EURATOM
SUPPLY AGENCY

Annual Report 2005

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Euratom Supply Agency

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Contents

Overview

In 2005, there was renewed interest worldwide in building new nuclear generation capacity in response to rising fossil fuel prices and concerns about climate change following entry into force of the Kyoto Protocol in early 2005. Security of energy supplies in general continued to climb on the political agenda, but on the other hand proliferation concerns remain an important factor in the trade of nuclear technology and materials.

Supplies of nuclear materials to the EU were stable, and while prices continued to increase, prices paid under long term contracts showed relatively modest increases (around 15 % for natural uranium compared to 2004). For the second year in a row, global uranium production increased, although not in a very significant way. It still remains below global reactor requirements, but many ongoing mine expansions and new mining plans are expected to narrow the gap in the coming years.

The only remaining uranium mine in the EU – in the Czech Republic – has extended its operation until 2008, and uranium exploration is now ongoing in Finland, Sweden and Slovakia. Mines are still under production in Romania which is due to join the EU in 2007.

For natural uranium, Canada was by far the largest supplier to the EU with 5 000 tU, followed by Australia, Niger and Russia. The share of re-enriched depleted uranium tails as a supply source decreased while that of highly enriched uranium feed increased. The size of the new Member States' nuclear fuel market represents an addition of about 10 % compared to the EU-15 market.

The uranium conversion and fuel fabrication markets have remained relatively stable, since a toll-conversion agreement concluded in March 2005 between BNFL and Cameco for 10 years will keep the Springfields (UK) conversion facility operating instead of closing it down in 2006 as had previously been announced.

The uranium enrichment market is preparing for a technological transition from gaseous diffusion to centrifuge enrichment in France and the Unites States, with some related concerns about the transition period. The market has experienced rising enrichment prices, including for exports from Russia, due in the short term to increased demand on enrichment capacity as a result of higher uranium prices and increases in electricity costs and, for the long term, due to the need to support investment in new capacity.

Construction of the Georges Besse II enrichment plant by AREVA (based on the joint venture between Urenco and AREVA) was slightly delayed because of the necessary political approvals by all concerned governments, but it is now expected that construction could start during 2006. The LES consortium which includes Urenco is moving ahead according to plans with the National Enrichment Facility in the United States.

In response to security of supply concerns and rising prices, many utilities have increased their purchases in order to rebuild inventory levels, which is a welcome development. The implementation of the diversification policy remains vital for the long term security of supply of the EU electro-nuclear industry.

Chapter 1

General developments

Main developments in the Member States

In the EU, no new firm decisions regarding new nuclear power plants were made in 2005.

In Finland, construction of TVO's Olkiluoto 3 plant started in 2005, and the plant is expected to be operational in 2009. The EPR project in Finland advanced to the actual construction phase after receiving the construction licence in early 2005.

In France, EdF continued to move forward its project to construct an EPR (European pressurised water reactor) of 1 600 MWe at Flamanville in Normandy. Construction is expected to start in 2007 and the reactor should be operational between 2010 and 2012, for a planned life of 60 years. A partial privatization of EdF occurred in November 2005, when 15 % of its capital was offered to financial market investors.

The governments of the three Baltic States concluded an agreement in February 2006 to consider the joint construction of a new nuclear power plant in Lithuania after the Ignalina-2 reactor is shut down in 2009. The political agreement was followed by a memorandum of understanding by the concerned energy companies – Lietuvos Energija AB, Eesti Energija and Latvenergo – concerning a feasibility study for such a new reactor.

In the Netherlands, the Borssele reactor (481 MW) received an extension of its operating lifetime until the end of 2033, for a total of 60 years.

In Germany, the Obrigheim reactor (340 MWe) was shut down on 11 May 2005, after 37 years of operation. No decisions have yet been made on the eventual extension of the operating life of other German NPP's. Another reactor shut down occurred in Sweden where the Barsebaeck-2 reactor (600 MW) was taken out of service at the end of May 2005. In Spain, the country's oldest reactor, Jose Cabrera (160 MWe), was permanently shut down on 30 April 2006 by governmental decision, after 38 years of operation.

Several other EU Member States are actively discussing their energy policy options and the possibility to build new nuclear reactors in order to raise the security of their energy supplies and to reduce their greenhouse gas emissions.

In the fuel cycle, AREVA Group of France and Urenco of Germany, the Netherlands and the United Kingdom moved forward with their Enrichment Technology Company (ETC) joint venture, but the final approval of a quadripartite agreement by all the involved governments was still pending in early 2006. Therefore, construction of the new Georges Besse II plant at the Tricastin site has been delayed but is now expected to start in 2006, with production starting in 2008–09 and reaching its nominal level of 7.5 million SWU's around 2016.

Main developments in the EU

Enlargement of the EU

After finalising the membership negotiations with Bulgaria and Romania in 2004, the Act of Accession for these countries was signed on 25 April 2005, and they are expected to join the EU in January 2007. Both Bulgaria and Romania have active nuclear power programmes; Bulgaria having 4 operating reactors and Romania one Candu reactor with its indigenous fuel cycle. A second nuclear reactor at Romania's Cernavoda plant is expected to start operation in 2007, and Bulgaria plans to complete the Belene power plant.

Regarding further accessions, screening of all the national legislation and its compatibility with EU legislation is on-going for both Croatia and Turkey.

Croatia shares the Krško NPP with Slovenia, and Turkey has announced plans to build three nuclear reactors in the coming years, up to a total capacity of 5 000 MW.

EU energy policy

In March 2006, the European Commission presented a Green paper setting a basis for a common European Energy Policy, the core objectives of which are sustainable development, competitiveness, and security of supply. Linked to these objectives are six priority areas:

- Completion of the internal energy market
- Ensuring solidarity among Member States
- A more sustainable, efficient and diverse energy mix, whilst respecting the right of Member States to make their own energy choices
- A strategic energy technology plan
- The need for a common external energy policy
- Identifying infrastructure priorities for the EU's security of supply.

EU Commission's proposal for a new shipments directive

The Commission adopted a draft proposal[1] for a Council Directive on the control of shipments of radioactive waste and spent fuel, intended to replace the existing Directive 92/3. The proposed Directive, which should also apply to spent fuel intended for reprocessing, simplifies procedures while ensuring consistency with the Basic Safety Standards (BSS) Directive and International Conventions. A final proposal was adopted and transmitted to the Council in December 2005[2], which takes into account the opinions expressed by the European Economic and Social Committee and the European Parliament.

[1] COM(2004) 716 of 12.11.2004.

[2] COM(2005) 673 of 21.12.2005.

Bilateral nuclear cooperation agreements

Implementation of the bilateral agreements with, Australia, Canada and the USA

The implementation of nuclear co-operation agreements with, Australia, Canada and the United States of America continued during 2005 to the satisfaction of all parties. Regular bilateral consultation meetings were held between the Commission and Australia as well as Canada.

Ukraine and Uzbekistan

An agreement for co-operation in the peaceful uses of nuclear energy between Euratom and the Ukraine was signed on 28 April 2005.

This agreement will provide a framework for co-operation in the peaceful uses of nuclear energy between the Community and Ukraine. It covers nuclear safety, controlled nuclear fusion, nuclear research and development, international transfers, including trade in nuclear materials and provision of nuclear fuel cycle services, as well as measures aiming at the prevention of illicit trafficking of nuclear materials.

A similar agreement with Uzbekistan entered into force already in 2004.

Kazakhstan

The negotiations on an agreement for co-operation in the peaceful uses of nuclear energy between Euratom and the Government of the Republic of Kazakhstan continued, and an amended proposal was submitted to Kazakhstan in February 2005.

Japan

An agreement for co-operation in the peaceful uses of nuclear energy between Euratom and Japan was finally signed on 27 February 2006, after several years of negotiations. After ratification of the agreement, it is expected to enter into force during 2006.

Russia

Negotiations for an agreement on trade in nuclear materials with the Russian Federation, based on a draft agreement presented by the Commission in 2004, are still awaited.

Chapter 2

Global supply and demand, security of supply

This chapter presents a short overview of the main recent developments affecting the global supply and demand balance and security of supply at different stages of the fuel cycle.

Demand for nuclear fuels

While there are only a few concrete plans in the EU to build new nuclear reactors, elsewhere in the world the situation is different and has a very big impact on the global nuclear fuel market.

Plans for new reactors are heavily concentrated in Asia (China, India, Japan, South Korea) and Russia. In addition, Ukraine, Brazil, Mexico and eventually many other countries are considering new nuclear power plants. China remains the biggest potential growth market for nuclear reactors and consequently nuclear materials as well as other commodities.

Russia also has an ambitious plan to build 40 000 MWe of new nuclear generating capacity by 2030, increasing the share of nuclear energy in electricity generation to 25 %. Such an expansion requires increased investment in Russian uranium exploration and production sectors.

In the United States, in early 2006 there were altogether 11 companies, joint ventures or utility consortia with plans to build 12-20 new reactors. The US government has taken steps to facilitate new nuclear construction by providing tax incentives in the US Energy Policy Act which was approved in 2005, and by streamlining the US Nuclear Regulatory Commission’s (NRC) licensing procedures, notably by introducing a combined construction and operating licence. However, firm decisions about new power plants remain to be made. Uprates and life extensions of existing power plants have continued to contribute to a rising generation capacity.

Supply of nuclear fuels

Natural uranium

In 2005, preliminary figures indicate that worldwide uranium production amounted to some 41 752 tU, compared with 40 475 tU in 2004 (+ 3.1 %). After a 13 % increase in 2004 versus 2003, the supply response has moderated. It will require several years before new mines or major expansions can be brought to production, but increasing production is expected in the coming years.

Canada's total production was 11 628 tU, compared with 11 597 tU in 2004.

Total Australian production in 2005 was 9 516 tU, compared with 9 010 tU in 2004.

Kazakhstan, Russia, Namibia and Niger followed with production between 4 300 and 3 000 tU.

Table 1: Natural uranium production in 2005, compared to 2004[1]

	Production in 2005 (Tonnes uranium)	Share in 2005 (%)	Production in 2004 (Tonnes uranium)	Change over 2004 (%)
Canada	11 628	27.9	11 597	0.3
Australia	9 516	22.8	9 010	5.6
Kazakhstan	4 329	10.4	3 719	16.4
Russia	3 325	8.0	3 200	3.9
Namibia	3 148	7.5	3 038	3.6
Niger	3 093	7.4	3 282	-5.8
Uzbekistan	2 300	5.5	2 050	12.2
US	1 020	2.4	862	18.4
Ukraine	800	1.9	1 000	-20.0
South Africa	674	1.6	755	-10.7
Others	1 888	4.5	1 962	-3.8
Total	41 722	100.0	40 475	3.1

(1) Figures published by producers or industry estimates.

New production plans and exploration activity

Uranium reserves are not considered to be the limiting factor for new production. The difficulties arise mostly from the long lead times between exploration and discovery and the start of actual production. During almost twenty years of depressed prices, there was very little investment in uranium exploration and production, and now the industry is trying to make up for the missed investment cycle.

Global uranium exploration activity continued to increase significantly in 2005, and some of the junior mining companies have made progress towards actual production.

Exploration activity continues to focus on Canada and Australia, but various African, Latin American and even EU countries like Finland, Slovakia and Sweden have received attention. The new owner of Olympic Dam (in Australia), the mine with potentially the world's biggest uranium production, has announced plans for tripling the mine capacity to some 15 000 tU/year by 2013, but a firm decision remains to be made. In parallel, work is underway to determine the size of a significant expansion to the deposit.

Russia has announced plans for new investment in uranium exploration and production in order to supply Russia's own needs and expected nuclear fuel exports. Current annual mining output is around 3 300 tonnes, while the requirements are estimated by Russia to be about 10 000 tonnes (considering national consumption and export supplies) and expected to rise in line with new reactor construction.

Kazakhstan has an ambitious programme to increase its uranium mining output from around 4 300 tU in 2005 to 6 500 tU by 2007 and to 15 000 tU in 2015. In order to achieve such a rapid expansion, the national uranium company KazAtomProm has concluded joint ventures and other partnerships with European, North-American, Russian and Japanese companies, and is discussing further partnerships with Chinese and South Korean companies.

Investment demand

A new element impacting uranium prices in 2005 was the emergence of investments funds buying physical stocks of uranium. Their purchases had a significant effect on the published spot prices, which rose during 2005 from 21 to 36 USD/lb U_3O_8 at the end of the year and to over 40 USD/lb U_3O_8 in March 2006.

Conversion

For the conversion market segment, 2005 was quite stable both in terms of prices and production, although inventories still need to be replenished after temporary production shut downs in 2003-2004.

Following the temporary shut down of its Metropolis facility, ConverDyn's has undertaken new investments to improve its production facilities and to increase its production capacity over time.

A toll-conversion agreement was concluded in March 2005 between BNFL and Cameco for 10 years. The BNFL Springfields facility was due to be closed down in 2006 but will now keep operating. This alleviates some of the concerns regarding the future supply of conversion services and some of the geographical unbalance of conversion capacities between Europe and North America, but additional conversion capacity in Europe may still be needed.

AREVA is examining its options for a new conversion plant in France but had not yet in early 2006 announced a firm decision in this regard.

Enrichment

Many utilities continued to move towards slightly lower tails assays in 2005, which helps to a certain extent to reduce their natural uranium needs. This trend increases demand for enrichment, and some price pressures have started to build up in the enrichment segment of the market. This is also related to the rising electricity costs which are an important cost element for companies using the gaseous diffusion technology, Eurodif and USEC. Since there is still some excess worldwide enrichment capacity, the price pressures are so far contained. Published enrichment price indicators increased from USD 110 in 2004 to 112-113/SWU at the end of 2005 and to USD 120-122/SWU in March 2006, although the low volume of the spot SWU market decreases the relevance of this price indicator.

The focus in the enrichment industry is on the announced new plants and on the progress made in keeping up with the planned schedules. Both AREVA and USEC are moving from the gaseous diffusion process to modern centrifuge enrichment technology. Urenco is expanding its capacity in Europe and leading the LES consortium to build a facility in the USA, while Tenex of Russia may increase its available capacity as well.

Fabrication

European Union fabrication facilities continued to provide adequate coverage of the utilities' needs. MOX fuel fabrication continued in Belgium and France.

Reprocessing

Reprocessing of irradiated fuel continued at the plants at La Hague in France and Sellafield in the United Kingdom. Under the amended German Nuclear Energy Act, shipments from Germany for reprocessing abroad have now ended. Instead, the spent fuel elements are to be taken to decentralised on-site interim storage facilities and transferred directly to final storage later after suitable processing.

Instead of having the reprocessed uranium re-enriched by conventional enrichment, some utilities, often in partnership with European fabricators, are sending the material to Russia where it is blended with HEU of military origin. After blending, the material is sent back to the EU in the form of enriched uranium product (EUP) for further fabrication of fuel elements.

Secondary sources of supply

The 'Megatons to megawatts' programme agreed between the USA and Russia in 1993 for down blending over a period of 20 years highly enriched uranium (HEU) from Russian nuclear weapons reached a milestone in 2005 with half of the agreed amount of HEU having been processed.

However, question marks remain over a potential extension of the programme beyond 2013. It appears likely that Russia's own needs and the needs for its fuel exports will be given priority, but the feed material is still likely to be supplied to the global market.

In the USA, the Department of Energy's (DoE's) National Nuclear Security Administration (NNSA) has announced plans to sell some US high-enriched uranium from the government's excess stockpile for down blending and use as commercial nuclear fuel.

Both the USA and Russia have made initiatives for creating an international fuel reserve, under the auspices of IAEA, in order to supply countries that forego having their own fuel cycle facilities. At least part of the material in such a reserve would come from HEU.

Security of supply

During 2005, the security of all energy supplies continued to receive increasing attention globally, with demand from China, India and other rapidly growing economies putting more pressure on supplies and prices. Nuclear energy does have the advantage that uranium resources are relatively well dispersed around the globe, and despite uranium price increases, fuel costs are still relatively small compared to electricity generation from fossil fuels. While the EU does not have significant uranium resources on its territory, several EU companies are active in uranium mining elsewhere. Maintaining good relations with producer countries is therefore essential. It is also important for the EU security of supply that significant parts of the needed conversion, enrichment and fuel fabrication are performed in the EU.

Global uranium reserves are sufficient for a major expansion of the industry, but the investments now being undertaken will not show immediate results. Due to a low number of major players at the various steps of the fuel cycle, supply constraints can happen at any stage, but reasonable inventory levels can mitigate eventual problems.

Secondary supplies continue to have a very large impact on the market, and therefore it is in the interests of all parties to strive for as much transparency as possible about future plans for the use and release into the market of such supplies.

ESA recommendations and diversification policy

The Supply Agency continues to recommend to EU utilities that they maintain an adequate level of strategic inventories and use market opportunities to increase their inventories, according to their individual circumstances. Furthermore, it is recommended that utilities cover most of their needs under long-term contracts with diversified supply sources.

The Agency is pleased to note that several utilities have indeed increased their inventories over the last couple of years, but some are still very reliant on just-in time deliveries.

Producers and fuel fabricators are also encouraged to consider whether their inventory levels are adequate to cover unforeseen disruptions. Notably, the transition of two enrichment companies from gaseous diffusion to centrifuge technology over the next years, while largely positive for the industry, could cause temporary uncertainties related to delivery schedules.

The Supply Agency continues to monitor the market, especially the supply of natural and enriched uranium to the EU, to ensure that EU utilities have diversified sources of supply and do not become over-dependent on any single source. Maintaining the viability of the EU industry at all stages of the fuel cycle remains an important goal for long-term security of supply. In recent years, restrictions on imports of natural uranium have not been deemed necessary. Regarding enrichment, the supply policy remained unchanged.

Chapter 3

EU supply and demand for nuclear fuels

The overview of supply and demand for nuclear fuels in the European Union 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 the quantities, origins and prices of acquisitions of natural uranium and separative work.

In order to allow comparisons with data from previous years, in many cases reference is still made to EU-15 utilities. Data from the new Member States is also provided to the extent possible, and when aggregate data for EU-25 is presented, this is expressly mentioned.

Fuel loaded into reactors

During 2005, about 2 500 tU of fresh fuel were loaded in EU-15 reactors containing the equivalent of 21 140 tU as natural uranium and 11 955 tSWU; most tails assays were in the range of 0.25–0.30 %. For the new Member States, the figures were approximately 240 t of fuel loaded, containing 1 900 tU as natural uranium and 1 100 tSWU.

Reactor needs/net requirements

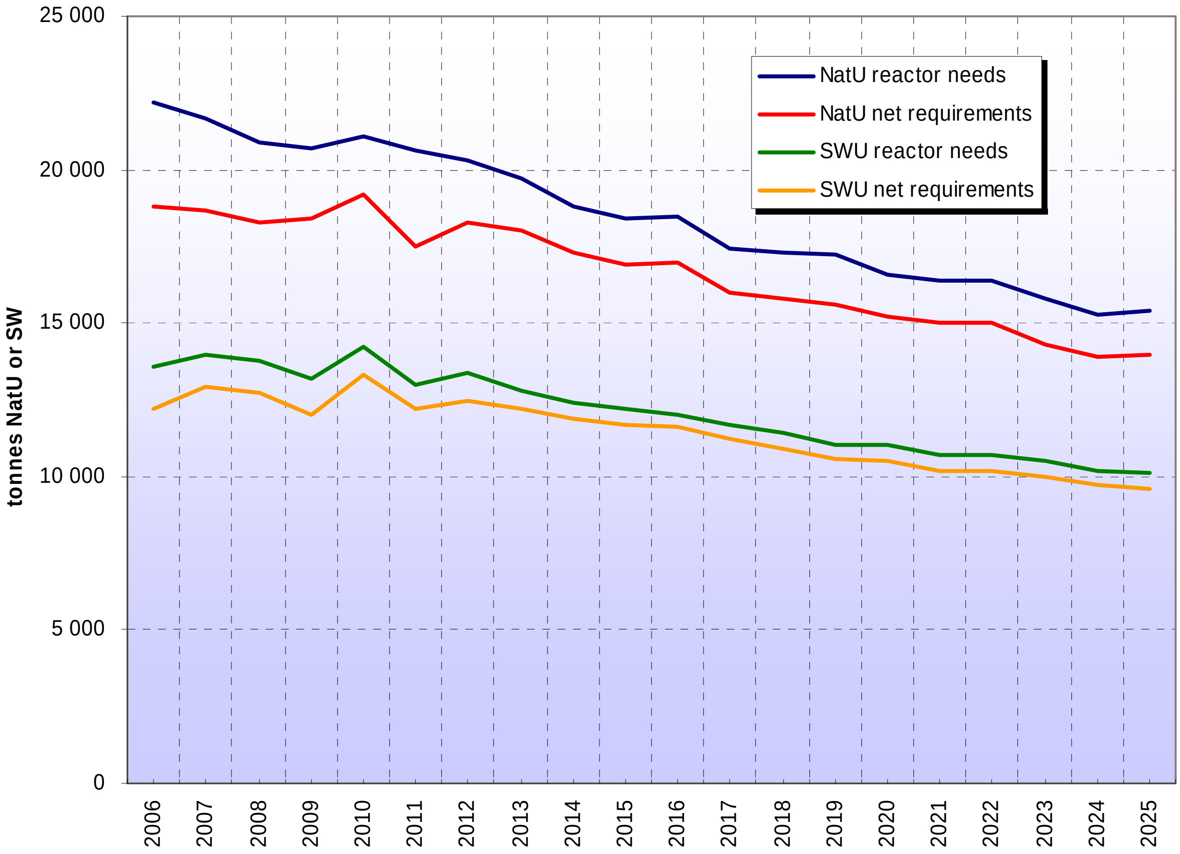
Estimates of future EU reactor needs and net requirements for uranium and separative work, based on data supplied by all EU utilities (including the new Member States), are shown in Graph 1 (see Annex 2 for the corresponding table). Net requirements are calculated on the basis of reactor needs less the contributions from currently planned uranium/plutonium recycling, and taking account of inventory management as communicated to the Agency by utilities.

The new Member States represent an addition of about 10 % to overall requirements, which explains most of the increase in the curves compared to the previous year. When comparing data from the EU-15 utilities to the previous forecast, it is worthwhile to note that the average estimated net requirements for natural uranium are down 2.5 % but the net SWU requirements are up 9 % for the next 10 years (for total reactor needs the figures are -4 % for natural uranium and +7 % for enrichment). This reflects decreasing tails assays due to the current relationship between natural uranium and SWU prices, but future price developments could again change the situation in coming years.

For the EU-25, average reactor needs for natural uranium over the next 10 years are forecast to be 20 400 tU/year, while average net requirements are about 18 100 tU/year.

Average reactor needs for enrichment over the next 10 years are expected to be 13 300 tSWU/year, while average net requirements will be in the order of 12 400 tSWU/year.

Graph 1: Reactor needs and net requirements for uranium and separative work (EU-25)



Supply of natural uranium

Deliveries of natural uranium to EU-15 utilities[1] increased considerably (+20 % in comparison with 2004) as upward flexibilities were exercised under long term contracts. The amount of uranium delivered under spot contracts was in line with historic averages, representing about 5 % of total natural uranium deliveries.

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 2004 is shown in Table 2. Transactions totalled approximately 47 800 tU (including contract amendments), some 33 800 tU of which were the subject of new purchase contracts by EU utilities (spot and multiannual). Some 6 100 tU transacted related to purchases between producers, intermediaries or between EU utilities. An additional 3 300 tU have been transacted under exchanges and loans.

[1] In order to allow easier comparisons with the previous year, most data refer to the EU-15. When data is presented for all of EU-25, this is specified.

Table 2: Natural uranium contracts concluded by or notified to the Supply Agency (including feed contained in EUP purchases)

Contract type	Number	Quantity (tU) (1)
Purchase/sale by an EU utility/user – multiannual (2) – spot (2)	 22 10	 32 200 1 600
Other purchase/sale – between EU utilities (multiannual) – between EU utilities (spot) – between intermediaries (3) (multiannual) – between intermediaries (3) (spot)	 0 3 1 3	 6 100
Exchanges and loans (4)	11	3 300
Amendments to purchasing contracts (5)	7	4 600
TOTAL	**57**	**47 800**

(1) In order to maintain confidentiality the quantity has been indicated only when there were at least three 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) Purchase/sale 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 quantity represents the net increase (or decrease) in material contracted for

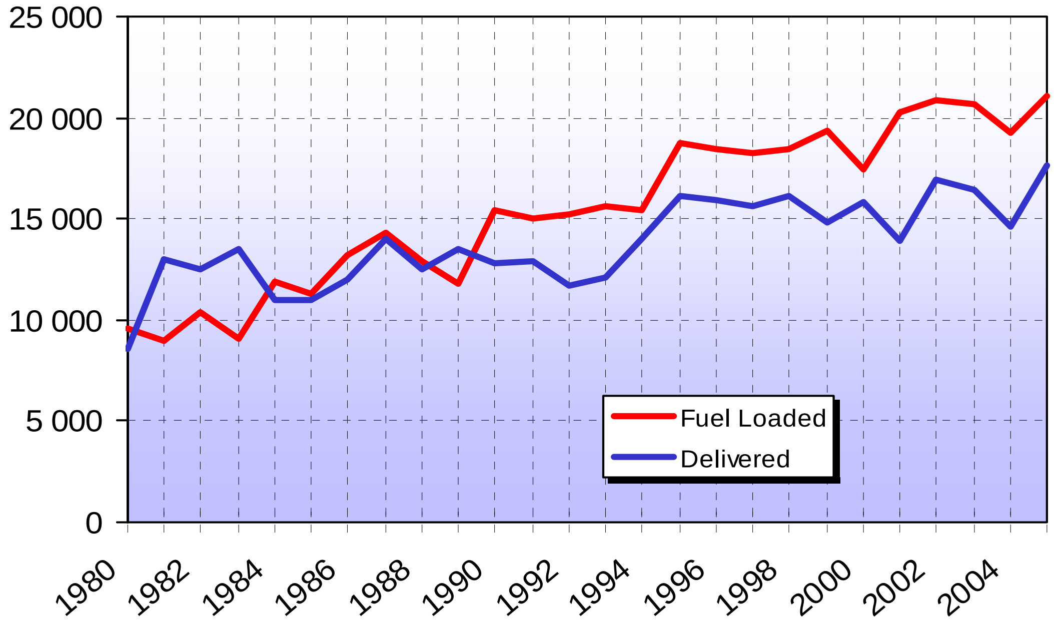
Volume of deliveries

During 2005, natural uranium deliveries to EU-15 utilities amounted to approximately 17 600 tU compared with 14 600 tU in 2004. Deliveries under spot contracts represented about 5 % of the total.

The deliveries taken into account are those made to the EU-15 utilities or their procurement organisations (excluding research reactors); they also include the natural uranium equivalent contained in enriched uranium purchases.

Deliveries and fuel loaded into reactors by EU-15 utilities since 1980 are shown in Graph 2. The corresponding table is in Annex 3. The difference between deliveries and the amount of fuel loaded can be explained by the use of reprocessed uranium or MOX fuel 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) (EU-15)



Average prices of deliveries

In order to provide comparable price information with previous years, the deliveries taken into account in the average price calculations are those made to the EU-15 utilities or their procurement organisations under purchasing contracts; they also include 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), which is often the case for utilities in the new Member States. To calculate the average price, the original contract prices are converted (using the average annual exchange rates as published by the European Central Bank) into euro per kgU in U_3O_8 and then weighted by quantity. To establish a price excluding conversion cost when it was not specified, the Supply Agency applied, in 2005, an estimated average conversion price of EUR 6.05/kgU (USD 7.50/kgU).

The average prices of deliveries under multiannual contracts in 2005 were:

EUR 33.56/kgU contained in U_3O_8	(EUR 29.20/kgU in 2004)
USD 16.06/lb U_3O_8	(USD 13.97/lb U_3O_8 in 2004)

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 average price of material delivered in 2005 under spot contracts was as follows:

EUR 44.27/kgU contained in U_3O_8	(EUR 26.14/kgU in 2004)
USD 21.19/lb U_3O_8	(USD 12.51/lb U_3O_8 in 2004)

It has to be noted that the relatively small number of spot market deals makes this price indicator less representative. The fact that the ESA spot price differs significantly from the spot prices published by RWE Nukem, TradeTech or Ux Consulting may be explained by several factors: the timing of spot market deals during the year and the time-lag between contract conclusion and deliveries, the relatively small number of spot deals in the EU and slight differences in the definition of a spot contract.

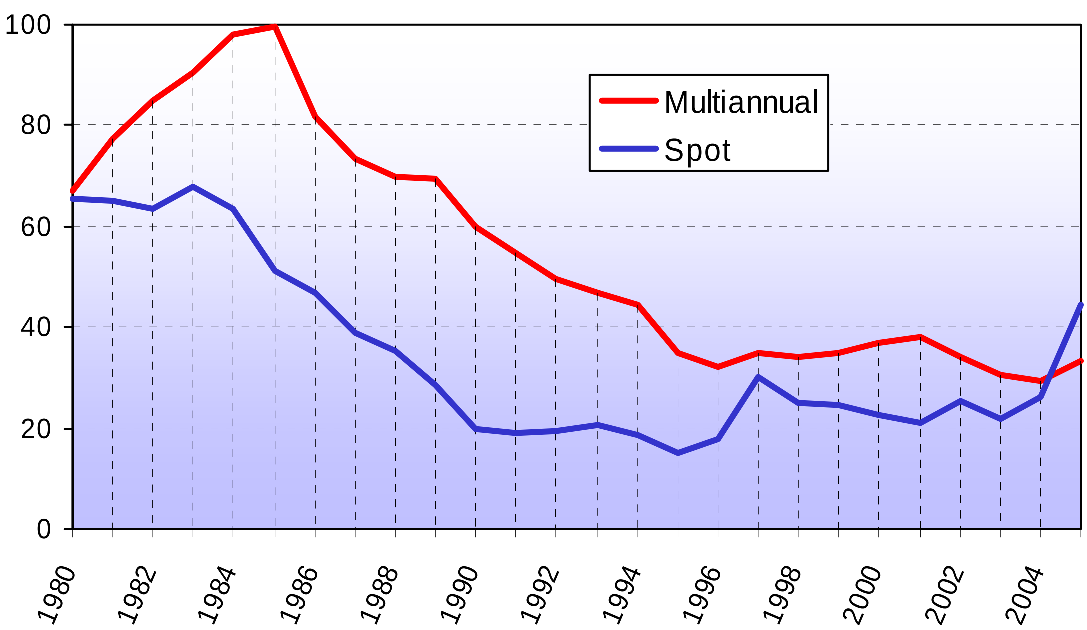
Exchange rates continued to play a significant role for both buyers and producers, but the situation was more stable than during the previous years. While the US dollar fluctuated wildly between the beginning and the end of 2005, its annual average rate in euros remained the same as in 2004, namely 1.24 (+ 10 % above the 1.13 level in 2003 and + 31 % above the 0.95 value of 2002).

See Annex 4 for detailed price information, and Annex 5 for the price calculation methodology.

Price history

Graph 3 shows the ESA average prices for natural uranium since 1980; the corresponding data are presented in Annex 4 (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, 1980-2005 (EUR/kgU)



Origins

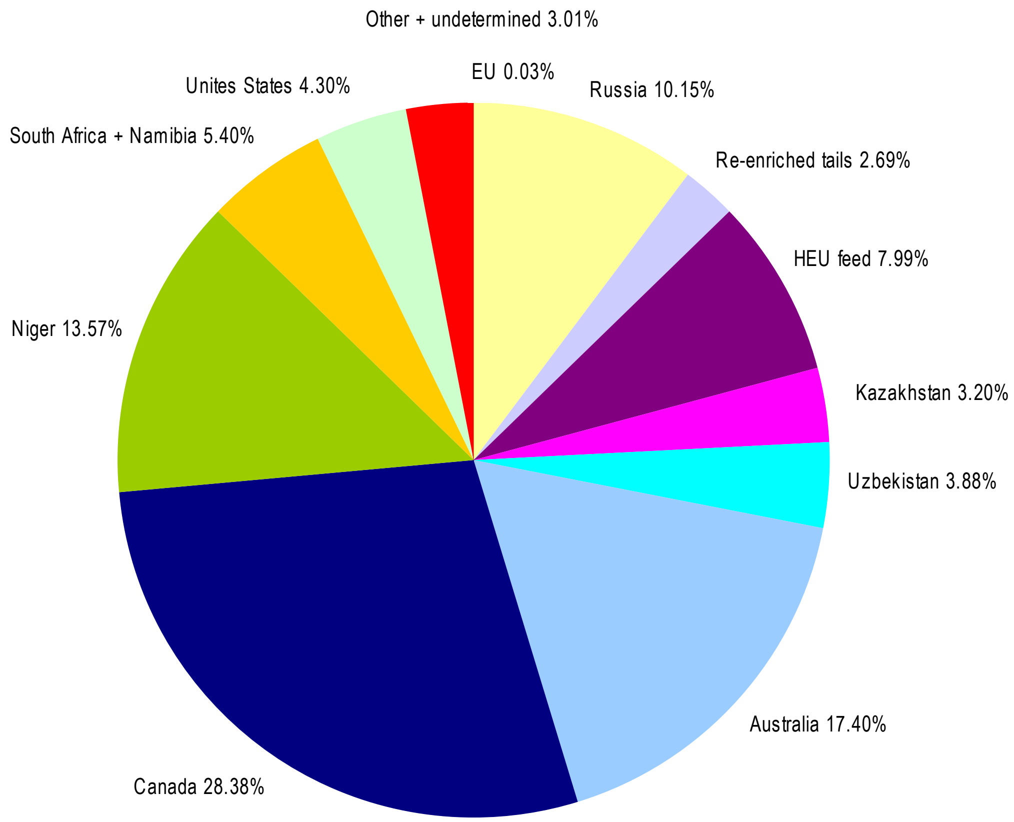
Canada increased its leading position in 2005 as a supplier of natural uranium, with 5 000 tU (3 300 tU in 2004) supplied to EU-15 utilities (28 %). Australia was in second position with 3 000 tU (2 400 tU in 2004), followed by Niger (2 400 tU) and Russia (1 800 tU). However, the natural uranium feed contained in enriched uranium deliveries from Russia amounted to 3 800 tU , but the mining origin of that feed material cannot always be determined. The amount of re-enriched tails material (500 tU) decreased compared to previous years while the share of HEU feed increased (1 400 tU).

For the EU-15, domestic supplies were almost non-existent, but taking into account the new Member States, the overall share is about 1.5 % since uranium mining is continuing in the Czech Republic. The remaining Czech uranium mine, Rožna, was due to end commercial production in 2005 but because of the rise in prices, production has now been extended until 2008.

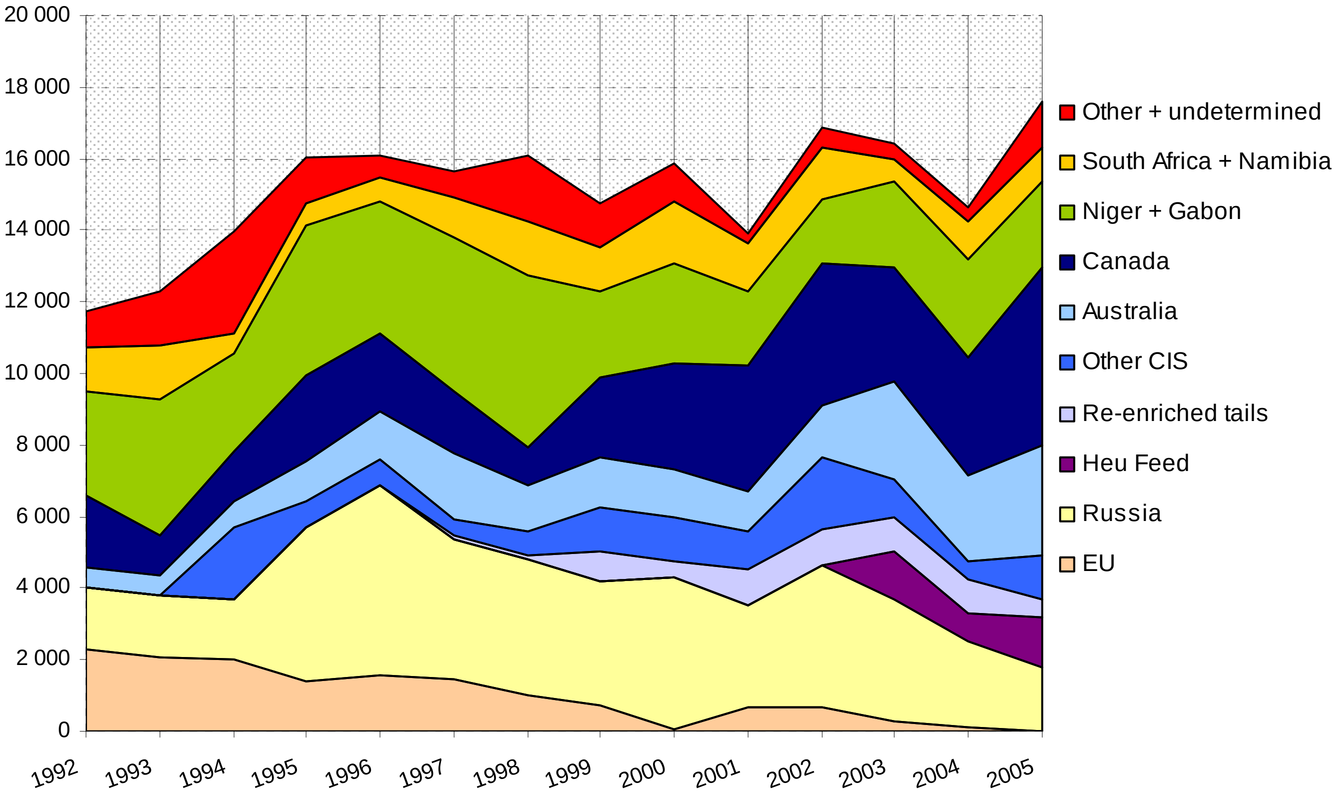
Direct purchases from other CIS countries than Russia have remained relatively low considering the potential of these countries. It is however expected that the amount of uranium from Kazakhstan will increase in coming years.

Looking at the new Member States, their annual demand represents about 2 000 tU. Apart from Czech domestic production, a major part of the supplies comes from Russia, although it is not always possible to determine the exact origin of the natural uranium because procurement is mostly done in the form of complete fuel assemblies.

Graph 4: Origins of natural uranium delivered to EU-15 utilities in 2005 (% share)



Graph 5: Purchases of natural uranium by EU-15 utilities by origin, 1992-2005 (tU)



Special fissile materials

Conclusion of contracts

Table 3 shows 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 2005 in accordance with the Supply Agency's procedures.

Table 3: Special fissile material contracts concluded by or notified to the Supply Agency

Contract type	Number
A. Special fissile materials	
Purchase (by an EU utility/user) – multiannual – spot	 10 22
Sale (by an EU utility/user) – multiannual – spot	 2 30
Purchase/sale (between two EU utilities/end users) – multiannual – spot	 2 5
Purchase/sale (intermediaries) – multiannual – spot	 - 9
Exchanges	10
Loans	1
Total (1)	
Contract amendments	**18**
B. Enrichment contracts (2)	
Multiannual Spot	16 5
Contract amendments	**21**

(1) In addition, there were 26 transactions for small quantities (Article 74 of the Euratom Treaty) which are not included here.
(2) Contracts with primary enrichers only.

Deliveries of low enriched uranium

In 2005, supply of enrichment (separative work) to EU-15 utilities totalled approximately 11 400 tSWU, delivered in 2 170 tLEU which contained the equivalent of some 18 650 tonnes of natural uranium feed (1). Some 77 % of this separative work was provided by EU companies (AREVA-Eurodif and Urenco).

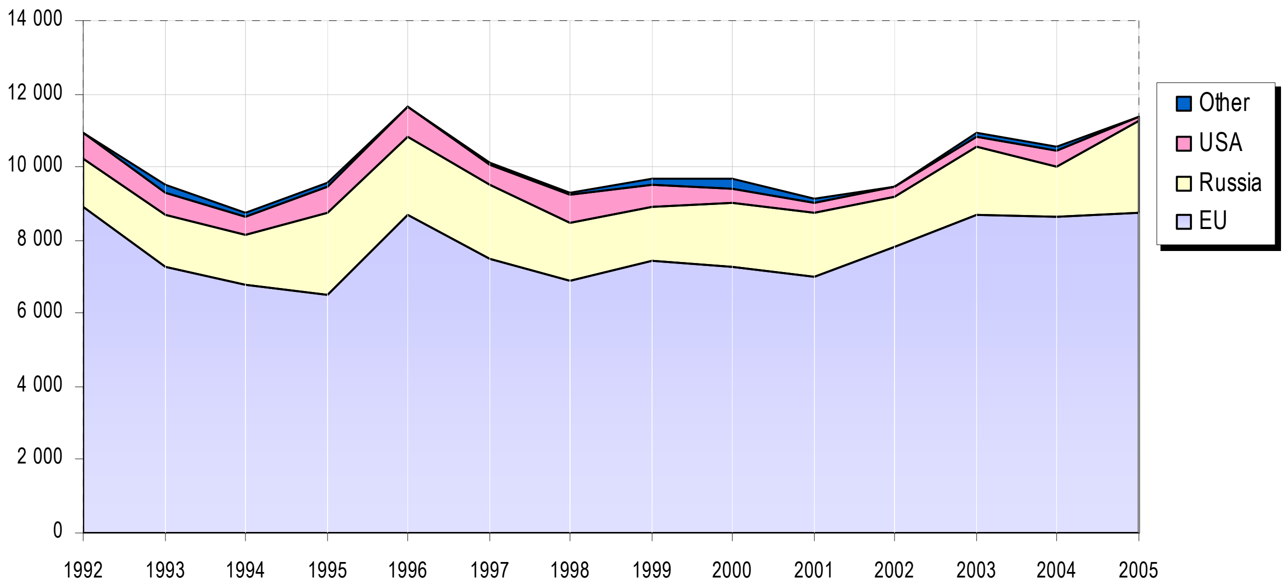
Compared with previous years, the average tails assays specified by utilities have decreased, and in most case the range is 0.25-0.30, instead of 0.30-0.35 a few years ago. This is an expected and normal result of the rising natural uranium prices and has also led to higher expectations for future enrichment requirements on the part of utilities.

Deliveries of Russian separative work to the EU-15 utilities under purchasing contracts represented 2 480 tSWU or 22 % of the total. This represents an increase from the previous year. When the new Member States are taken into account, the total share of Russian SWU's in the EU-25 is about 27 %.

Enrichment supplies from the USA accounted for about 2 % of the total in EU-25.

Supply of enrichment to EU-15 utilities by origin since 1992 is shown below.

Graph 6: Supply of enrichment to EU-15 utilities by origin, 1992-2005



(1) The tails assay used for the calculation of the natural uranium feed and separative work components has a significant impact on the values of these components. An increase in the tails assay increases the amount of natural uranium and reduces the amount of separative work required to produce the same amount of EUP. The optimal tails assay is dictated by the prices of natural uranium and separative work. For its calculations the Supply Agency used the contractual tails assay declared by the utilities or, when this was not available, a standard 0.30 %. It should also be noted that enrichers do not always use the contractual tails assay at their plants; as a result, they may become major users or 'producers' of natural uranium according to the circumstances. The real figures for supply and demand of natural uranium and separative work may be influenced in one or the other direction by the real tails assay.

Plutonium and mixed-oxide fuel

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 difficulties because of the political decisions in some countries to postpone or to abandon this solution for the management of irradiated fuels. Recently, the United States has started to reconsider its position towards reprocessing and may start to develop its fuel cycle operations in this direction.

The quantities loaded into EU-15 reactors and the estimated savings from the use of MOX fuel are shown in Table 4 (no MOX fuel is used in the new Member States). The quantity of MOX fuel loaded was 8 387 kg Pu in 2005, below the level of previous years. 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 tSWU.

Table 4: Utilisation of plutonium in MOX in the EU-15 and estimated natural uranium (NatU) and separative work savings

Year	kg Pu	Savings	
		t NatU	tSWU
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
2002	9 890	1 190	790
2003	12 120	1 450	970
2004	10 730	1 290	860
2005	8 390	1 010	670
Total	**85 590**	**10 290**	**6 845**

Chapter 4

Administrative report

Personnel

Following the transfer of the Supply Agency to Luxembourg in 2004, new staff has been recruited and the number of staff at the Supply Agency (16) is now back to the staff level it had in Brussels at the end of 2003.

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.

Costs relating directly to the Supply Agency's staff and its office are borne by the European Commission.

The Supply Agency's expenditure in 2005 amounted to 162 000 EUR, improving the budgetary execution to 80 %.

Activities of the Advisory Committee

The Advisory Committee held three meetings during 2005:

In February, an informal meeting was held at the request of ESA's Director General, in order to discuss a reflection document about the future organization and rules of the Agency, to pave the way for a revision of its Statutes, taking into account the reality of the nuclear market and industry.

The mandate of the Committee members was renewed for two years from the end of March 2005.

At its April meeting, the chairman of the Committee was re-elected, and the Committee, in fulfilment of its statutory duties, examined and gave opinions on the Supply Agency's annual report for 2004, its balance sheet and accounts for the same year as well as its budget for 2006.

Observers from Bulgaria and Romania attended the December meeting for the first time, and the Commission gave an update on negotiations between Euratom and third countries.

Joint ESA/Advisory Committee activities

Task force on security of supply

The task force, which was created jointly by the ESA and the Advisory Committee in 2003, finalised its work at the end of 2004 and the final report was published on the ESA web site in July 2005 (http://ec.europa.eu/euratom/docs/task_force_2005.pdf).
The mandate for the work and the main conclusions can also be found in the previous Annual Report covering 2004 (http://ec.europa.eu/euratom/ar/ar2004.pdf).

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http://ec.europa.eu/euratom/

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

Further information

Additional information may be found on Europa, the European Union server at http://europa.eu/index_en.htm. It provides access to the websites of all European institutions and other bodies.

The Internet address of the European Commission's Directorate-General for Energy and Transport is http://ec.europa.eu/energy/index_en.html. It contains information, for example, on the security of energy supply, energy related research, nuclear safety, and electricity and gas market liberalisation.

List of abbreviations

CIS	Commonwealth of Independent States
ESA	Euratom Supply Agency
EURATOM	European Atomic Energy Community
IAEA	International Atomic Energy Agency
(US) DOE	United States Department of Energy
(US) NRC	US Nuclear Regulatory Commission
USEC	United States Enrichment Corporation
EUP	Enriched uranium product
HEU	Highly enriched uranium
LEU	Low-enriched uranium
MOX	Mixed-oxide fuel (fuel of uranium and plutonium oxide)
RET	Re-enriched tails
SWU	Separative work unit
tSWU	tonne separative work (= 1 000 SWU)
tU	tonne U (= 1 000 kg uranium)
BWR	Boiling water reactor
EPR	European pressurised water reactor
LWR	Light water reactor
NPP	Nuclear power plant
PWR	Pressurised water reactor
RBMK	Light water graphite-moderated reactor (Russian design)
VVER/WWER	Pressurised water reactor (Russian design)
kWh	kilowatt-hour
MWh	megawatt-hour = 10^3 kWh
GWh	gigawatt-hour = 10^6 kWh
TWh	terawatt-hour = 10^9 kWh

Annexes

Annex 1: CIS supplies

A) Russian supply of natural uranium and feed contained in EUP to the EU-15

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	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
2002	3 900	600	4 500	1 000	5 500	33
2003	3 400	0	3 400	1 200	4 600	28
2004	2 400	0	2 400	900	3 300	23
2005	3 800	0	3 800	500	4 300	23
Total	**46 360**	**5 200**	**51650**	**6 950**	**58 600**	**28**

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

B) Deliveries to EU-15 utilities of natural uranium and feed contained in EUP from the CIS (tU)

Year	Deliveries to EU-15 utilities ([2])			
	Quantity tU	as % of supply ([3])	incl. RET ([4])	incl. RET as % of supply ([3])
1992	2 700	23		
1993	2 700	22		
1994	4 500	32		
1995	5 200	32		
1996	6 800	43		
1997	5 000	32	–	–
1998	5 600	35	–	–
1999	5 100	34	6 200	42
2000	5 800	37	7 000	44
2001	4 100	29	5 100	37
2002	6 900	41	7 900	47
2003	4 500	27	5 700	35
2004	2 900	20	3 800	26
2005	**5 050**	**27**	**5 550**	**30**
Total	**66 850**	**32**		

([1]) Operators include producers, users and intermediaries.
([2]) Including exchanges but excluding re-enriched tails except for 1997–98 as explained under footnote ([4]).
([3]) Supply to EU utilities covers total deliveries to EU-15 utilities under purchasing contracts during the respective year.
([4]) 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 ‘Quantity tU’ for 1997 and 1998. The figures include RET acquired as a result of exchanges.

Annex 2: EU-25 reactor needs and net requirements (quantities in tU and tSWU)

A) From 2006 until 2015

Year	Natural Uranium		Separative Work	
	Reactor needs	Net requirements	Reactor needs	Net requirements
2006	22 200	18 800	13 600	12 200
2007	21 700	18 700	14 000	12 900
2008	20 900	18 300	13 800	12 700
2009	20 700	18 400	13 200	12 000
2010	21 100	19 200	14 200	13 300
2011	20 600	17 500	13 000	12 200
2012	20 300	18 300	13 400	12 500
2013	19 700	18 000	12 800	12 200
2014	18 800	17 300	12 400	11 900
2015	18 400	16 900	12 200	11 700
Total	**204 400**	**181 400**	**132 600**	**123 600**
Average	20 400	18 100	13 300	12 400

B) Extended forecast from 2016 until 2025

Year	Natural Uranium		Separative Work	
	Reactor needs	Net requirements	Reactor needs	Net requirements
2016	18 500	17 000	12 000	11 600
2017	17 400	16 000	11 700	11 200
2018	17 300	15 800	11 400	10 900
2019	17 200	15 600	11 000	10 600
2020	16 600	15 200	11 000	10 500
2021	16 400	15 000	10 700	10 200
2022	16 400	15 000	10 700	10 200
2023	15 800	14 300	10 500	10 000
2024	15 300	13 900	10 200	9 700
2025	15 400	14 000	10 100	9 600
Total	**166 300**	**151 800**	**109 300**	**104 500**
Average	16 600	15 200	11 000	10 500

Annex 3: Fuel loaded into EU-15 reactors and deliveries of fresh fuel under purchasing contracts

Year	Fuel loaded			Deliveries		
	LEU (tU)	Feed equiv. (tU)	Enrich. eq. (tSWU)	Natural U (tU)	% spot	Enrichm. (tSWU)
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		15 400		13 500	11.5	
1990		15 000		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	9 800
1995	3 040	18 700	10 400	16 000	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	12.0	10 100
1998	2 830	18 400	10 400	16 100	6.0	9 200
1999	2 860	19 400	10 800	14 800	8.0	9 700
2000	2 500	17 400	9 800	15 800	12.0	9 700
2001	2 800	20 300	11 100	13 900	4.0	9 100
2002	2 900	20 900	11 600	16 900	8.0	9 500
2003	2 800	20 700	11 500	16 400	18.0	11 000
2004	2 600	19 300	10 900	14 600	4.0	10 500
2005	**2 500**	**21 100**	**12 000**	**17 600**	**5.0**	**11 400**

Annex 4: Supply Agency average prices for natural uranium (EU-15)

Year	Multiannual contracts		Spot contracts		Exch. rate USD/EUR
	EUR/kgU	USD/lb U_3O_8	EUR/kgU	USD/lb U_3O_8	
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
2002	34.00	12.37	25.50	9.27	0.95
2003	30.50	13.27	21.75	9.46	1.13
2004	29.20	13.97	26.14	12.51	1.24
2005	**33.56**	**16.06**	**44.27**	**21.19**	**1.24**

(*) The spot price for 2001 was calculated on the basis of an exceptionally low total volume of only some 330 tU under four 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 EUR 5.70/kgU (USD 5.10/kgU).

Annex 5: Calculation methodology for ESA U_3O_8 average prices

The Euratom Supply Agency collects two categories of prices on an annual basis:

- ESA weighted average U_3O_8 price for multiannual contracts, paid by EU utilities for their deliveries in a given year;
- ESA weighed average U_3O_8 price for spot contracts, paid by EU utilities for their deliveries in a given year.

The differences between multiannual and spot contracts are defined as follows:

- 'multiannual' contracts are defined as those providing for deliveries extending over more than 12 months;
- '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.

Methodology

Prices

Prices are collected directly from utilities or via their procurement organisations, through:

- contracts submitted to the ESA;
- end-of-year questionnaires, completed if necessary by visits to the utilities.

Data requested on natural uranium deliveries during the year

These include the following elements: ESA contract reference, quantity (kgU), delivery date, place of delivery, mining origin, natural uranium price with specification of currency, unit of weight (kg, kgU, lb), chemical form (U_3O_8, UF_6, UO_2), indication of whether the price includes conversion and, if so, the price of conversion, if known.

Deliveries taken into account

The deliveries taken into account are those made under purchasing contracts to the EU electricity utilities or their procurement organisations during the respective year. They include also the natural uranium equivalent contained in enriched uranium purchases.

Other categories of contracts are excluded ([1]).

Deliveries for which it is not possible to reliably establish the price of the natural uranium component are excluded from the price calculation (e.g. uranium out of specification or enriched uranium priced per kg of EUP without separation for the feed and enrichment components).

([1]) Such as contracts between intermediaries, sales by utilities, purchases by non-utility industries, barter deals.

Checking

ESA compares the deliveries and prices reported with the data collected at the time of the conclusion of contracts as subsequently updated. It compares, in particular, the actual deliveries with the 'scheduled deliveries' and options. Where there are discrepancies between scheduled and actual deliveries, clarifications are sought from the organisations concerned.

Exchange rates

To calculate the average prices, the original contract prices are converted into EUR per kgU contained in U_3O_8 using the average annual exchange rates as published by the European Central Bank.

Prices which include conversion

For the few prices which include conversion and where the conversion price is not specified, the ESA, given the relatively minor cost of the conversion, converts the UF_6 price to a U_3O_8 price using an average conversion value based on its own sources of information, specialised trade press publications and confirmed by discussions with the converters.

Independent verification

Two members of the ESA staff independently verify calculation sheets from the database.

In spite of all the care, errors/omissions are uncovered from time to time, mostly on missing data, e.g. deliveries under options, which were not reported. As a matter of policy, the ESA never publishes a corrective figure.

Data protection

Confidentiality and physical protection of commercial data is provided through use of stand-alone computers, not connected either to the Commission Intranet or to the outside world (including Internet). Contracts and backups are kept in a safe room, with restricted key access.

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