

Nuclear fuel supply

# World enrichment over-capacity

Brussels

The Euratom Supply Agency, which has the sole right to negotiate nuclear fuel supply contracts for Euratom's 10 member states, points out in its annual report for 1981 that EEC is in danger of creating an overcapacity of nuclear fuel enrichment services. Last year EEC registered a positive trade balance of 2,200 tonnes SWU (separative work units) compared with its own requirements of 4,500 tonnes. By 1984 the European Community could have a capacity of 11,800 tonnes and an internal demand of 7,400 tonnes.

The over-capacity is likely to become more of an embarrassment, since Japan and Brazil, which until now have been in the market as buyers, have decided to build their own enrichment plants. What is worse is that Australia, which has signed a long-term supply contract with EEC, plans to upgrade locally the uranium it mines, and detailed studies are already under way for the construction of a plant for isotopic separation. This may create political problems as some of Euratom's member states would prefer to keep separate the purchase of natural uranium and enriched uranium for security reasons.

By 1990, according to the Euratom

Supply Agency, world enrichment capacity is likely to be around 49,650 tonnes SWU compared with the 1980 figure of 36,150 tonnes. The United States still dominates the industry with a 27,300 tonne capacity but from 1989 onwards France will be capable of enriching 13,300 tonnes.

The prospect of competition from France may have a significant impact on the costs of enrichment. The price of the US Department of Energy's enrichment services is steadily increasing, reports the Euratom agency. The cost per SWU rose by 27.4 per cent last year (from \$111.75 to \$141.14) and the Department of Energy announced a further price rise for 1982. These price rises have been further exacerbated by the decline in the value of the European Currency Unit (ECU) against the dollar so that enrichment costs at the "front end" of the fuel cycle now exceed 40 per cent of the total cost of operations while the natural uranium component has for the first time fallen to below 40 per cent of the cost. Uranium users have therefore been hanging onto their stocks of natural uranium rather than enriching it prematurely.

The price of plutonium has also fallen, from \$10 to \$4 per gramme of Pu fissile

## Uranium enrichment in Euratom nations (tonnes SWU)

	Production	Requirement	Balance
1978	—	1,400	-1,400
1979	2,600	3,200	-600
1980	6,000	3,900	+2,100
1981	6,700	4,500	+2,200
<i>Capacity</i>			
1984	11,800	7,000	+4,800
1985	11,800	7,400	+4,400

material, and the Euratom agency predicts that in future the supply of plutonium could considerably exceed that required by fast reactor programmes. Similarly, natural uranium is also likely to remain a buyer's market with an excess of supply over demand. Prices have remained stable, with world stocks of natural and enriched uranium now equivalent to more than three years' consumption. Deliveries of natural uranium to Euratom countries amounted to 13,000 tonnes in 1981 and this is likely to drop to 10,750 tonnes by 1983.

Jasper Becker

## French nuclear power

# EDF's setbacks

Electricité de France (EDF) is having increasing trouble with some tiny but important parts of its pressurized water nuclear reactors, which were due to provide half of France's electricity by next year. In fact the problem is so worrying that EDF says it will have to close down 20 stations for repair between 1983 and 1984, with a total loss of some 22 operational reactor-months.

The pieces are clips which hold up guide tubes for the control rods — rods which must be driven or dropped into the reactor core to close down the nuclear reactor in case of accident. In January, pieces of one of these clips were found lodged in an emergency cooling pipe in one of the reactors at Gravelines, and since then other broken clips have been detected at Fessenheim and in two reactors at Bugey. The loss of the clips is potentially dangerous — they could block the proper entry of the control rods, or, by circulating in the cooling system they could damage pumps and valves.

Moreover, it seems that the broken clips had no individual faults: the error appears to have come in the choice and treatment of the clip material (which is exposed to high temperatures and radiation levels in the reactor). That is why the clips must be replaced in all 20 reactors where the material was used, at a cost (mostly in lost electricity production) of at least FF 1,000 million.

The incident illustrates one of the dangers of the massive French nuclear programme, which reduced costs by using long series production of a few single designs. If the design is wrong, all fail at once. "This just shows how the French nuclear industry has all its problems yet to come" said one commentator this week. Robert Walgate

### Projected world enrichment capacity (tonnes SWU)

	1981	1982	1986	1987	1988	1989	1990
Eurodif (France)	10,000	10,800	10,800	10,800	10,800	10,800	10,800
Urenco	550	750	2,100	2,300	2,700	3,000	3,300
DoE diffusion (US)	26,900	27,100	27,300	27,300	27,300	27,300	27,300
DoE centrifugation (US)	—	—	—	—	1,100	2,200	2,200
Technabexport (USSR)	3,000	3,000	3,000	3,000	3,000	3,000	3,000
PNC (Japan)	—	—	100	100	250	250	250
UCOR (South Africa)	—	—	—	—	100	100	100
Nuclei (Brazil)	—	—	100	200	200	200	200
Coredif (France)	—	—	—	—	—	2,500	2,500
<b>Total</b>	<b>40,450</b>	<b>41,650</b>	<b>43,400</b>	<b>43,700</b>	<b>45,450</b>	<b>49,350</b>	<b>49,650</b>

## India embroiled in nuclear politics

Bangalore

After more than three months, negotiations between India and France over the supply of enriched uranium for India's troubled nuclear power station at Tarapur have reached stalemate. France is insisting on operating the safeguards laid down by the International Atomic Energy Agency (IAEA), aimed at limiting the spread of nuclear weapons. To the Indian negotiators, however, such restrictions imposed by Western countries on the supply of nuclear fuel "devalue India's national prestige" by asking for "humiliating terms and conditions".

The negotiations, described by India's Foreign Minister Mr Narashima Rao as "a tortuous process", did see some compromises made by France on the matter of reprocessing spent fuel in India. But these proved insufficient to break the

deadlock, with India being particularly unwilling to comply with France's alleged insistence on a written undertaking that India will not carry out any further testing of nuclear bombs.

The Indian government is also in disagreement with the Soviet Union, having declined a Soviet offer to build a 1,000-MW nuclear plant in India, despite its problems in obtaining enriched uranium for its Tarapur plant. The Soviet offer, made previously when Mr Morarji Desai was Prime Minister, was renewed during Mrs Indira Gandhi's recent visit to Moscow.

Like France, the Soviet Union is insisting on the IACA safeguards. In the face of restrictions from both East and West, members of India's parliament have called for a speeding up of plans to develop MOX, an indigenous fuel supply.

B. Radhakrishna Rao