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U R A N I U M

by

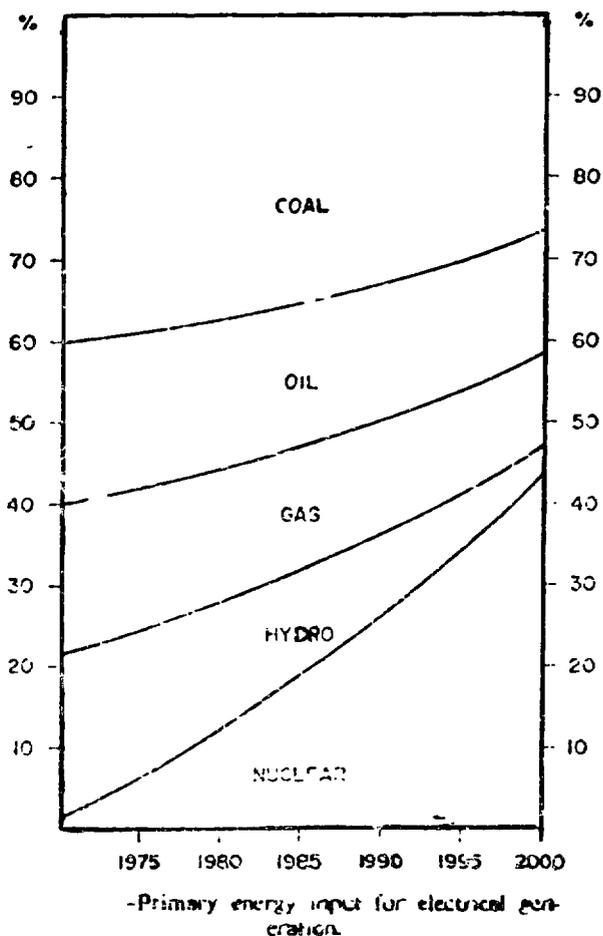
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The major use for uranium is as a fuel in the generation of electricity and consequently, the future demand for uranium will be determined by the rate of electricity consumption. The main factors influencing energy consumption are economic prosperity and population increase. Therefore GNP is a very good guide to energy usage and there has been a remarkable one to one relationship in industrialised countries with increased energy consumption being directly proportional to increased real income.

The primary energy consumption of the world is increasing at about 4.5 per cent per annum but electricity is being consumed at a greater rate of 7 per cent which means that consumption roughly doubles every ten years.

Growth in electricity demand in the future will see a change in the make-up of the primary energy sources used in world electrical generation.



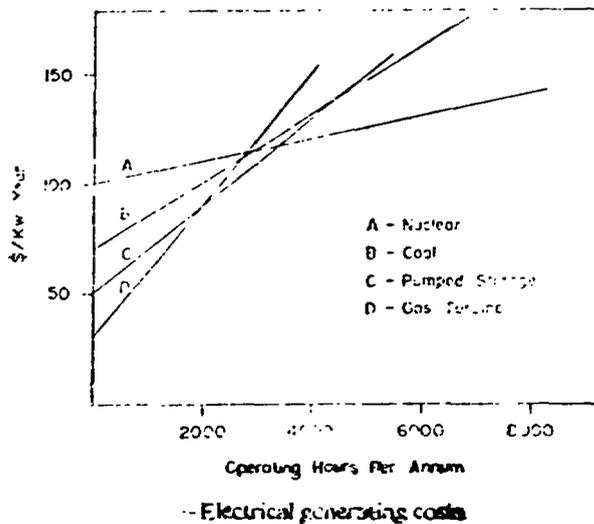
Nuclear power will make a major contribution, rising from about 5 per cent now to about 45 percent in the year 2000. Over the same period, coal's share will decline from 40 per cent to about 26 per cent but, in absolute terms, coal supply will still increase by 3 per cent per year.

While coal resources might appear adequate to fulfil the increase in world electricity consumption, many factors will constrain a full exploitation and utilisation of these resources. The major constraints to coal supply are the disposition of resources, reluctance by many producers to lift exports, shortage of workforces, inadequate transport systems and, most importantly, the environmental factors.

Oil and Gas and Hydro production will not be able to match the continued growth of electricity production and their relative share of total demand will consequently decline.

Fifty three countries are committed to nuclear energy. Worldwide there are now 219 reactors licensed to operate and 244 under construction. On top of that, there are about 100 on order and over 200 reactors planned.

Electricity can be produced at cheaper cost from nuclear power stations than from any other source.



(Ref: Atlantic Council of the United States)

This slide shows the advantage of nuclear in base load generation. Take say 6,000 operating hours per annum and nuclear is about 25 per cent cheaper than generating electricity from coal.

The next slide shows comparative costs in the U.S.A. and U.K. Nuclear is significantly cheaper than other fossil fuels.

*Electrical generating costs*

	U.S.A. (cents per kWh)	U.K. (pence per kWh)
Nuclear	1.5	0.69
Coal	1.8	1.07
Oil	3.5	1.27

In recent time, there have been many reports of an impending energy gap. Obviously there is a need for very substantial re-adjustments in both supply and demand and only nuclear, and to a less extent coal, have the capacity to meet this gap.

America, Japan and countries of Western Europe in the 1960's had seen an oil shortage looming. In these countries we have seen steady growth of nuclear capacity.

In the United States, the long term electricity supply has become of great concern over the past year. The U.S. faces the grim prospect of power shortages in the early 1980's, according to a new forecast by The National Electric Reliability Council. A major reason is that new capacity for nuclear, and coal, is behind schedule due to Government regulations, financial problems, fuel supply uncertainties and public opposition to various aspects of power generation and transmission.

The United States is the most important country in the nuclear field. At the end of last month there were 72 commercial reactors operating in America and, as a proportion of total electricity generated, nuclear was 13 per cent. There were another 88 reactors under construction (more than ever before) and 38 on order. In ten years time, the United States will be drawing more than 20 per cent of its electrical energy from nuclear plants with a capacity of 830,000 MWe. By the end of the century the nuclear contribution will exceed 30 per cent.

A similar pattern is emerging in other countries as well. In Japan where current nuclear capacity is 8000 MWe, growth in electrical consumption and a shortage of fossil fuels will see nuclear grow to 150,000 MWe by the year 2000 or 40 per cent of electrical generation. Nuclear power will account for 25-30 per cent of total European electricity consumption in the nineties. The EEC countries together with Spain, Sweden and Switzerland, have vigorous nuclear power programmes.

In these countries which have experienced considerable nuclear growth, there are several factors of note. There is the concern for conservation of fossil fuel, yet there is a recognition of the need to maintain energy supplies and expand gross national product. High priced energy or alternatively, conservation programmes, could affect demand for energy which, in the extreme, could have a reverse effect on GNP and employment.

The reports of the Windscale Inquiry in Great Britain and The Cluff Lake Board of Inquiry in Canada, canvassed the issues in The Nuclear Power Debate - moral and substantive, from uranium to plutonium reactors, from reactor safety to terrorism, weapons proliferation and waste disposal. Carefully and meticulously they separated fact from fiction, reality from emotive and unsubstantiated claims. That the projects at the centres of these inquiries were given the go-ahead adds weight to the acceptability and the need of the world for nuclear power. My best estimate in the future demand for uranium in the Western World is shown on the next slide.

*Western world uranium demand 1977-2000  
('000 tonnes uranium)*

1977	25
1980	38
1985	72
1990	144
2000	260
cumulative	3031

Australia's future markets for uranium lie mainly in the U.S.A., Japan and Western Europe. Because of existing uranium supply contracts, these markets offer only limited prospects for Australian exports in the early 1980's. There has been much speculation in recent times that market estimates have been revised downwards. This is so, but predominantly in the short-term. Long term prospects for uranium sales through nuclear programmes overseas still offer the opportunity to sell all Australian output by the 1990's - say 13-15 years from now. This situation is enhanced by the fact that cumulative demand by the end of the century greatly exceed presently known low cost reserves.

My best estimate of future sales is shown on the next slide.

*Summary of possible Australian U<sub>3</sub>O<sub>8</sub> sales  
('000 tonnes/year)*

	1985	1990	1995
U.S.A.	1	5	7
Japan	2.5	5	8
W. Europe	6	13	15
Other	—	2	2
Total	9.5	25	32

Australia could expect sales that would allow our mines to produce 9,500 tonnes of uranium in 1985 building up to 32,000 tonnes per annum by 1995.

The market will influence the development of Australian deposits. As you would know, the Fox Report of the Ranger Environmental Inquiry recommended to the Government that sequential development of Australia's uranium deposits be adopted principally for social and environmental reasons. In its policy announcement of August 25, 1977, the Government did not accept that recommendation, believing that market and environmental factors would work to that effect anyway. However, it is in the interests of producers and buyers of uranium that supply and demand be in equilibrium, without wide fluctuation. Without such a policy, it would be disastrous to see all Australian uranium producers come on stream at the same time competing with each other in a limited market up to 1985.

There are six major uranium deposits, representing nearly half a million tonnes of uranium, waiting development in Australia. The present status of each is follows:-

#### RANGER

The deposit was first discovered in 1970 and contains announced resources estimated at 100,350 tonnes of  $U_3O_8$ . Equity in the project is held to the extent of 50 per cent by the Commonwealth Government and 25 per cent each by Peko Wallsend Operations Ltd and Electrolytic Zinc Company of Australasia Ltd.

Development of the deposits rests on the signing of an Agreement with the Aborigines. Between May and August 1978, the Commonwealth Government entered into detailed negotiations with the Northern Land Council pursuant to Section 44 of the Aboriginal Land Rights Act. The outcome of these negotiations was an Agreement which was initialled on 25th August 1978 by the leaders of the negotiating teams and approved for signature at a meeting of the Northern Land Council on 14th September. Formal execution of this Agreement has been delayed by an interim injunction taken out in the Northern Territory Supreme Court on 19th September, calling on the Council to show that the Agreement was reached in accordance with Section 23 of the Aboriginal Land Rights Act.

Construction could start next year and Ranger could be in production by 1982 at the rate of 3000 tonnes per annum of  $U_3O_8$ .

#### JABILUKA

Pancontinental Mining Ltd. found its deposit in 1971. It has the greatest

announced reserves of any Australian deposit at 207,400 tonnes  $U_3O_8$ . Pancontinental has submitted a Draft Environmental Impact Statement in December 1977 in accordance with The Environment Protection (Impact of Proposals) Act 1974, administered by the Commonwealth Department of Environment, Housing and Community Development.

The Draft Statement was open for public inspection earlier this year and the Company is presently engaged in completing The Environmental Impact Assessment procedures for final submission to the Minister.

When approval is given negotiations with the Northern Land Council will start. The construction period could be 2 to 3 years.

The project recently received a set back when the Commonwealth Government withdrew approval for Pancontinental to extend the Arnhem Highway to the project site.

#### NABARLEK

This deposit was discovered by Queensland Mines Ltd. in 1970. Some Aborigines have said that because of its relatively small size, they would like it to be established first.

The Draft Environmental Impact Statement was submitted in December 1977 and, like Pancontinental, Queensland Mines would need to have E.I.S. approval as well as an Aboriginal Agreement before it could be in production. It is still possible that Nabarlek could be in production before Ranger. It has the highest grade of the Australian deposits and could be worked out in less than ten years, failing any addition to reserves which are presently estimated at only 9,100 tonnes  $U_3O_8$ .

#### KOONGARRA

The fourth of the Northern Territory deposits, Koongarra was discovered by Noranda Australia Ltd in 1970. It is some way from development but will submit its Draft Environmental Impact Statement before the end of 1978.

#### YEELIRRIE

The Western Mining Corporation Ltd. deposit found in Western Australia in 1972. The required Environmental Review and Management Programmes and Draft

Environmental Impact Statement for The Metallurgical Research Plant to be situated at Kalgoorlie and for the Yeelirrie Project, were submitted to the Western Australian and Commonwealth Governments in June 1978. Western Mining has recently reduced its equity to 75 per cent with Esso Exploration and Production Australia Inc. taking 15 per cent and Urangesellschaft mbH & Co. K.G. taking 10 per cent.

It is important to realise that funding of resource projects in Australia is becoming increasingly difficult and Western Mining Corporation has arranged its 75 per cent outlay to be secured against its share of the Yeelirrie Project assets - 35 per cent coming from pre-payments for sales to Esso and the balance from other customers. In other words, Western Mining's contribution to the project is similar in a way with 72.5% capital costs being provided by the Government for 50% of the equity. The final choice of the circuit to be used at Yeelirrie will be made after a 1 tonne per hour pilot plant test programme is completed. The pilot plant is to be established at Kalgoorlie.

#### BEVERLEY

The sixth major deposit and located in the Lake Frome Region, South Australia is under the control of Oilmin N.L./Western Uranium Ltd and was discovered in the late 1960's. With the present attitude of the South Australian Government, development would seem some way off. I believe that if the South Australian Government was to change its views, the project could be brought into production in a reasonably short time.

It is fascinating to reflect on the changing political scene for uranium. The Federal Labour Government in 1974 dictated that it had a right to participate in Northern Territory projects and acquired an interest in the Ranger deposit. Nowadays uranium development is not a popular subject in the Australian Labour Party. Paradoxically, could be said that Australia's uranium mining industry had its origins in South Australia. It began with money provided by the United Kingdom Government in the Second World War. The South Australian Government pursued a programme of continuous exploration leading to the first sales contract with the Combined Development Agency, negotiated by the then Premier of South Australia in Washington in 1951. The Australian Atomic Energy Commission was not in existence at the time. The Radium Hill Project then provided the stepping stone for subsequent development at Rum Jungle and elsewhere. Up to 1971, when Rum Jungle shut down, Australian production of  $U_3O_8$  was nearly 10,000 tonnes with the major contributors being Mary Kathleen, Rum Jungle and Radium Hill.

Despite some objections to uranium mining and nuclear power, we must accept that its future is inevitable. If the Western world wants to maintain its living standards and as others try to reach for that goal, there is no alternative but to meet the world's energy needs, for the next few decades at least, by utilising nuclear power. The forecast of nuclear growth is shown in the next slide.

NUCLEAR ELECTRICITY GENERATING CAPACITY

(GWe)

	1978	1985	1990	2000
W. Europe	32	105	190	370
U.S.A.	50	115	170	350
Canada	5	12	20	30
Japan	14	26	45	100
Others	4	22	65	150
Total Wstn. World	105	280	490	1000

On the 25th August, 1977, following its consideration of the findings of the Fox Inquiry, and following substantial public debate of the issues involved, the Government announced its decision to proceed with the development and export of the Nation's uranium deposits substantially in conformity with the findings of the Inquiry.

The legislative basis for the Government's decision was established in Federal Parliament during March and April of this year with the passage of a number of Bills dealing with specific areas.

- The Atomic Energy Act 1953-1966 was amended to confirm the Government's control of the mining of uranium and its application of nuclear safeguards pursuant to international obligations, and also to facilitate the participation of the Atomic Energy Commission in the development of the Ranger Project.
- The National Parks and Wildlife Conservation Act 1975 was amended to facilitate the formation of the Kakadu National Park in two stages, with the Ranger and Jabiluka mining areas being excluded, and the Regional Town Centre serving the mines being included in the Park.
- The Environment Protection (Alligator Rivers Region) Act, 1978, is new legislation authorising the appointment of a Supervising Scientist, the formation of a Co-ordinating Committee and a Research Institute to monitor and carry out research into the environmental effects of uranium mining and to prescribe methods and procedures for mining operations to be carried out.

- The Environment Protection (N.T. Supreme Court) Act 1978 is new legislation enabling the Director of National Parks and Wildlife, and the Northern Land Council representing Aborigines to enforce environmental protection provisions in relation to uranium mining.
- The Environment Protection (Nuclear Codes) Act, 1978, is new legislation authorising the Governor General to approve codes of practice for regulating and controlling all activities in relation to uranium mining.
- The Aboriginal Land Rights (Northern Territory) Act, 1976, was amended to allow Land Trusts to hold title to land on behalf of an for the benefit of all Aborigines rather than specific groups of Aborigines; to ensure that all Aboriginal land in the Alligator Rivers Region, apart from the areas to be set aside for mining, would be leased to the Director of National Parks and Wildlife; and to provide for future claims to presently alienated Crown Lands within the region.

At about the same time, complementary and consequential legislation was passed in the Northern Territory Legislative Assembly, aligning Northern Territory legislation with the Aboriginal Land Rights Act. This involved the enactment of Laws for the protection of Aboriginal Sacred Sites, control of seas adjacent to Aboriginal land, entry to Aboriginal land and the protection and conservation of wildlife on Aboriginal land and the provision of schemes of management of wildlife on that land.

Exploration in Australia and the rest of the world for uranium is still at a high level. New deposits in Saskatchewan in Canada promise cheap uranium in large quantities and, in the short term pose a threat to Australia's marketing efforts. However, many countries are looking to Australia to supply uranium in the future.

It is more than academic to note the similarities between the Alligator Rivers Region and Saskatchewan as major uranium provinces.

Saskatchewan, with about 200,000 tonnes estimated of uranium reserves, can make all of its production available for export. While there are two mines in operation at present, Eldorado and Rabbit Lake, there are another four developments - including the Cluff Lake and Key Lake deposits waiting to

be developed. These could be expected to have a direct impact on the potential markets open to Australian producers in the early 1980's. Apart from increased production from existing mines being effective from 1979, new developments such as Cluff Lake and Key Lake will produce about 3000 tonnes of uranium yearly by about the time the Australian deposits could be coming into production. Total Canadian production is expected to rise by 10,000 tonnes by 1985.

It is therefore vital that Australia establishes its market presence in order to secure limited short term opportunities and to establish the basis for long term sales.

*Western world uranium resources  
(000 tonnes uranium)*

	Reasonably assured to US\$15 per lb U <sub>3</sub> O <sub>8</sub>	\$15-\$30 per lb U <sub>3</sub> O <sub>8</sub>	Estimat- ed addi- tional to US\$30 per lb U <sub>3</sub> O <sub>8</sub>	Total
Canada	145	28	605	778
U.S.A.	331	269	815	1415
South Africa	186	90	74	350
Australia	312	—	41	353
Western Europe	61	426	181	668
Others	116	58	111	285
Total	1151	871	1827	3849

Free world resources of uranium are about 4 million tonnes which would satisfy all estimates made of demand up to the year 2000. The reasonably assured resources of up to \$US30 per LB U<sub>3</sub>O<sub>8</sub> are about half that amount i.e. 2 million tonnes and this amount does not meet demand to the year 2000, re-cycling notwithstanding.

The economic benefits to Australia from uranium mining would be significant. Uranium export earnings would exceed those from sugar or beef and almost equal those from wheat or wool. The ultimate benefits to Australia are not only in terms of the balance of payments, but also in employment opportunities and the development of the Northern Territory.

Today there are about 800 Aborigines living in the Alligator Rivers Region including twenty four traditional owners of the Ranger and Pancontinental areas. Ranger, itself will have directly about 350 employees and with all the mines in the area over 1000 employees. These employees, families and service people will number about 3,500 in the Regional Town.

For the proposed developments in the Northern Territory, approximately 2,500 people will be employed offsite providing transport goods and services.

Mr. Justice Fox saw that mining and Aborigines could co-exist in the Alligator Rivers Region by a method of sequential development and limiting the white population. The Government in its Land Rights Legislation has provided that Aboriginal consent is not required for mining on the Ranger Project area or for leases granted to exploration licence holders who had applied for such leases before June 4, 1976. However, for these areas Aborigines can negotiate on the terms and conditions under which mining should proceed, not whether mining itself should proceed. Details of monetary compensation and environmental safeguards have been negotiated for Ranger by the Commonwealth Government with the Northern Lands Council but await ratification.

The Agreement awaiting ratification makes provision, amongst other matters, for the protection of the rights of the traditional owners, the Sacred Sites and the environment and includes provision for monetary payments and royalties expressed in percentage terms to an Aboriginal Benefits Trust Account to be applied for the benefit of Aborigines in the Northern Territory.

The Agreement also provides for Aboriginal employment and training opportunities, control of liquor and instruction of mine workers and their families in Aboriginal culture and traditions. These provisions meet the requirements of the Aborigines themselves.

We as an industry, recognise that Aboriginal people are proud of their culture and lifestyle and have an affinity for the land which is difficult to interpret in our Society's terms. However, we believe that uranium mining will provide the means for the Aborigines to pursue opportunities that will be generated from the Government's policy of Aboriginal self-determination.

The world is growing smaller and its needs are growing greater. There is no doubt there will be a continuing increase in energy consumption in the world. There is cause for concern in the widening energy gap in the future as we continue to draw on fossil fuels as the major source of energy.

Other sources of energy will need to be developed but for the time being, nuclear power is the only proven technology capable of meeting the shortfall of supply.

Many countries are looking to Australia to supply uranium in the future and as the Deputy Prime Minister recently said,

"Australia is likely to be the world's biggest industrialised exporter of energy in the 1980's - as big in fact, as some of the larger OPEC members".

Many countries will continue to depend on imported fuels. Australia has an obligation to assure a long term supply of uranium.



26th October 1978