

THE URANIUM INDUSTRY: LONG-TERM PLANNING FOR SHORT-TERM COMPETITION

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ABSTRACT

The Uranium Industry : long term planning for short term competition

Today, uranium producers face new challenges in terms of both production (new regulatory, environmental and social constraints) and market conditions (new sources of uranium supply, very low prices and tough competition).

In such a context, long-term planning is not just a prerequisite to survive in the nuclear fuel cycle industry. In fact, it also contributes to sustaining nuclear electricity generation facing fierce competition from other energy sources in increasingly deregulated markets.

Discussion

Firstly, the risk of investing in new mining projects in western countries is growing because, on the one hand, of very erratic market conditions and, on the other hand, of increasingly lengthy, complex and unpredictable regulatory conditions.

Secondly, the supply of other sources of uranium (uranium derived from nuclear weapons, uranium produced in CIS countries, ...) involve other risks, mainly related to politics and commercial restrictions.

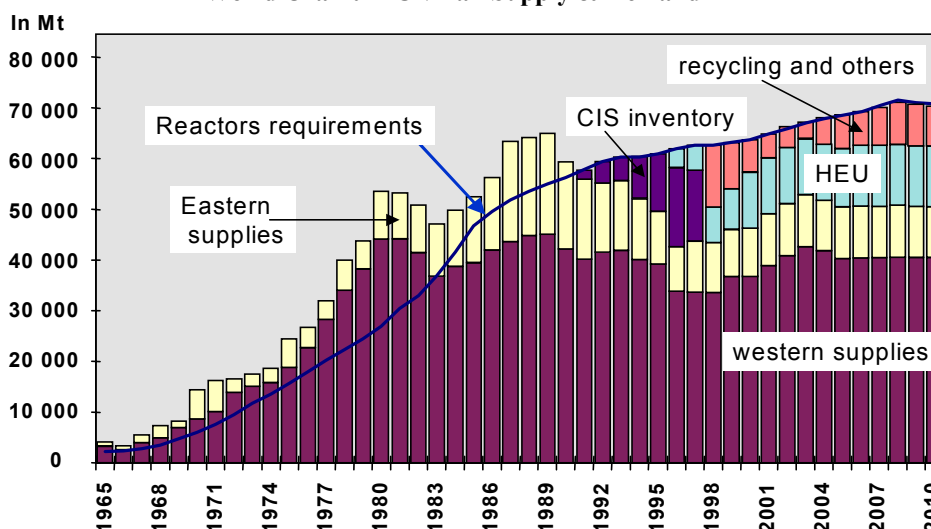
Consequently, competitive uranium supply requires not only technical competence but also financial strength and good marketing capabilities in order to anticipate long-term market trends, in terms of both demand and supply. It also requires taking into account new parameters such as politics, environment, regulations, etc.

Conclusions

Today, a supplier dedicated to the sustainable production of nuclear electricity must manage a broad range of long-term risks inherent to the procurement of uranium.

Taking into account all these parameters in a context of short-term, fast-changing market is a great challenge for the future generation.

World Uranium Civilian Supply & Demand



INTRODUCTION

To what extent are nuclear electricity market evolutions reflected in the strategy of fuel cycle suppliers ? To what extent do primary suppliers of nuclear fuel cycle products and services contribute to sustaining nuclear electricity competing with other electricity sources? This paper typically will concentrate on illustrating this problematic in terms of production and procurement of uranium. Therefore, it will focus mainly on the following points:

- 1) What are the major trends currently applying to the Uranium Market?
- 2) How and to what extent are expected trends of uranium supply and demand reflected in the long-term strategy of the uranium producers ?
- 3) How and to what extent does the uranium producers' long-term strategy contribute to the near to long-term competitiveness of the nuclear electricity ?

URANIUM MARKET EVOLUTIONS

As a major element for characterisation of the uranium market, the evolution of past and expected world uranium requirements (over a 30-year period) is worth focusing on. Uranium requirements are linked directly to the operation of nuclear power plants, with uranium being used as fuel for the production of power. Consequently, the leading trends observed in terms of evolution of nuclear electricity capacity also relate to uranium requirements. Fig. 1 illustrates the main trends in terms of world uranium requirements (i.e. required consumption of uranium) :

- 1) nuclear power programs enforced over the last 20 years have led to the doubling of total world

uranium requirements from 30,000 MtU to more than 60,000 MtU over the same period

- 2) world uranium requirements will presumably slightly increase in the next 10 years to about 70,000 MtU due to the further development of nuclear power programs in Asia (mainly in Japan and in China) ; uranium requirements in Europe and America are expected to stabilise over the same period.

Trends in the supply of uranium

As shown on Fig. 2, current uranium requirements are fulfilled by a huge diversity of supplies. We usually group these supply sources into two main categories:

- 1) primary production of uranium (i.e. current mining of uranium)
- 2) secondary supply of uranium (i.e. supply from existing stockpiled uranium or former military material converted into civil-use uranium)

The past 20 years of overproduction of uranium (in the light of the oil crises, nuclear power programs turned out to forecast a much more drastic rise in the nuclear capacity and consequently featured uranium as a strategic material in Nations' interests) led to building up huge stockpiles of material. More recently, the move of major countries towards a much more balanced energy mix and the political will to dismantle nuclear arsenals have led to considering the existence of huge quantities of "unproductive" stockpiled uranium. The increasing share of secondary supplies of uranium has been the major market trend for 10 years now: secondary supplies include uranium stockpiles built up mainly by utilities and producers, uranium State inventories, nuclear products stemming from the reprocessing activity and recycled into

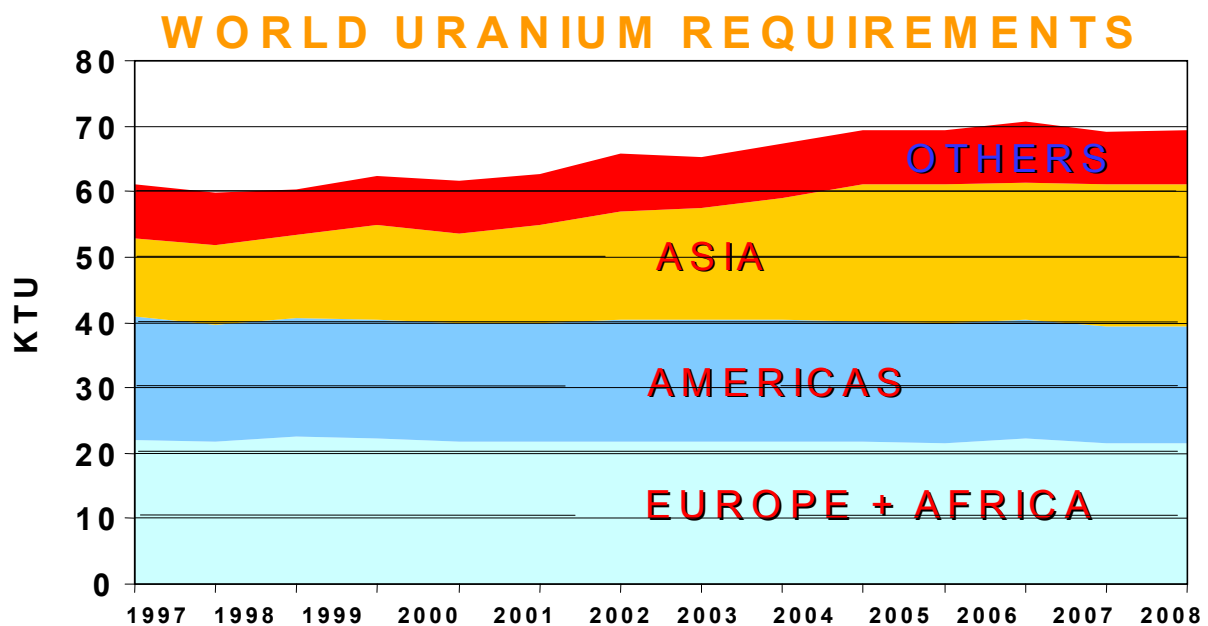


FIGURE 1. Tthis graph shows the expected evolution of world Uranium requirements

reactors as fuel, uranium stemming from the destruction of nuclear weapons. One of the typical features associated with the secondary supply of uranium is that it brings a mostly short-term oriented view on the market (occurrence of corresponding events may be rather unpredictable and “once decisions have been taken, please enforce them rapidly”).

As a direct consequence of the steady increase in secondary supplies, the share of the primary production of uranium has been steadily reduced over the last 20 years. Today, Western primary production of uranium contributes to only 50% of total uranium supply (i.e. 30,000 to 35,000 MtU/year). Given the expected slight

increase of uranium requirements over the next 10 years and the stability of secondary supplies over the same period, it is very likely that current level of primary production will be further needed in the next 10 years.

Trends in the regulatory framework

This stable level of primary production of uranium has already to be guaranteed today within an increasingly constraining regulatory framework, as illustrated in Fig. 3. It results in higher administration costs and increasing administrative periods for the development and the operation of mine ore-bodies.

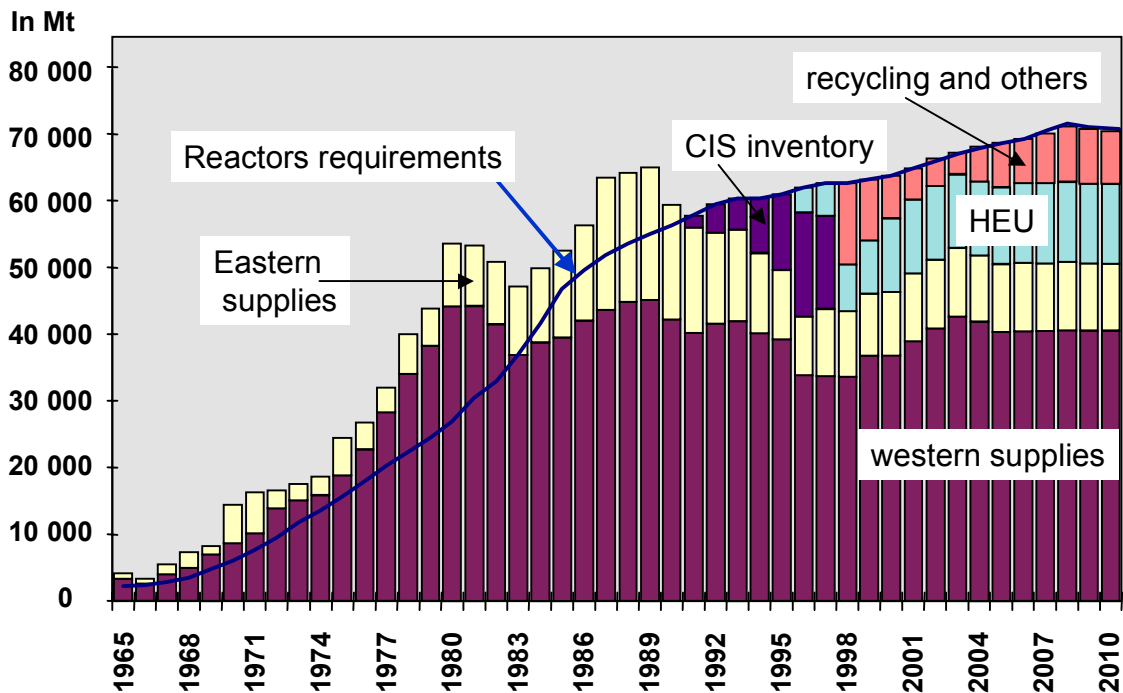


FIGURE 2. This graph shows the evolution of world uranium supply and demand

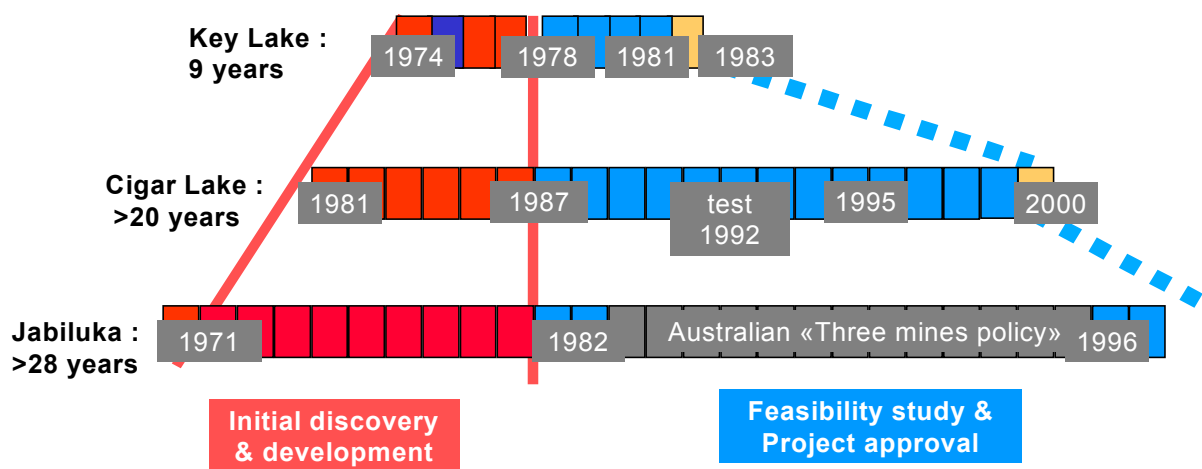


FIGURE 3. This graph shows the evolution of lead-times from discovery of mines to uranium production

Trends in the demand for uranium

Newspapers headlines make it clear everyday: electricity producers are facing a drastic market evolution with few certainties even in the short-term and a jump in a “deregulated market” as the main features. In this relatively new framework, nuclear electricity already has to compete with other electricity sources, mainly in terms of competitiveness and flexibility. Arbitrage between existing and new electricity production sources, as well as between own production and external procurement is likely to become a driving force within utilities in the coming future. This trend will be increasingly reflected in nuclear utilities’ purchasing policy.

As a main consequence of this longstanding trend, utilities reflect the short-term view stemming from the sale of kWh into their procurement of fuel. Obvious features of this increasing trend are mainly the request for lower fuel prices and ever increased reactivity (response time, creativity, flexibility).

A.m. trends (increasing share of secondary supply, ever more constraining regulatory framework) all drive the market into the same direction, i.e. increasing the financial, political, environmental and regulatory risks taken care of by primary producers of uranium. In the future, it seems clear to us that primary producers will further participate in the market **only** with increased financial capability, a geo-strategically diversified supply portfolio and a long-term planning strategy (with decisions to be taken typically 15 to 20 years ahead of the expected effective date).

RENEWAL OF LONG-TERM SUPPLIES

The HEU Feed deal

In many respects, the recently finalised “HEU Feed deal” is worth being discussed here further in details. A political agreement concluded in 1993 between the US

and Russia gave rise to the dismantling of Russian Nuclear Weapons, thereby bringing a total 500t of HEU into the civilian nuclear market over a 20-year period (equivalent to ~150,000tU as UF₆ and ~92MSWU). Whereas the commercialisation of the SWU component was awarded to USEC in 1996, the reasonable marketing of the natural uranium in the UF₆ form belonging to Russia led to the conclusion of a commercial agreement between COGEMA, Cameco and Nukem on the one hand and Tenex, the commercial arm of the Russian MINATOM, on the other hand in 1999.

Feedback from the past :

The agreement will contribute to reducing nuclear weapon grade material stockpiles. It will thereby help manage the past overproduction of uranium for military purposes on a civilian ground, while simultaneously lift at least partially the huge uncertainties clouding the uranium market before the agreement was signed. This will be beneficial not only to the signatories, but also to all market participants.

Long-term planning and short-term competition :

Under the terms of the agreement, the 135,000 tU left will be marketed reasonably by the three Western companies and Tenex over a 15-year period. The Western companies have **exclusive options** to purchase a total 100,000 tU on a yearly basis over the 15 remaining years of the HEU agreement, while Tenex will retain a balance of about 35,000 tU for its own commercial purposes. Further to these frame conditions, the creation of stockpiles in both the USA and Russia will extend the sales of substantial amounts of natural UF₆ in the market over a longer period :

- in the US, a stockpile of about 22,000tU will be withdrawn from the market for a 10-year period.
- in Russia, a monitored stockpile made up of the natural UF₆ not purchased in the US by the three

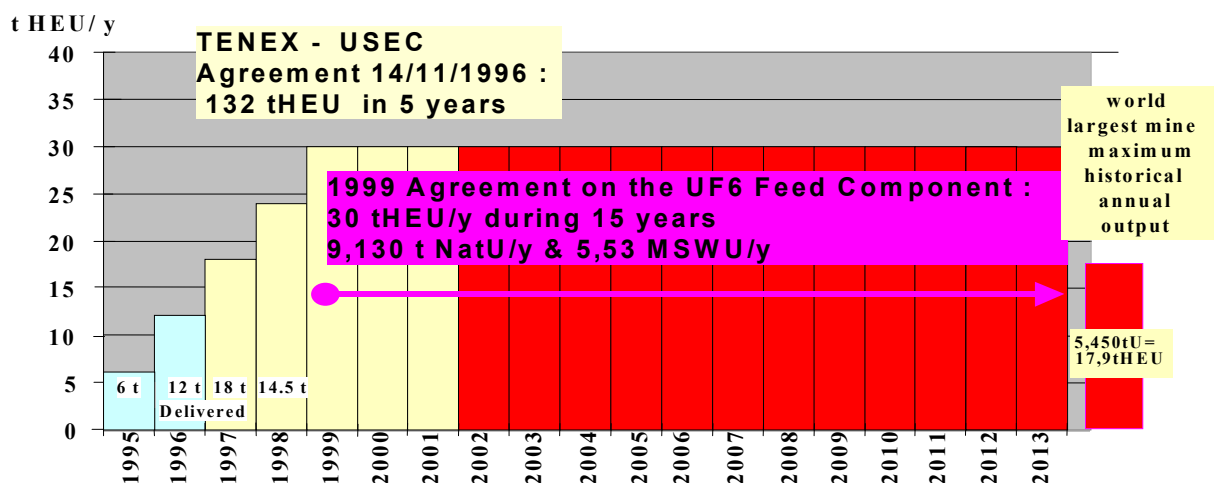


FIGURE 4. This graph shows the impact of the “HEU Feed Deal” on the Uranium Market

western companies and sent back to Russia will reach at least the same amount before the Russian side will be given the right to commercialise the excess uranium under its existing contracts. From this stockpile, the Russians can use a 2,580 tU/year allowance for further HEU blending purposes.

Simultaneously with the providing of market stability to all participants, the commercial agreement also enables further competitiveness since the purchase price of the UF₆ is based on market conditions. Access to related quantities of natural UF₆ provides to each of the two main primary producers of uranium a supply equivalent to a new mid-size uranium mine.

Primary production of uranium

Taking into account Western companies' current supply portfolio and the stable level of primary production required in the future leads to the conclusion that primary producers will have to further renew their uranium ores put into operation to compensate for the reduction in the production of uranium stemming from existing mines (cf Fig. 5).

This actually is not much of a surprise and constitutes only the extension of a drastic move already being enforced for 10 years now within the COGEMA Group. Rationalisation of production on existing mines, start of production on then ongoing projects and reinforcement of the Group's resource basis in the best category have been the leading patterns since the early 90's, as illustrated in table 1.

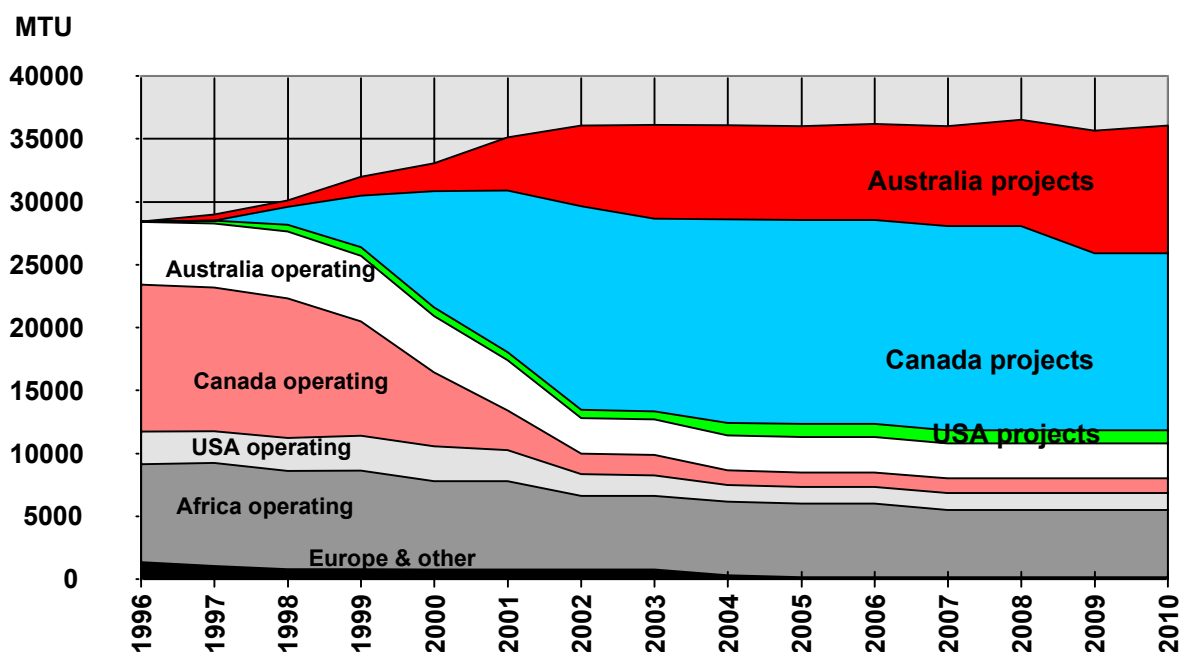


FIGURE 5. This graph shows the expected evolution of uranium production in Western countries

TABLE 1. This table shows the evolution of COGEMA's uranium production portfolio

Country	Company	Mine	COGEMA share %	Reserves tU 1/99	Grade %U	Mining Method	Production Capacity tU/y	Start up year	1 999 production tU
France	SMJ	Jouac	100	1 030	0.5	Underground	500	1978	440
Niger	Cominak	Akouta	34	46 000	0.5	Underground	2 200	1978	1 910
		Arlit	61,4	19 500	0.25	Open pit	1 500	1971	1 000
Gabon	Comuf	Mikouloungou	68,1	380	0.25	Open pit	750	1961	300
USA	Malco	Christensen	71	8 000	—	ISL	690	1989	60
Canada	CRI	Cluff Lake	100	3 300	0,7	Underground	1 900	1980	1 250
		Key Lake	16,7	4 000	1,3	Open Pit	5 400	1980	400
		McClellan	70	19 300	2,2	O/P & Underg.	2 300	1999	—
		Mc Arthur	30.2	185 000	12,2	Underground	6 920	1999	—
		Midwest	76	13 000	3,8	Underground	2 150	—	—
		Cigar Lake	37	135 000	11,6	Underground	6 920	2002	—
Kazakhstan	KATCO	Muyunkum	45	N/A	—	ISL	N/A	—	—
Total				434 510			31 230		5 360

CONCLUSION: THE SUPPLY MARKET

We believe that the nuclear utilities' search for short-term optimisation testifies that they are confident in the stability of the procurement market on the long run. This is guaranteed by the producers' long-term strategies and their taking care of the major risks (financial, political, technological, environmental and regulatory risks) associated with the production and supply of front-end products, amidst which uranium concentrates. Actually, this testifies also that the primary production of uranium has a future, associating probably more numerous competencies than in the past.

In the coming future, uranium producers' environment will be increasingly driven by the need for

arbitration between new investment needs (development of future production and new technologies, evolution of resource portfolio) and reasonable secondary supplies taking into account current and future market reality. Actually, the same trend applies to our customers, i.e. utilities, regarding their mix of energy production sources. This is a good sign for improved mutual understanding in the customer-supplier relationship in the nuclear electricity sector and is likely to lead to increased co-operation between utilities and uranium producers. It will undoubtedly contribute to the further competitiveness of nuclear electricity, thereby helping maintain and renew nuclear generation assets.