

A future for South Africa's nuclear agency?

Pelindaba. When South Africa's new government takes office in May next year, one of its first tasks will be to assess the future of the three strategic energy industries created by the National Party government. Two of these, SASOL and MOSSGAS, recover oil from coal and natural gas respectively. The third is the Atomic Energy Corporation (AEC), which occupies a vast site at Pelindaba, 20 km west of Pretoria in the foothills of the Magaliesberg mountains.

This year, the AEC will receive a R469 million (US\$142 million) government subsidy, a third of which comprises interest and loan repayments guaranteed by the state. A new government can but honour these repayments if it wishes to remain creditworthy. The question is whether it will continue to subsidize operating costs to maintain a nuclear industry, or cut its losses by simply writing off the capital repayments.

The AEC's own programme aims to make the organization 75 per cent self-sufficient, in terms of running costs, by the turn of the century. Exempt from tax, last year it generated just under 30 per cent of its operating budget, or R177 million, from sales, just under 60 per cent of which were of nuclear fuel products. The balance comprised irradiation products and services, fluorochemicals and industrial products arising from the corporation's expertise in aluminium welding. But now, the AEC sees its salvation in the non-nuclear sector: it hopes to double its sales in the current financial year.

The highly enriched uranium (HEU) used to manufacture South Africa's nuclear devices, now back in the hands of the AEC, is being used to re-load the SAFARI-1 reactor. Commissioned in 1965, that was designed to run on 93 per cent HEU, but has been running on 45 per cent HEU since the United States stopped supplying SAFARI in 1976. The bomb material will be sufficient to supply the reactor for the rest of its lifetime, estimated at between 15 and 20 years.

The two main uses of the reactor are the production of medical and industrial isotopes, and the irradiation of silicon for the manufacture of power-rectifiers. The reactor is currently operating at about one-fifteenth of its capacity in each area, and last year produced sales of only R5 million from isotopes and R1 million from silicon irradiation. The problem is that the South African market for isotopes is small and that for silicon irradiation almost non-existent. But Don Mingay, SAFARI's manager, hopes to be able to increase exports by capitalizing on a predicted global shortage of neutrons when the Belgian BR2 reactor closes in 1996.

The nuclear fuel section contains three plants: one for conversion of feed material

to uranium hexafluoride, the Z-plant, where enrichment is performed by the stationary-wall centrifuge process (developed in South Africa), and a fabrication plant, where fuel rods are manufactured.

The Z-plant appears doomed: the chief of the AEC's nuclear fuels division, Piet Venter, concedes that it is too energy-intensive to be viable under any circumstances. Even under an agreement this year by which the Electricity Supply Commission (ESCOM) supplies the AEC at a cheap rate, the plant is expected to generate income



Michael Cherry

Dr Anthony Jackson, head of the AEC's business development unit.

from sales of only R80 million, compared with operating costs (excluding capital depreciation) of R134 million.

Nobody will say exactly how much energy Pelindaba's Z-plant consumes. But it is a remarkable irony that the AEC uses one per cent of ESCOM's total electricity production, only 3.3 per cent of which is generated by Koeberg, its single nuclear power station. Venter says that the technology would have been economically viable if the plant had been constructed to produce five million separative work units (SWU), as originally planned. Currently, it is producing 300,000 SWU annually, which represents three-quarters of its full capacity.

Somewhere along the line, a decision was taken to scale down the capacity dramatically, but it appears that its cost-effectiveness was never reassessed. More likely, this was not really the issue: the project was essentially an expensive smokescreen for

the pilot plant, which used the same process (on a smaller scale) to enrich uranium for weapons manufacture (see *Nature* 362, 384; 1993).

The decision on whether to close the Z-plant may even end up on the agenda before the government changes hands next year. The fate of the conversion and fabrication plants is less clear-cut. Both would be viable if South Africa were to build a second nuclear power station, but that is unlikely before 2000, even if the new government deems it politically acceptable.

Although both plants could break even through exports, these are prohibited in the case of the fabrication plant; it is a condition of the technology transfer that fuel elements can be sold only in South Africa. The AEC has applied for a review of this provision, which is currently being considered.

Another potential area for cutback is in the AEC's R80-million research and development budget, half of which is at present being spent on the development of a molecular laser uranium enrichment process. Current plans are to fund the project for two more years at this level, with a prototype due to be running by 1995. The corporation had hoped eventually to replace the Z-plant with one using molecular laser enrichment.

But AEC's chief executive, Waldo Stumpf, says that the future of the project will depend on whether the private sector will finance it on a commercial basis. He claims that the AEC has overcome three major technical problems in molecular laser enrichment: the micro-aerodynamics of flow cooling, repeating laser pulses at 2 kHz and controlling uranium hexafluoride concentration in the flow-cooling network. But others, both within and outside the AEC, ask whether another expensive artefact of South African isolation is being nurtured.

Can the AEC turn itself into a viable organization? Both the corporation's management and its board, says Stumpf, are "very painfully aware of the non-commercial decisions and over-investment in the middle seventies". The AEC has cut its staff from more than 8,000 in 1986 to a little over 3,000 today. But opulence persists: the Pelindaba parking-lot is replete with luxury models of German motor cars.

Michael Cherry

Correction: ESO negotiates with Chile over agreement on telescopes

This news article (*Nature* 363, 384; 1993) incorrectly reported that the European Southern Observatory (ESO) site at Paranal in Chile was bought by ESO twice, from different private owners. This is true of the La Silla site; the Paranal site was donated to ESO by the Pinochet government. □