclear fuel to the reprocessing plant in La Hague were resumed during 2001, after an interruption of 4 years.

Reprocessing of fuel from Borssele NPP was resumed as a consequence of the resumption of transports.

With regard to the Borssele NPP the Government is of the opinion that it has an arrangement with EPZ, the owner of the plant, to close down the NPP at the end of 2003. EPZ, however denied that there was such an arrangement. Therefore, the Government decided to have a civil procedure aiming at closing the NPP by the end of 2003. A verdict by the court is expected mid-2002.

ENRICHMENT

In the Anti-Dumping and Countervailing duty investigations initiated by USEC in December 2000 for imports of low enriched uranium for imports from The Netherlands, Germany and the United Kingdom, the United States Department of Commerce on 14 December 2001 made public its Final Determination that imports of LEU from the Urenco Group would not be subject to an anti-dumping duty. The DOC also determined that imports of LEU from the Netherlands, Germany and the United Kingdom would be subject to a countervailing duty rate of 2.26 %.

The duty is a relatively small one, given that USEC sought countervailing duties at a rate in excess of 20% and anti-dumping duties at rates between 15 and 21%.

The US International Trade Commission (ITC) is due to rule on 28th January 2002 on whether the Urenco imports have materially injured USEC, or threaten to do so. If the ITC decides this is the case, the DOC will then issue final anti-dumping and countervailing duty orders that will result in the imposition of duties on Urenco LEU imports.

RADIO-ACTIVE WASTE POLICY DEVELOPMENTS

COVRA is responsible for the treatment and storage of all kinds of radioactive waste. In December 2000, the Dutch Government announced its intention to increase its shares in COVRA from 10% (with 90% owned by the nuclear utilities, EPZ and GKN, and the Energy Research Foundation) to 100%. Presently, the State is negotiating with the majority shareholders about the transfer of ownership.

NUCLEAR RESEARCH

On 9 November 2001 the High Flux Reactor (HFR) in Petten in The Netherlands celebrated its 40th anniversary. Dutch authorities decided to build the reactor because it was considered critical to have the possibility of further developing nuclear knowledge. The "Reactor Centrum Nederland" was initiated and construction of the HFR started in 1957. Ownership of the reactor was later transferred to the European Commission to facilitate European usage of this unique facility. The day-to-day operation of the HFR is now the responsibility of The Nuclear Research and Consultancy Group (NRG). The HFR plays a key role in Europe's nuclear and medical research and development.

The replacement of the HFR's reactor pressure vessel in 1984 paved the way for new irradiation possibilities - an important step in facilitating medical research that led to a substantial increase in the production of nuclear medicine for diagnosis, therapy, and pain treatment.

Every year, more than seven million patients in Europe are treated with radio isotopes from the HFR.

ÖSTERREICH - AUSTRIA

No new developments were reported.

PORTUGAL

ENERGY POLICY CONSIDERATIONS

Portugal's energy policy objectives are to reduce dependence on imported energy and to develop domestic sources; to reduce dependence on oil and to diversify energy sources and suppliers; to reduce the environmental impact of the production and use of energy; to reduce the energy bill and to increase efficiency of energy supply and conservation.

These objectives have been pursued through the promotion of energy efficiency, introduction of natural gas, restructuring of the electricity sector and liberalisation of the oil sector.

However, despite these measures the rate of energy consumption and its intensity regarding GDP have shown a severe resistance to be reduced.

With the aim of addressing the paramount issues of the energy system with an over dependence on imports and an increasing energy intensity and to reduce the greenhouse gas emissions, the Government in its Council of Ministers session of 27 September 2001, approved a major energy programme called " E4 Programme, Efficiency of Energy and Domestic Sources of Energy" whose main objectives are to overcome the structural imbalance of the country energy sector, to contribute to the settlement of the European Union Energy Internal Market, to make the country energy system more flexible, to promote a large range of energy efficiency measures and to make easier the access and development of electricity production through cleaner technologies in particular using renewable sources of energy.

To make the electricity market more flexible and efficient and within the framework programme of the EU to build the internal market of energy the Governments of Portugal and Spain signed on 14 November 2001 a Protocol of Co-operation whose target is to develop and consolidate the Iberian Electricity Market that hopefully will be in place on 1 January 2003.

ELECTRICITY CAPACITY AND PRODUCTION

As far as electricity supply is concerned total installed capacity in 2001 was 10.9 GWe (4.9 renewables including hydro, geothermal and wind, 2.5 oil, 1.8 coal and 1.7 natural gas) and gross domestic generation was in the order of 43 TWh.

NUCLEAR ELECTRICITY GENERATION

Portugal has no plans to use this source of energy

FUEL CYCLE DEVELOPMENTS

Yellow cake production in 2001 was 4.7 t U_3O_8 and the activity came to a end due to the depressed market conditions.

RESEARCH REACTOR

The situation regarding RPI remains as previously described. It is however worth mentioning that a successful effort in rejuvenating the staff has being going on and with it a significant increase in the reactor utilisation has been achieved.

SUOMI - FINLAND

ENERGY POLICY CONSIDERATIONS

In 1999 the Government appointed a ministerial working group to prepare a national action plan for meeting the targets of the Kyoto Protocol for reducing greenhouse gas emissions. As a result, the National Climate Strategy was submitted to the Parliament in the form of a Government report on the 27th March 2001. The strategy contains the principles, targets and measures that the Government finds necessary in order to meet the national target. It concludes that in order to meet the climate strategy targets, it is necessary to implement an energy conservation programme, and a programme promoting renewable sources of energy. Together these two programmes may account for about half of the targeted emissions reduction. The other half must be obtained by electricity supply measures. Regarding these measures one presented alternative line of action involves approving the building of additional nuclear power capacity.

In year 2000 the electric power company Teollisuuden Voima Oy (TVO) submitted an application for a decision-in-principle to the Council of State concerning the construction of a new nuclear power unit. A decision-in-principle is a necessary prerequisite for obtaining a construction licence. According to the application, the 1000-1600 MWe LWR unit will be built on either one of the two existing nuclear power plant sites. A decision on the application was being prepared in 2001. (The Government took a favourable decision-in-principle on a fifth nuclear power plant unit in January 2002. The entry into force of the decision is subject to ratification by the Parliament.)

NUCLEAR POWER GENERATION

The total amount of electricity produced by the four nuclear power units in 2001 was 21,9 TWh (net). This corresponds to 30,5 % of the electricity generation and 26,8 % of the electricity supply in Finland. The load factors of the units varied between 89,0 % and 97,6 %.

RADIOACTIVE WASTE POLICY AND DEVELOPMENTS

The main focus of radioactive waste management in Finland is currently on the disposal of spent nuclear fuel. Parliament endorsed on 18th May the Government's decision-in-principle concerning the construction of the disposal facility planned by Posiva Oy. The intended site of the disposal facility is Olkiluoto in the municipality of Eurajoki in Western Finland. It is also one of the two Finnish nuclear power plant sites. According to the plans of Posiva Oy, a company jointly owned by the two Finnish nuclear power companies, the construction licence of the final disposal facility itself will be applied for around the year 2010. Later on, a licence to operate the facility will also be required.

RESEARCH REACTORS

The only research reactor in Finland, a 250 kW Triga Mark II reactor near Helsinki was, as before, used for boron neutron capture therapy (at the reactor site), research, education and isotope production.

SVERIGE - SWEDEN

ENERGY POLICY CONSIDERATIONS

In 2001 a renewed evaluation was made of the conditions for the closure of the second reactor in the Barsebäck plant. The government informed Parliament in November that its assessment from last year remained unchanged, i.e. that the conditions, including considerations related to environmental effects, effects on security of supply and the price of electricity, were not fulfilled. A new evaluation is expected during 2003.

NUCLEAR ELECTRICITY GENERATION AND CONSUMPTION

The total production of electricity in Sweden in 2001 was 157,6 TWh and consumption 150,2 TWh. The net export of electricity was 7,4 TWh.

The eleven nuclear power reactors generated 69,2 TWh, compared with 54,8 TWh in the previous year. Following the unusually high water flow to the reservoirs, hydro electricity production was at record level 78,3 TWh, about 14 TWh higher than a normal year.

The average availability of the power stations was high, about 89 % (from 86 % for Ringhals 1 up to 95 % for Forsmark 1).

In December 2001 Oskarshamn 1 (440 MW) was shut down for about 12 months' final modernisation of the unit. The modernisation includes exchange of the control and supervision equipment and also the turbine.

All supplies of nuclear fuel materials and services were made in time and without any problems, as were all transports of radioactive waste and spent fuel.

NUCLEAR FUEL CYCLE DEVELOPMENTS

At the Westinghouse Atom fuel fabrication plant 326 t of uranium dioxide powder were converted and 226 t of fresh fuel were produced during 2001. The predominate part of the production was for the export market.

A key element of the Swedish co-ordinated nuclear waste management programme is siting of a deep geological repository for spent fuel. The siting process, which started in a focussed manner almost ten years ago, made substantial progress in 2001.

In line with the siting programme presented earlier SKB, the Swedish Nuclear Fuel and Waste Management Co., has selected three sites – in Oskarshamn, Östhammar and Tierp - for site-investigations. The proposal was reviewed by the Nuclear Power Inspectorate (SKI), the municipalities and many others. In November 2001 the government found that SKB has fulfilled the specified requirements to allow it to continue the process. The government, like SKI, considered that SKB should use the KBS-3 method as a planning prerequisite for the site investigations and that development of alternative methods should also in future be followed within the framework of the RD&D-programme. Further, the government had no objection against SKB starting site investigation at the three sites indicated. In December 2001 the municipality council of Östhammar agreed to investigation in the Forsmark area. The other two municipalities concerned are expecting to make their decisions during spring 2002.

During the year the utility OKG made several attempts to get a decision from the government regarding the 1998 application to use MOX fuel in its reactors. However, no decision was made.

The Studsvik centre provides different types of nuclear services to power plants and other nuclear installations. The European operations focus on the treatment of low level waste in its incineration and melting facilities. The rebuilt and extended melting facility was taken into operation in the beginning of 2000 and the services were extended with a steel shot blasting plant for mechanical decontamination of metal scrap.

RESEARCH REACTORS

At Studsvik both the R2 (a 50 MW MTR used for fuel testing, fuel investigations, silicon doping and isotope production) and the R2-0 (1 MW) reactors have operated at full capacity. Both reactors provided neutrons for basic research for the Neutron Research Laboratory in Sweden. The new Boron Neutron Capture Therapy facility at the R2-0 reactor was taken into operation. It will be used to treat patients suffering from brain tumours with neutron radiation. The new facility for production of iodine-125, used for the treatment of prostate cancer, was also in operation.

UNITED KINGDOM

ENERGY POLICY CONSIDERATIONS

In June 2001, the Prime Minister commissioned the Cabinet Office Performance and Innovation Unit (PIU) to carry out a review of the longer term, strategic issues surrounding energy policy for the UK, within the context of meeting the challenge of global warming, while ensuring reliable and competitive energy supplies. The aim of the review was to set out the objectives of energy policy for the UK to 2050 and develop a strategy that ensures current policy commitments are consistent with longer-term goals. The review considered the role of coal, gas, oil and renewables for the future energy balance for the UK and what role, if any, the nuclear industry should play in meeting environmental and security of supply objectives[1].

In September, the Government published a consultation document on the options for the management of radioactive waste over the coming centuries. The document sets out proposals from the Government and the Devolved Administrations on how best to initiate a UK-wide debate on future radioactive waste management policy. The Government believes that it is necessary to involve as many people as possible in the debate in order to reach a decision that can achieve the widest public acceptance.

The proposals include setting up an independent advisory body on what information there is, what more is needed and when enough has been gathered to enable the debate to start. By opening a wide range of communication channels, the Government hopes as many as possible of the UK's population will give their views. The paper sets out a five-staged programme, culminating in legislation, if needed, in 2007. Further details and a copy of the consultation paper can be found on: www.defra.gov.uk/environment/index.htm.

The Government wants to ensure that the public sector civil nuclear legacy, currently the responsibility of BNFL and UKAEA, is managed safely, securely and cost effectively and in a manner that ensures the protection of the environment. The Government believed there was a need for a stronger strategic control and direction for the management of this legacy. As a result, following a review commissioned early in 2000, the Government announced in November 2001 the creation of the Liabilities Management Authority (LMA). The LMA will be responsible for all public sector civil nuclear liabilities.

NUCLEAR ELECTRICITY GENERATION AND CONSUMPTION

The UK's nuclear power stations supplied 82.99 TWh in 2001, compared with 78.33 TWh in 2000. This represented 23 % of total electricity supplied in 2001 (compared with 22% in 2000).

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[1] The PIU report was published in February 2002 and a copy can be found on www.piu.gov.uk

FUEL CYCLE DEVELOPMENTS

In December 2000, Urenco delivered its 50 millionth SWU and at the end of 2001 had a production capacity of 5250 tonnes of separative work (tSW). In December 2000, USEC Inc. filed a petition with the United States Department of Commerce and International Trade Commission, alleging that Urenco had shipped low enriched uranium (LEU) to the US in violation of anti-dumping and countervailing duty laws. As such, USEC sought countervailing duties in excess of 20% and anti-dumping duties at rates between 15 and 20% on imports of LEU from Urenco. In December 2001 the US Department of Commerce made its Final Determination that imports of LEU would not be subject to an anti-dumping duty, but would be subject to a countervailing duty of 2.23%. In January 2002 the US International Trade Commission ruled that Urenco's imports threatened USEC with injury.

In October 2001, the Government announced the approval of the operation of BNFL's Sellafield MOX Plant (SMP). The Plant will manufacture mixed oxide (MOX) fuel from uranium and plutonium separated from spent fuel, which is reprocessed mainly at BNFL's Thermal Oxide Reprocessing Plant (THORP), also located at Sellafield. The decision to approve the operation of SMP was taken after a number of public consultations and after the Government considered it justified in accordance with the requirements of European Community law. The Irish Government and a number of NGOs have pursued legal challenges through the courts but in each court case the UK Government's decision has been upheld. BNFL started the first stage of plutonium commissioning in December, following the granting of a licence of consent by the Health and Safety Executive.

Early in the year, BNFL announced that it would shut down its Springfields UF_6 plant at the end of March 2006 and cease all further marketing of conversion services. It is projected that the shutdown of the BNFL plant in 2006 will result in the need for an expansion of the remaining primary production capacity early in the second half of this decade. In the meantime, it will operate in support of its own nuclear power reactors and existing customer commitments.

At the end of July, NII gave UKAEA permission to re-start three key plants in its Fuel Cycle Area (FCA) at Dounreay, which has not operated since May 1998. NII's consent means UKAEA can start gearing up to its £4bn programme to decommission the site within 50-60 years. The three key FCA plants that received NII consent are all facilities that sort and package a variety of solid intermediate-level wastes (ILW) for storage in engineered vaults. Their return to service is an essential step toward UKAEA being able to decommission more of the site's redundant research and development facilities. In June 2001, the Government announced that the fast reactor reprocessing facilities at Dounreay would not be refurbished and asked UKAEA to take whatever action was needed to put the fuels in a condition where they could be safely managed for the long term.

RESEARCH REACTORS

The UK currently has one operating civil nuclear research reactor, belonging to Imperial College, part of London University. Others await decommissioning, are in the process of being decommissioned, or have been fully decommissioned.

CHAPTER 5 - ADMINISTRATIVE REPORT

PERSONNEL

The staff establishment of the Supply Agency at the end of 2001 was 19.

Mr Goppel, Director General since 1989 left the Supply Agency at the end of August after having reached mandatory retirement age. Mr Blanquart, head of unit and a Supply Agency staff member for over 30 years, also retired.

The Commission decided to appoint Mr Waeterloos, who is also Director of the Euratom Safeguards Office (ESO) in Luxembourg, to replace Mr Goppel on a temporary basis. Early in 2002, Mrs Carrillo Dorado was appointed head of unit in replacement of Mr Blanquart.

FINANCE

The Supply Agency is financed principally by a subvention from the budget of the Commission, as a result of a Council decision of 1960 to postpone the introduction of a charge on transactions to defray the operating expenses of the Supply Agency as provided by the Euratom Treaty.

The Supply Agency's expenditure in 2001 amounted to € 160 200, a slight increase of some 4% compared to the previous year. Expenditure was higher in particular on meetings of the Advisory Committee and its Bureau.

Since 1995, when expenditure was still close to € 200 000, the Supply Agency achieved savings of some 20%, during a period of increased involvement in negotiations on co-operation agreements, enlargement, trade and policy disputes, etc.

ADVISORY COMMITTEE

The Advisory Committee met twice in 2001.

At the Spring meeting on 28 March 2001, the Committee adopted an opinion on the Commission’s Green Paper on the security of energy supply. As far as the role of the Supply Agency is concerned, the opinion states: “The nuclear industry in the European Union has historically been reliably supplied with uranium from external sources during its entire history. An important contribution to this stability has come from the Euratom Treaty, which charges the Community with the task of ensuring that all users receive a regular and equitable supply. The Euratom Supply Agency plays a central role in performing this task in co-operation with the industry.” And one of the conclusions states: “Within the framework of the Euratom Treaty, the Commission and the Euratom Supply Agency ensure a more structured situation with respect to nuclear fuel supply security than is the case with other energy sources” (see section “Debate on the European Commission’s Green Paper” in Chapter 1).

On the same day, the term of office of the Committee expired. Members for the Committee for the term of office 2001-2003 were appointed by the Council on 27 September 2001.

At the meeting on 22 November 2001, new chairmen and vice-chairmen of both the Committee and the Working party were elected. One of the items on the agenda was an envisaged re-organisation of the nuclear services of the Commission. The Committee decided to contribute to the exercise by undertaking to submit to the Supply Agency's Director General a document setting out the Committee's views on the future role of the Supply Agency and the Committee itself.

More generally, the Committee was being kept informed on developments related to the Community's nuclear co-operation agreements with the United States, Canada and Australia; on the progress regarding the negotiations for potential new agreements (Japan, Uzbekistan); and on a number of other issues of interest to the nuclear community: the follow up to the Green Paper, the USEC anti-dumping petition against European enrichers, and the claim against the US Department of Energy for SWU-overcharging, filed by the Supply Agency on behalf on two European utilities.

ORGANISATIONAL CHART
as at 31 December 2001

Director General (acting)	C. WAETERLOOS
Nuclear fuels supply contracts and research	D. CARRILLO DORADO (from 1.2.2002)
	J. MOTA
	A. BOUQUET
	P. BOUCHAUD-BEULÉ
General Affairs; Secretariat of the Advisory Committee	D.S. ENNALS
	G. MUIJZERS

ADVISORY COMMITTEE OF THE SUPPLY AGENCY

Chairman	L.-F. DURRET (Areva, France)
Vice-Chairmen	G. PAULUIS (Synatom, Belgium)
	J.-L. DE GUZMAN MATAIX (Permanent Representation of Spain to the EU)

WORKING PARTY

Chairman	I. MIKKOLA (TVO, Finland)
Vice-Chairmen	M. S. TRAVIS (Rio Tinto Mineral Services, United Kingdom)
	W. SANDTNER (Ministry of Economic Affairs and Technology, Germany)

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WEBSITE

This report and previous editions are available from the Supply Agency's website:

http://europa.eu.int/comm/euratom/index_en.html

A limited number of paper copies of this report may be obtained, subject to availability, from the above address.

MORE INFORMATION

Additional information may be found at EUROPA, the European Union server at http://europa.eu.int/index_en.htm giving access to the web sites of all European institutions and other bodies.

The address of the European Commission's Directorate General for Energy and Transport is http://europa.eu.int/comm/energy/index_en.html, where information can be found on e.g. the Green Paper on the security of energy supply, and on electricity and gas market liberalisation.

See http://www.contracts.ogc.doc.gov/fedcl/opinions/2001opin/96-644c.pdf for the June 2001 decision of the US Court of Federal Claims on SWU overcharging.

The Climate change site is to be found at http://unfccc.int/index.html

LIST OF ABBREVIATIONS

EU	European Union
EBRD	European Bank for Reconstruction and Development
IAEA	International Atomic Energy Authority
JRC	European Commission Joint Research Centre
NIS	New Independent States
US(A)	United States of America
(US-) DOC	United States Department of Commerce
(US-) DOE	United States Department of Energy
(US-)-NRC	US Nuclear Regulatory Commission
AD	Anti-dumping
CVD	Countervailing duty
LTFV	Less than fair value
EUP	Enriched uranium product
LEU	Low-enriched uranium
HEU	Highly enriched uranium
MOX	Mixed oxide fuel (fuel of uranium and plutonium oxide)
RET	Re-enriched tails
SWU	Separative Work Unit
tSW	tonne Separative Work (= 1000 SWU)
tU	tonne U (= 1000 kg uranium)
LLW, ILW, HLW	Low-, Intermediate-, High-level waste
NPP	Nuclear Power Plant
BWR	Boiling Water Reactor
HFR	High Flux Reactor
LWR	Light Water Reactor
PBMR	Pebble Bed Modular Reactor
PWR	Pressurised Water Reactor
AVLIS / SILVA	Atomic Vapour Laser Isotopic Separation
kWh	kilowatt-hour
MWh	Megawatt-hour = 10^3 kWh
GWh	Gigawatt-hour = 10^6 kWh
TWh	Terawatt-hour = 10^9 kWh

ANNEXES

ANNEX 1: EU REACTOR NEEDS AND NET REQUIREMENTS

(Quantities in tU and tSW)

A) From 2002 until 2011

Year	Natural Uranium		Separative Work	
	Reactor needs	Net requirements	Reactor needs	Net requirements
2002	20,000	15,700	12,100	10,600
2003	20,400	17,100	12,000	10,900
2004	20,800	18,200	12,000	10,900
2005	19,500	17,800	11,200	10,400
2006	20,700	18,700	11,900	10,900
2007	20,000	18,300	11,800	10,900
2008	19,100	17,500	11,300	10,500
2009	19,200	17,700	11,400	10,700
2010	19,500	18,300	11,500	10,900
2011	18,000	16,900	10,400	9,900
Total	197,200	176,200	115,600	106,600
Average	19,700	17,600	11,600	10,700

B) Extended forecast from 2012 until 2021

Year	Natural Uranium		Separative Work	
	Reactor needs	Net requirements	Reactor needs	Net requirements
2012	19,000	17,900	11,100	10,700
2013	18,900	17,800	11,200	10,800
2014	17,600	16,500	10,500	10,000
2015	17,800	16,700	10,600	10,200
2016	17,800	16,700	10,600	10,200
2017	16,900	15,800	10,100	9,600
2018	17,300	16,200	10,300	9,900
2019	17,100	16,000	10,200	9,800
2020	16,500	15,400	9,800	9,400
2021	16,700	15,600	10,000	9,500
Total	175,600	164,600	104,400	100,100
Average	17,600	16,500	10,400	10,000

ANNEX 2: FUEL LOADED INTO EU REACTORS AND DELIVERIES OF FRESH FUEL UNDER PURCHASING CONTRACTS

Year	Fuel loaded			Deliveries		
	LEU (tU)	Feed eq. (tU)	Enrich. eq. (tSW)	Natural U (tU)	% spot	Enrichm. (tSW)
1980		9,600		8,600	(4)	
1981		9,000		13,000	10	
1982		10,400		12,500	<10	
1983		9,100		13,500	<10	
1984		11,900		11,000	<10	
1985		11,300		11,000	11.5	
1986		13,200		12,000	9.5	
1987		14,300		14,000	17.0	
1988		12,900		12,500	4.5	
1989		11,800		13,500	11.5	
1990		15,400		12,800	16.7	
1991		15,000	9,200	12,900	13.3	10,000
1992		15,200	9,200	11,700	13.7	10,900
1993		15,600	9,300	12,100	11.3	9,100
1994	2,520	15,400	9,100	14,000	21.0	8,800
1995	3,040	18,700	10,400	16,100	18.1	9,600
1996	2,920	18,400	11,100	15,900	4.4	11,700
1997	2,900	18,200	11,000	15,600	12	10,100
1998	2,830	18,400	10,400	16,100	6	9,200
1999	2,860	19,400	10,800	14,800	8	9,700
2000	2,500	17,400	9,800	15,800	12	9,700
2001	**2,800**	**20,300**	**11,100**	**13,900**	**4**	**9,100**
Total	22,370	320,900	111,400	293,300		107,900

ANNEX 3: ESA AVERAGE PRICES FOR NATURAL URANIUM

Year	Multiannual contracts		Spot contracts		Exch.rate
	euro/kgU	US$/lb$U_3O_8$	euro/kgU	US$/lb$U_3O_8$	US$/euro
1980	67.20	36.00	65.34	35.00	1.39
1981	77.45	33.25	65.22	28.00	1.12
1982	84.86	32.00	63.65	24.00	0.98
1983	90.51	31.00	67.89	23.25	0.89
1984	98.00	29.75	63.41	19.25	0.79
1985	99.77	29.00	51.09	15.00	0.76
1986	81.89	31.00	46.89	17.75	0.98
1987	73.50	32.50	39.00	17.25	1.15
1988	70.00	31.82	35.50	16.13	1.18
1989	69.25	29.35	28.75	12.19	1.10
1990	60.00	29.39	19.75	9.68	1.27
1991	54.75	26.09	19.00	9.05	1.24
1992	49.50	24.71	19.25	9.61	1.30
1993	47.00	21.17	20.50	9.23	1.17
1994	44.25	20.25	18.75	8.58	1.19
1995	34.75	17.48	15.25	7.67	1.31
1996	32.00	15.63	17.75	8.67	1.27
1997	34.75	15.16	30.00	13.09	1.13
1998	34.00	14.66	25.00	10.78	1.12
1999	34.75	14.25	24.75	10.15	1.07
2000	37.00	13.12	22.75	8.07	0.92
2001	**38.25**	**13.18**	***21.00 ****	***7.23 ****	**0.90**

* The spot price for 2001 was calculated on the basis of an exceptionally low total volume of only some 330 tU under 4 transactions, one of which accounted for two thirds of this quantity. Some 300 tU were delivered as UF_6 without a price being specified for the conversion component. To establish a price excluding conversion costs for these deliveries, the Supply Agency applied an estimated average conversion price of € 5.70/kgU (US$ 5.10/kgU).

ANNEX 4: OPINION OF ESA'S ADVISORY COMMITTEE ON THE EUROPEAN COMMISSION'S GREEN PAPER ON THE SECURITY OF ENERGY SUPPLY

(use the link below to open the Opinion as published in the Official Journal of the European Communities)

http://europa.eu.int/comm/euratom/GPop-OJ.pdf