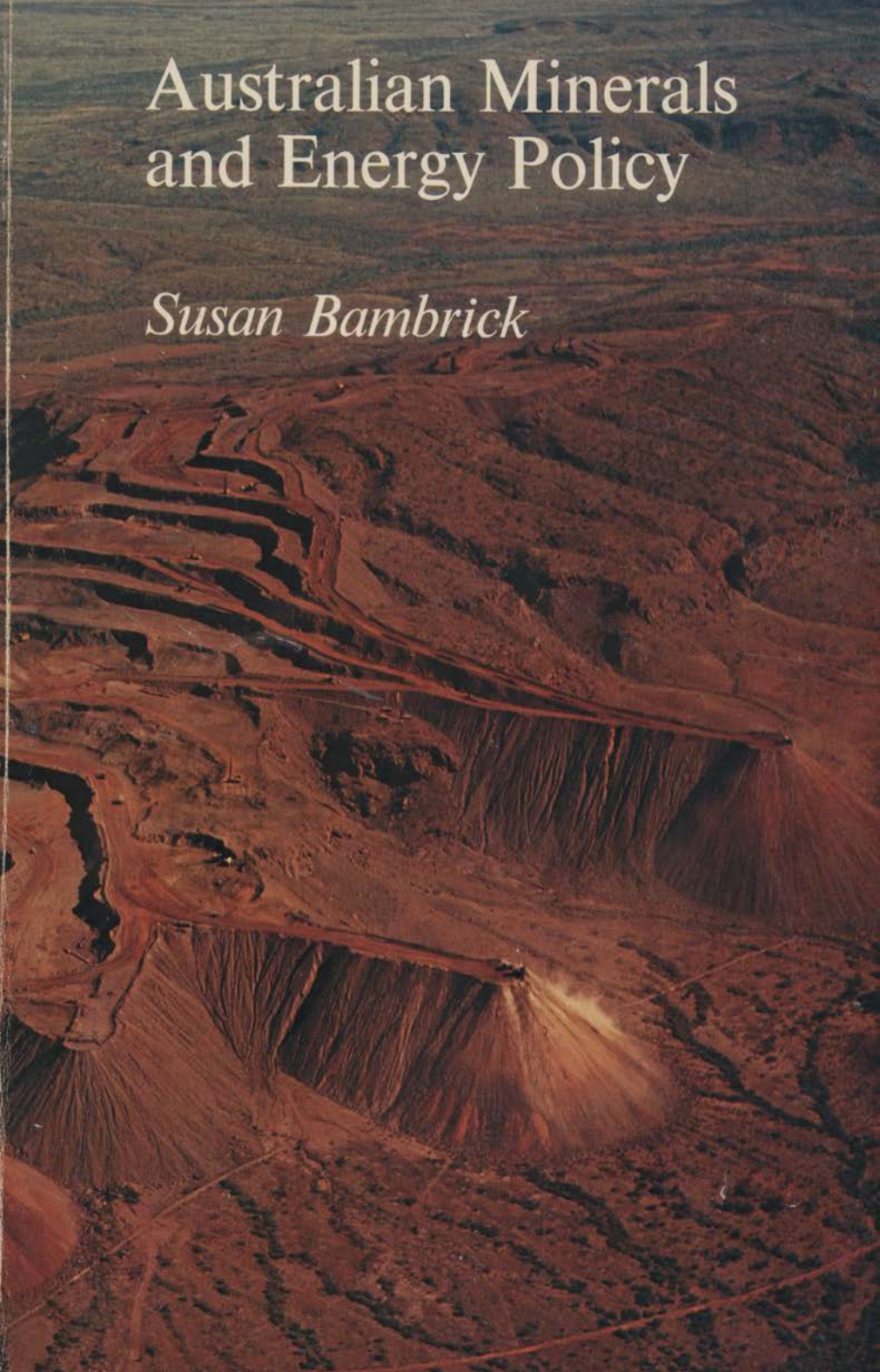


Australian Minerals and Energy Policy

Susan Bambrick



This book was published by ANU Press between 1965–1991.

This republication is part of the digitisation project being carried out by Scholarly Information Services/Library and ANU Press.

This project aims to make past scholarly works published by The Australian National University available to a global audience under its open-access policy.

Australian Minerals and Energy Policy

Australian Minerals and Energy Policy

Susan Bambrick

Australian National University Press
Canberra, Australia, London, England and
Norwalk, Conn., USA, 1979

First published in Australia 1979

Printed in Australia for the Australian National University Press, Canberra

© Susan Bambrick 1979

This book is copyright. Apart from any fair dealing for the purpose of private study, research, criticism, or review, as permitted under the Copyright Act, no part may be reproduced by any process without written permission. Inquiries should be made to the publisher.

National Library of Australia
Cataloguing-in-Publication entry

Bambrick, Susan

Australian minerals and energy policy.

Index.

ISBN 0 7081 1070 3.

1. Energy policy—Australia. 2. Mines and mineral
resources—Australia. I. Title.

333.7

Library of Congress No. 78-74969

United Kingdom, Europe, Middle East, and Africa: Books Australia,,
3 Henrietta St, London WC2E 8LU, England
North America: Books Australia, Norwalk, Conn., USA
Southeast Asia: Angus & Robertson (S.E.Asia) Pty Ltd, Singapore
Japan: United Publishers Services Ltd, Tokyo

Preface

In 1972, when at the instigation of Professor Burgess Cameron I first began teaching a course in resources policy, it was an unusual subject to find in the curriculum of an Australian University. Now, however, there is much wider interest in the subject and resource economics, mineral economics, and related subjects appear in both university and college syllabuses, either alone or as part of other subjects. The students who take these subjects have diverse backgrounds and skills. Some of them are undergraduates with a sound training in economic theory. Some of them are geologists with some years of field experience. Now subjects such as this are being offered at secondary level.

This book is intended as an introduction for a range of courses. It gives some background on the place of the minerals and energy sector in the Australian economy, and of its inter-relationship with other sectors. It outlines some of the policy issues with which the sector has confronted the government—foreign ownership, taxation, Aboriginal land rights, environment, further processing, regional development, provision of infrastructure—and discusses some of them at length, although at a level the general reader would find interesting. It examines the topical issue of energy policy in the Australian context.

There is a set of workshop questions for each chapter. Teachers may find these useful for class discussion or for individual project work. The questions are grouped together at the end of the book where they need not distract the general reader.

The book draws in part on material I prepared for three courses in 1978 for the Australian Mineral Foundation. The first was *Mineral Development Decisions and Government Policy*, in which I was assisted by Norman Miskelly of Ord Minnett, Sydney. The second was *Mineral Economics*, in which I assisted Brian Mackenzie of Queen's University, Ontario. The third was *Mineral Exploration Management*, which was given by Rex Davis of Imperial College, London. I am grateful to the Australian Mineral Foundation, and to its Director, Dean Crowe, for permission to publish the course material.

I wish to thank the following for their generous grants to ANU Press towards the publishing costs of the book: C.S.R. Ltd; Esso Australia Ltd; The Utah Foundation; C.R.A.; B.P. Aust. Ltd; Alcoa of Australia Limited; The Shell Company of Australia Limited; and Thiess Bros Pty Limited.

I wish also to express my gratitude to Gaye Holbrook who typed the manuscript not only efficiently but cheerfully.

Canberra
November 1978

Susan Baambrick

Contents

	<i>Page</i>
Preface	v
1 The Minerals and Energy Sector: Relationships and Comparisons	1
2 Australia and the World	9
3 Federal Policy	20
4 Taxation: Some Concepts and Provisions	34
5 Taxation: Discounted Cash Flows and some realities	46
6 Finance for Australian Mineral and Energy Projects	64
7 Aborigines and Mining	72
8 Aspects of Energy Policy	85
9 Mining and the Environment	115
10 Government and Private Enterprise: Infrastructure, Processing and Exploration	147
11 Decisions of Government: Government Participation, Subsidies, Foreign Ownership and Federalism	170
12 The Alternative: The Policies of the Federal Opposition	200
13 Relationships Again: Inter-sectoral Linkages and Multipliers	208
Questions for Discussion	224
Index	235

Illustrations

Mining and Mineral Processing Operations and Significant Mineral Deposits

- 1 A walking dragline, Goonyella mine
- 2 Zinc Corporation leases 1936 and 1961
- 3 Mining at Bridge Hill Ridge
- 4 Marlin seals, Bass Strait
- 5 Weipa export wharf
- 6 Myall Lakes
- 7 Mount Tom Price and Burleigh Beach
- 8 Saraji and Peak Downs mines

Endpapers

- facing p. 54*
facing p. 55
facing p. 70
facing p. 71
facing p. 150
facing p. 151
facing p. 166
facing p. 167

1 The Minerals and Energy Sector:

Relationships and Comparisons

In the 1950s and most of the 1960s Australian politicians could base their long-term economic thinking on economic growth, and their short-term economic thinking on maintaining the smoothest path possible in that growth, and they would have faced little questioning of their goals. They would have faced only criticism of the policies they used in pursuit of their objectives, and in the distribution of the gains from economic growth.

In the 1970s, the distribution question has loomed larger politically. Some commentators suggest the Australian electorate has polarised. Distribution has become more important, of course, as economic growth has slackened—maintaining or increasing one's *share* of 'the cake' seems more important when the cake is of constant size than when it is increasing. Then, too, the legitimacy and wisdom of economic growth as a goal has been questioned by many.

In the climate of opinion of the sixties, the mining boom in Australia was viewed favourably by most. Government encouragement of the industry was readily justified. The industry's growth was seen as contributing to overall well-being. Its contribution to the balance of payments, hitherto dependent on the rural industry and often precarious, was seen as a major contribution to national welfare.

Recently, the industry's growth and its foreign exchange earnings have been argued by a few politicians to be *against* Australia's economic interests. This followed an article by Dr R. G. Gregory of the Australian National University,¹ in which he pointed out that

from the viewpoint of the rural sector which exports and the manufacturing sector which competes with imports this force will be similar to that which would flow from very large tariff changes. Consequently, by observing the adjustments of the rural and the manufacturing sectors to the rapid growth of mineral exports, it is possible to calculate indirect estimates of the effect of the Australian tariff on them.

He calculated that 'the mineral discoveries have had a much greater effect on these sectors than the recent across the board 25% general reduction of tariffs'.

R. G. Gregory, 'Some Implications of the Growth of the Mineral Sector', *The Australian Journal of Agricultural Economics*, Vol. 20, No. 2, August 1976, p. 71.

Gregory's work was used by some sections of the Australian Labor Party to argue against growth in mining in general and uranium mining in particular. However, as I commented at the time:

it is true that high-productivity sectors cause problems for low-productivity sectors; and that more efficient use of a nation's resources—e.g. by moving them into profitable mining ventures—causes difficulties for less efficient sectors and even for less efficient mining ventures. But it is not valid to argue from this that profitable mining ventures should be discouraged. Increased foreign exchange earnings can be used, either for investment, or for imports. To refuse them is to lower economic growth. To accept them may mean some structural adjustment for other industries.²

In his research, Dr Gregory had had three main interests:

- (i) Analysis of tariff policy—general policy questions, such as what the tariff does and how important it is. Manufacturers and their employees favour the tariff (although as consumers they do not); woolgrowers do not; importers do not. In mid-1973 there was a 25 per cent across-the-board tariff cut.
- (ii) The Australian exchange rate appreciated by 20 per cent between December 1972 and December 1973. Continuous appreciation was a different situation from the virtually fixed exchange rates operating since World War II.
- (iii) The inter-relationships in the economy that are the essence of the tariff question: that if tariffs work against the interests of consumers and industries using imports, then a tariff which favours manufacturing works against the interests of others.

Dr Gregory noted that an exchange rate appreciation, like a tariff cut, made imports cheaper. In the period he was considering, both appreciation and tariff cuts had occurred, and it was difficult to sort out the effects of each.

He found that in 1971, 1972 and 1973 there were large, mineral-related increases in international reserves—increases in quantity and price of exports, capital inflow to the mineral industry, and capital inflow simply because the Australian position seemed strong because of its mining industry.

Increased reserves can be a mixed blessing. They increase the money supply quickly, which many believe leads to inflation. The Labor government, when examining its pre-budget dilemma in 1973, was advised that international reserves could be used on goods and services (through a tariff cut), and thus reduce the rate of inflation. It was suggested that those employed in industries facing competition might be re-employed in building roads and hospitals.

² *Mining Review*, February 1977.

One difference between a tariff cut and exchange rate appreciation is in their breadth of impact. With an appreciating exchange rate as a result of a minerals boom, the rural sector and the import-competing sector are worse off; but with a tariff cut, the burden of adjustment fell on one sector, the import competing sector.

Since both exchange rate and tariff adjustment occurred in the period considered, it is not possible to be sure of the relative importance of the two.

In summary, the government appears to have no way of insulating all other sectors against the effect of a minerals boom on foreign reserves—some or all will feel it through the rising costs of inflation, through exchange rate appreciation, or through tariff cuts.

As mentioned above, some Labor politicians saw this as a reason for slowing down mineral development. One other suggestion that was made was that, since capital inflows are involved, the cost of adjustment should be borne by those with access to those inflows. However, interconnections must be recognised, for if capital inflow is restricted, those with capital needs will go increasingly to the domestic capital market, and another sector, e.g. building, may be squeezed.

What issues are involved in choosing where adjustments should be made? Politicians may ask themselves which sector provides their greatest support. They may also tend to favour inflation as a means of adjustment, since they may blame that on the rest of the world, rather than tariff cuts, which can be laid at their door with certainty.

From the viewpoint of the national income they cannot be impartial as to where the adjustment is to occur. If they place a high priority on per capita national income in their welfare function, they might prefer that the mineral industry should not bear the adjustment, and adopt a tariff cut with the burden borne by import-competing industries such as clothing.

If, however, a high priority in their welfare function goes to maintaining people in the same employment, they would not have a tariff cut.

The choices have different distributive effects—import-competing industries are labour intensive, often depending significantly on migrant women. Mining is not labour intensive.

In reply to his critics, Dr Gregory has said that in his article he has naturally had to simplify the situation, but that simplicity itself is not a criticism. The question is, does the simplicity miss the point?

He points out that if he were writing for the future, the article would be different. The longer the view, the less important are short-run adjustments and the more important is the national income aspect. Furthermore, if oil imports rise as predicted, the phenomenon with which he was concerned might disappear by 1984.

The problem Dr Gregory has discussed for Australia is not unique. A

'Dutch disease', from the impact of North Sea oil and gas, has been identified. Britain could also suffer, but the fact that she began so far in deficit limits the symptoms. The Middle East wants to use its riches to develop its manufacturing sector, but its high exchange rate makes manufacturing expensive.

Australia is a federal system, and federal government decisions on the matters discussed by Dr Gregory will affect the balance between states. Regional priority is therefore another factor in the policy choice. If tariffs are increased, it will be harder to sell minerals and the federal system will discriminate against Queensland and Western Australia. Dr Gregory has said that Queensland and Western Australia have always been disadvantaged by the federal system. (Federalism is considered further in Chapter 11.)

Dr Gregory was concerned with the macro-economic relationship between mining and the rest of the economy. There are also micro-economic aspects—e.g. the backward linkages of the industry to suppliers and its forward linkages with its customers. These determine its employment and income effects in the rest of the economy. They will be considered further in Chapter 13.

What has been the size of the mineral industry relative to other sectors? In 1902, the gross value of production from mining was 76 per cent that from factories, and 35 per cent from primary production.³ By 1968, the last year for which this comparable historical series was available, the gross value of production from mining was 8 per cent of that from factories and 16 per cent of that from primary production. From then it is possible to compare value added in mining and in factory production, but there was not a great deal of variation, e.g. value added in mining was 15 per cent of the value added in factory production in 1974.⁴

The mining industry has contributed a greater proportion to exports than it has to production, e.g. in the six months ended December 1977, mines and quarries (except gold) contributed 29 per cent of exports. Manufactures contributed 22 per cent, the pastoral industry 21 per cent, agriculture 19 per cent, the dairy industry 2 per cent, fishing 1 per cent.⁵ In 1976–7 Australian exports of mineral products totalled \$461 m., or 40 per cent of the value of total exports.

Although mining contributes significantly to exports and to production, it is capital-intensive and its contribution to employment is less than proportional to its contribution to production. The Census of 30 June 1971 showed that only 1.5 per cent of the employed population was

³ A.B.S., *Year Book of the Commonwealth of Australia*, No. 61, p. 1090.

⁴ This is on a limited definition of mining, which classifies processing of all types as manufacturing.

⁵ Calculations from A.B.S. *Exports Bulletin*, 15 March 1978.

engaged in mining,⁶ compared with 23.2 per cent in manufacturing, 18.9 per cent in wholesale and retail trade, 10.8 per cent in community services, 7.9 per cent in construction, 7.4 per cent in agriculture, forestry and fishing, 6.9 per cent in finance, insurance and real estate, 5.4 per cent in public administration and defence, 5.2 per cent in transport and storage, 5.1 per cent in entertainment, recreation, hotels and personal service, 2.0 per cent in communication and 1.7 per cent in electricity, gas and water. It was thus the smallest employer of the industry groups, with 75,400 workers in that Census year. This number would rise if the sector for statistical purposes were expanded through the processing and fabrication chain. The mining workforce has risen since the Census year, and by May 1976 stood at 82,800.⁷ Its relationship with the manufacturing workforce changed little—from 6.2 in 1971 to 6.3 per cent in 1976. Other sectors changed their relative positions. Along with the relative decline in traditional primary industry, the ratio of the manufacturing workforce to that engaged in agriculture, forestry and fishing rose from 18.6 to 21.6 per cent. With the relative increase in the tertiary sector, the ratio of the mining workforce to the entertainment, restaurant, hotel and personal services workforce fell from 28.4 to 20.7 per cent; the ratio to the civilian labour force in wholesale and retail trade fell from 7.7 to 6.9 per cent.

Agriculture showed the highest number of average hours worked per week by employed persons in May 1976, at 47.5, followed by forestry and fishing at 40.8,⁸ then mining at 39.5. Transport and storage had 38.0, construction 37.6, manufacturing 37.2, and wholesale and retail at 36.2. Coupled with a relatively long working week in mining is a relatively high wage structure which makes average income per employee in mining somewhat higher than in other sectors.

The wage income produced by the mining industry is an economic benefit to the nation; so are the taxes and royalties it pays (an indication of their size is given in Chapter 5); so too are the net profits of Australian companies. The net profits of foreign companies, if retained here, are in a somewhat ambiguous category. If they are reinvested, they are creating income and employment here, but in raising foreign equity they have longer-term implications.

How does the profitability of mining compare with the profitability of other Australian industries? Is mining the high-risk industry it claims to be in taxation discussions?

The PA Report, *Australian Business Profitability, 1976-7* examined average percentage return on shareholders' funds for seventy-five industry sub-groups. The best performer was coalmining (32.7),

⁶ A.B.S., *Year Book*, No. 61, p. 696.

⁷ Ibid., p. 696.

⁸ Ibid., p. 697.

followed by wool and skin buying (25.2), soaps, detergents and toilet preparations (21.1), broadcasting and TV (19.9) and road transport (18.5). For twenty-four industry sub-groups the figure fell short of the two-year bond rate of 9.4 per cent, with the worst performers being farming properties (3.1 per cent), mainly woollen textiles (3.9), canned fruit (4.5), motor vehicle manufacture (5.7), primary metal industries and hotels and motels (each 6.4).

The forty-six companies in the mining group had a median⁹ percentage return on total assets in 1976-7 (before tax and interest) of 7.4, the second lowest median return. The median return on shareholders' funds, after tax and interest, was 6.9 per cent, the lowest industry figure.

The seven utilities had a median return pre-tax of 7.1 per cent (post-tax and interest 8.3), twenty-six primary production and distribution companies had 7.6 per cent (7.3), ninety-four finance companies had 7.9 per cent (9.5), forty-two building and construction companies had 9.2 per cent (9.3), 393 manufacturing companies had 11.1 per cent (11.4), eighteen transport companies had 11.2 per cent (17.2), thirty-eight retail/wholesale companies 12.1 per cent (11.9), thirty-four vehicle distribution companies 12.5 per cent (13.3).

Mining was the only industry studied whose median return (pre-tax and interest) fell in 1976-7. The relatively low median return hides diverse company performance. On a very small sample, the top 5 per cent of companies (presumably two out of forty-six) had returns higher than 38.2 per cent. The next highest corresponding figures were for transport (23.8) and manufacturing (23.1). The top 25 per cent of mining companies (presumably eleven companies) had a percentage return (pre-tax and interest) greater than 14.7. This coincided with the corresponding figure for manufacturing. Vehicle distribution, transport and retail/wholesale trade all had higher figures.

Was the relatively low median return for mining (before tax and interest) typical at 7.4 per cent? In 1971 it was 11.8 per cent, while only retail/wholesale and vehicle distribution had higher figures.

Diversity of profitability appears not only amongst mining companies, and for the industry over time, but also for sub-aggregates of the mining industry. The average percentage return on shareholders' funds (after tax and interest), over the years 1973-4 to 1976-7 fluctuated for non-ferrous metals between 8.5 and 17.4; rose throughout for the ferrous group and coal, the ferrous group from 6.3 to 15.1, and coal from 3.5 to 32.7; fluctuated for primary metal industries between 5.2 and

⁹ The median is that figure above which half the results for the group may be found, and below which half may be found. It is not as much affected by extreme values as is the simple arithmetic mean, and may be contrasted with the mode, which is for any sample the figure appearing most.

8.0; fluctuated for petroleum refining and marketing between 4.6 and 8.5; and fluctuated for metal fabrication and distribution between 8.6 and 12.8. Metal building supplies rose throughout.¹⁰

The PA Report showed the ratio of shareholders' funds to total assets to have been 44 per cent in 1976-7, compared with 51 per cent for manufacturing, 48 per cent for the retail/wholesale trade, and 48 per cent for vehicle distribution. Primary production and distribution was 36 per cent, building and construction 31 per cent.

How does the degree of foreign ownership compare between Australian industries? The answer depends on industry definition—for example whether mineral processing is regarded as mining or manufacturing. It also depends on the definition of foreign ownership, and the proposed new foreign investment guidelines of mid-1978 may perhaps change definitions for statistical purposes. Under these guidelines, a company with 25 per cent Australian ownership is to be given 'honorary Australian' status if it expresses an intention to raise local equity to 50 per cent in the future.

The Australian Bureau of Statistics has distinguished direct foreign ownership, where 25 per cent or more is owned by a foreign person or company, from indirect or portfolio investment. The proportions of direct and other identifiable foreign ownership are not strictly comparable between industries. In the mid-seventies, mining was estimated to have 40.9 per cent direct foreign ownership,¹¹ exceeded only by advertising (42.5 per cent) and general insurance (41.4 per cent). Manufacturing was 27.7 per cent. Mining also had the third highest percentage of other identifiable foreign ownership (10.9), but since the categories exceeding it—life insurance (18.0) and finance (21.3)—had relatively low direct holdings by foreigners, mining finished up as the sector with the lowest Australian ownership at 48.2 per cent. Manufacturing had the highest at 68.8 per cent.

Mining was also identified as having the lowest degree of Australian control of any sector, and life insurance, then manufacturing, as the highest. Foreign control is said to exist if a single foreign person or company owns 25 per cent of paid-up capital, if there is no larger Australian shareholding. Where local and foreign shareholdings are equal, the company is classified as foreign, and this could affect the mining figure significantly since the joint Australian-overseas venture has been common since the boom of the sixties.

Are mining companies amongst the largest companies in Australia? B.H.P., which has mining, mineral processing and petroleum amongst its interests, is the Australian company with the largest resources. In

¹⁰ From this list it can be seen that the PA Report defines mining more widely than does the Australian Bureau of Statistics.

¹¹ A.B.S., *Year Book*, No. 61, p. 364.

1976 it had a turnover of U.S. \$2270m.; its market value of shares was U.S. \$1855m.¹² C.R.A., not till now regarded as an Australian-owned company, although it operates here almost exclusively, had sales of U.S. \$1038m. and a market valuation of U.S. \$1040m., followed by the retail chain Myer (sales U.S. \$1202m., market valuation \$578m.). These are small operations, however, compared with, say, Royal Dutch Shell, the largest company outside the U.S., with sales figures of U.S. \$34,029m., or even National Iranian Oil (U.S. \$19,593m.) and B.P. (U.S. \$17,988m.).

B.H.P. and C.R.A. may be worthy of including in lists of world companies where size of assets or turnover is the criterion. B.H.P. has appeared in *Fortune's* list of the top fifty companies outside the U.S. However they did not star in the PA Report's ranking (for 1976-7) of Australian companies by the ratio of net profit to total assets, a criterion which like any other will be affected by the accounting conventions adopted. The leader in this list was Thiess Peabody Mitsui Coal Pty Ltd (31.8 per cent). The other mining companies in the top twenty that year were Renison Ltd (27.5 per cent), Utah Mining Australia (21.1), and Bellambi Coal Co. Ltd (18.6). Eleven of the companies were involved in television.

¹² *Business Week*, 'Survey of 1976', published July 1977.

2 Australia and the World

Production in the minerals and energy sector is largely export-oriented. Table 2.1 shows for selected minerals the percentage of mine production exported. This is over 80 per cent for eight of the eleven minerals shown. The lowest figure was for black coal, which is used locally for electricity generation and in the steel industry. Petroleum is not shown in Table 2.1, since Australia has to import around one-third of her needs.

Table 2.1

Mine production exported			
	%		%
Tungsten	99	Iron ore	89
Rutile, zircon and ilmenite	97	Lead	85
Bauxite/alumina	96	Zinc	81
Nickel	95	Tin	68
Manganese	90	Copper	60
		Black coal	45

Source: Australian Mining Industry Council, What Mining Means to Australians.

Current Trade

Black coal, iron and associated products, and bauxite and alumina represent Australia's major mineral exports (see Table 2.2), although lead, nickel, zinc, copper, and mineral sands are significant.

Of these exports 48 per cent went to Japan, 22 per cent to the E.E.C., 8 per cent to the U.S. and 22 per cent to other countries.

Table 2.3 shows that for the six months ended December 1977 Japan was the most important single market for coal, copper, iron ore, and zinc. Coal and iron ore sales to Japan are by far the largest values in the table—and Japanese purchases of coal and iron ore are amongst the most significant items in Australia's trade balance. It has even been said that if the Japanese steel industry sneezes, the Australian economy catches cold.

To put this comment in perspective, Japan in the eight months ended February 1978 took 70 per cent of export tonnages of coal (74 per cent by value), and coal was Australia's single most important commodity

Table 2.2

Australian Exports of Principal/Mineral Primary Products, 1975-7 f.o.b. value (\$m.)			
	1975	1976	1977
Alumina	343.8	526.6	629.5
Aluminium (ingot)	46.2	45.1	69.6
Coal (black)	755.5	1189.2	1379.9
Copper (ores, concentrates, refined)	140.3	152.0	149.0
Gold (ores, cons., refined)	17.3	39.0	43.2
Ilmenite cons.	18.1	15.6	19.4
Iron ore and pellets	748.8	830.9	952.4
Iron, ingot steel, ferro-alloys	239.5	211.3	207.4
Lead (ores, cons., refined)	129.7	161.2	231.4
Nickel (ores, cons., refined)	174.0	260.9	252.5
Rutile cons.	60.1	72.5	53.5
Salt, bulk	17.2	26.6	29.2
Tin (ores, cons., refined)	32.0	30.0	61.8
Tungsten cons.	14.4	16.8	35.9
Uranium and thorium	0.0	0.0	74.4
Zinc (ores, cons., refined)	118.5	160.0	149.7
Zircon cons.	57.3	54.5	36.2
Other minerals	274.6	328.6	351.9
	3187.3	4120.7	4726.8

N.B. Figures may not add to totals because of rounding. Bauxite figures are not readily available.

Source: Derived from Bureau of Mineral Resources, *Australian Mineral Industry Review*, Preliminary Summary 1977.

Table 2.3

Japanese Imports, January-December 1975 (U.S. \$'000)		
	<i>World</i>	<i>Australia</i>
Total all items	57,840,162	4,158,593
Iron ore, cons.	2,195,721	1,001,456
Iron and steel scrap	369,889	63,066
Non-ferrous base metal ores and cons.	1,758,726	232,472
Copper ores, cons.	808,111	43,892
Nickel ores, cons.	191,312	51,140
Bauxite, etc.	71,491	41,240
Lead ores, cons.	52,648	1,950
Zinc ores, cons.	211,320	29,426
Manganese ores, cons.	170,030	32,144
Non-ferrous ores, cons.	253,813	32,679
Mineral fuels	25,641,256	1,102,109
Coal, coke, etc.	3,471,377	922,665
Natural gas	1,171,747	147,605

export during the period, accounting for 11.7 per cent of total exports.¹ Wheat accounted for 8.4 per cent, greasy wool for 7.6, beef for 6.2 and iron ore for 7.9 of exports. Of these iron ore exports Japan took 78 per cent by tonnage and 81 per cent by value.

Japan is not the major importer of all of Australia's mineral exports. The United Kingdom appears as the most significant importer of lead, which reflects the fact that lead from Mt Isa goes to the company's smelter on the Thames. The U.S.A. is the major importer of mineral sands, although Europe (the U.K., Netherlands and others) and Japan are also significant.

How important is Australia as a supplier to other countries? Tables 2.3 and 2.4 show for the year 1975 total Japanese and U.K. imports of minerals and energy commodities, and imports from Australia.

Table 2.4

U.K. Imports, January–December 1975 (U.S. \$'000)		
	<i>World</i>	<i>Australia</i>
Total, all commodities	53,266,575	
Metalliferous ores, scrap	1,054,930	27,763
Iron ore, cons.	373,551	16,115
Non-ferrous base metals, ores, cons.	405,662	8,249
Copper ores, cons.	310	
Nickel matte, etc.	164,600	1,323
Bauxite	7,987	298
Lead ores and cons.	12,548	
Zinc ores and cons.	23,568	3,048
Tin ores, cons.	55,086	2,278
Manganese ore, cons.	17,296	
Metalliferous non-ferrous waste	52,221	2,372
Silver and platinum ores	176,272	
Coal, coke	250,648	101,727
Petroleum and products	9,240,576	
Non-ferrous metals	1,819,359	
Chemicals	3,123,479	
Beverages and tobacco	918,149	
Sugar and honey	1,367,773	
Cereals and preparations	1,357,395	
Food and live animals	8,714,999	
Basic manufactures	10,511,129	
Textile yarn, fabric, etc.	1,513,416	
Iron and steel	1,820,061	
Machines and transport equipment	10,025,858	
Miscellaneous manufactured goods	4,150,607	

¹ A.B.S. *Exports Bulletin*, 15 March 1978.

Table 2.5

**Value of Exports of Major Commodities, by country, six months ended
December 1977**
(\$m.)

<i>Country</i>	Coal ¹	Copper ²	Iron ore, etc. ³	Lead ⁴	Mineral sands ⁵	Zinc ⁶
Japan	543.8	14.9	408.9		5.4	15.3
France	24.2	5.2	11.4		1.3	
Korea	23.3		10.0			
Netherlands	21.5		10.9	3.7	6.1	6.3
U.K.	19.0	9.8		71.9	6.1	
Italy	18.9	1.8	27.2	3.4	2.2	
Spain	9.2				1.6	
U.S.A.				6.0	19.0	8.9
New Zealand				2.5		6.0
Germany (Fed. Rep.)		11.1	21.2		0.9	
Belgium-Luxembourg		7.6	6.7	3.7		
Thailand						4.0
Argentina			17.6			
India				8.5		2.4
Hong Kong			6.3			2.5
Malaysia						1.7
Iran			3.8	3.1		
Indonesia						7.6
Pakistan			4.5			
Philippines			26.0			
Singapore			1.2			
Venezuela			4.0			
China—excl. Taiwan			28.2			
Taiwan			8.3	1.5		3.9
Poland			1.6	1.0	1.0	
Brazil					1.0	
Other	47.3	1.9	32.0	10.0	4.0	8.7
Total	707.2	52.1	629.8	115.2	48.4	67.2

Notes:

1 Anthracite, bituminous and sub-bituminous (except briquettes).

2 Ore, cons.; refined, unworked.

3 Iron ore and cons.; iron and steel ingots and other primary forms; iron, pig and cast.

4 Lead and lead alloys (incl. silver-lead) unworked.

5 Titanium and zirconium ore and cons. (except beneficiated ilmenite).

6 Ore and cons., zinc and zinc alloys, unworked.

Figures may not add to totals because of rounding.

Source: Calculated from A.B.S. *Exports of Major Commodities by Country*, December 1977.

Table 2.5, which shows values of some mineral exports by country, conceals some details of the relative degrees of processing of given products before export to various countries. The iron ore figure includes \$490m. iron ore and concentrates, \$402m. of which went to Japan; with other sales to the Federal Republic of Germany (\$15m.); France, the Netherlands and China (excluding Taiwan), each \$11m.; Korea (\$10m.); Italy and Taiwan (each \$8m.). Iron and steel ingots amounted to \$117m., the main importers being the Philippines (\$26m.), Italy (\$19m.), Argentina (\$18m.), Hong Kong and the Federal Republic of Germany (each \$6m.) with Japan and Pakistan each \$5m. Trade patterns in iron and steel are unstable, however, as illustrated by the fact that Argentina's imports in the corresponding period of the previous year were \$6m. (compared with \$18m.); Belgium-Luxembourg's were \$10m. (compared with \$2m.); Iran's \$9m. (compared with \$4m.); Japan's \$11m. (compared with \$5m.); Pakistan's \$1m. (compared with \$5m.); the Philippines' \$16m. (compared with \$26m.); Singapore's \$6m. (compared with \$1m.); Spain's \$18m. (compared with zero) and other countries' \$6m. compared with \$23m. Pig iron and cast iron represented \$22m. of the total iron ore, etc. figure in Table 2.5 with China (excluding Taiwan) representing \$17m. Major changes from the previous year included a drop from \$14m. to \$1m. in sales to Japan.

Similarly the zinc figure conceals a figure of \$24m. for zinc ore and concentrates, where the bulk went to Japan (\$15m.) and the Netherlands (\$6m.); and \$43m. for zinc and zinc alloys, unworked, where \$9m. went to the U.S., \$8m. to Indonesia, \$6m. to New Zealand, \$4m. to Thailand and to Taiwan, and \$2m. to Hong Kong, India and Malaysia.

Australia also imports mineral primary products—a total of \$912m. in 1977, or about 20 per cent of the value of exports. Other imports included phosphate rock (\$48m.), asbestos (\$34m.) and diamonds (gems and industrial) (\$28m.).

The Future

What are the factors likely to affect future trade?

Australian coal and iron ore exporters are realising that dependence upon the Japanese market as the engine of growth is unwise—they have gained from this in the past, but even when growth resumes, perhaps in a year or two, it may not be as significant as it has been in the past. In any case, the Japanese have for some years been seeking to diversify their sources of supply, hastened by the attitudes of the Australian Labor government from 1972, and have established raw material links with other countries (e.g. iron ore from Brazil), and have equity in Brazilian steel-making capacity. Other possible suppliers of iron ore include India, Pakistan, and Africa, and in the much longer term, maybe China. Coal suppliers at present include Canada and the U.S.

The coal discussed thus far is coking coal; Australian exporters have

also been able to sell small tonnages in Europe. However, their real European markets may develop in steaming coal, for electricity generation. Japan may also be active in this market, as evidenced by Japanese interest in acquiring equity in N.S.W. steaming coal deposits. The N.S.W. Premier, Neville Wran, returning in May 1978 from a trip to the U.S.A., also explained that he had found considerable interest in N.S.W. steaming coal for electricity generation, because the U.S. has difficulty in opening new strip mines, and problems in introducing nuclear power on a large scale. Utah announced in June 1978 new contracts with Europe.

Australian companies with metallurgical coal for sale, or with iron ore, are turning from Japan to new steel industries—to the next generation of developments such as the government-encouraged industry of Korea and Taiwan. Although China has resources of both coal and iron ore, it appears that in the short term at least she prefers to import significantly, apparently for economic reasons.

China is entering increasingly into world trade, e.g. with Australia and Japan, but her direction and its effect are difficult to forecast with any accuracy. Russia, too, with her apparently huge fuel reserves—including oil and gas—could also have a significant impact on world trade in minerals and energy. However, most commentators concentrate on the free world when making their predictions.² They also ignore the possibilities and problems posed by mineral and energy resources in Antarctica—e.g. coal is certainly known to exist in the Australian Antarctic Territory, but exploitation is generally regarded as so remote that the complexities of entitlement do not seem to concern the government as yet.³ Technical change could rapidly alter the situation.

Of much more immediate concern to some Australian mineral producers are two forms of government interference in the free market. The first is that practised by governments of developing countries who, for either balance of payments or employment reasons, are prepared to encourage specific mineral industries in such a way that normal supply-demand interaction does not occur. This has been especially true of the copper industry, where some countries who are 'relatively high cost producers . . . do not appear to be primarily motivated by profit' and maintain 'high production levels despite depressed copper prices'.⁴ This

² See e.g. P. Malozemoff, 'Geographical Aspects of the Mineral Equation', *Proceedings of the Joint Conference, 1978*, Australasian Institute of Mining and Metallurgy and American Institute of Mining, Metallurgical and Petroleum Engineers.

³ For example Dr R. Dodson, of the Bureau of Mineral Resources, addressing the 1977 ANZAAS Congress in Melbourne, took the view that exploitation was not possible.

⁴ G. F. Joklik, 'Identity Crisis in the Copper Industry', *Proceedings of the Joint Conference*.

has led to problems for companies in countries such as Australia and the U.S., for if falling prices are not met with a supply cutback, prices will not rise. The industry is accustomed to cyclical instability, but the artificially sustained downward trend, which lasted well into 1978, was something new.

The second government-induced problem arises when industrialised countries construct artificial barriers against imports of processed materials, either to protect or create employment at home. This limits the extent to which exporting nations can increase their processing. Against this must be set the fact that developed nations may face environmental problems and be happy to see pollution created elsewhere. A few years ago, Japan said she had no room to expand existing steelworks, let alone provide a green fields site, and interest was generated in Australia. However, with the changing economic situation at home, Japan has found that the domestic steel industry could be expanded.

Now it is energy shortages and rising energy prices that are causing overseas consuming countries to look to energy-rich countries such as Australia as sites for processing. An aluminium smelter is to be built at Gladstone in Central Queensland, using electricity generated from coal. Aluminium smelters in the past have required favourable energy deals to encourage them, e.g. Alcoa at Port Henry was favourably treated by the Victorian Government, while Comalco's smelter at Bluff in New Zealand was originally encouraged in government negotiations, although subsequent negotiations have not been so favourable. C.R.A.'s plans for a mini-steel mill in Victoria, and direct reduction facilities in the Pilbara, hinge on energy prices.

The federal Department of National Development in May 1978 forecast that Australia's energy demands in the 1980s would not grow as fast as they had in the 1960s. This did not take account of the hypothetical processing facilities, e.g. a uranium enrichment plant and petrochemical plant could alter the picture.

With possible uranium exports, natural gas exports, and petroleum imports, what influence will energy trade have on Australia's balance of payments over the next decade?

The Trade Development Working Party in March 1977 suggested that during the period 1976-85 Australia's oil imports could increase—from 219,000 barrels per day (B/D) in 1977 to 614,000 B/D in 1985; it projected the cost of imported oil could rise from \$A982m. in 1977 to about \$4.1 billion in 1985. In September 1977, B.H.P.'s Chairman announced increased oil reserves in Bass Strait, extending from 1981 to 1982-3 the date when local oil production could be expected to start to decline. In 1978, it appears that Bass Strait oil production will be maintained at present levels till 1984, and there may be no serious decline till 1990. Some of this supply results from price incentives.

Offsetting these increased oil imports will be increased exports of Queensland and N.S.W. coal. One estimate suggests coal exports may reach \$A2.6b. by 1985. Some commentators feel this is over-optimistic, but at the first Australian coal conference in April 1978, Mr Tanabe from Nippon Steel predicted a difficult time for coking coal for two to three years, followed by stabilisation—and as mentioned above, steaming coal demand is expected to mushroom in the U.S., Europe and Japan.

If uranium exports do take place, what will they bring? The Ranger Report suggested revenue (in January 1976 prices) of \$500m. p.a. by 1984–5, rising to \$1000m. p.a. in 1989–90 with \$1200m. p.a. from 1991–2. This was based on an average price of \$15.37 per lb of U_3O_8 . The uranium market has, however, altered since then, and will alter further before Australian projects come on stream. Liquefied natural gas exports from the North-West Shelf could bring over \$500m. p.a. (1977 prices) from 1986.

Trade flows are not alone in their effect on the balance of payments. Inflows of equity and loan capital, and outflows of interest, dividends, and loan repayments can also be significant.⁵

Foreign Ownership

Capital inflow to finance the minerals boom of the sixties was a major factor in Australian economic policy in that decade.⁶

The mines already operating at the opening of the sixties had varying degrees of foreign ownership, rooted in their development or in financial difficulties arising afterwards. The mines included silver-lead-zinc mines at Broken Hill (N.S.W.) and Mt Isa (Queensland), a copper mine at Mt Lyell (Tasmania), extensive coal-mines in N.S.W., iron ore mines near Whyalla in South Australia, and gold-mines in Western Australia. The companies operating them included offshoots of the British Rio Tinto interests, Mt Isa Mines (half of whose shares were owned by American Smelting and Refining, A.S.A.R.C.O.), and predominantly Australian companies—B.H.P. (which had ceased operations at Broken Hill in 1915, but as a monopoly steelmaker operated its own coal- and iron ore mines); North Broken Hill, South Broken Hill; Electrolytic Zinc (now E.Z.); and Peko-Wallsend.

The main factor in the sixties boom was doubtless the growth of the Japanese market, particularly for coal and iron ore for the growing steel

⁵ For estimates of the overall effect of the North-West Shelf project on the balance of payments, see Susan Bambrick, 'National and Regional Economic Effects of North-West Shelf Development', *Economic Activity*, Vol. 21, No. 2, April 1978, Table 5.

⁶ For a detailed description of foreign ownership of Australian mining projects by 1972, see Susan Bambrick, 'The Integration of Australia's Mineral Policies', 44th ANZAAS Congress, Sydney, August 1972.

industry. The U.S. company Peabody, with its mining expertise, and the Japanese company Mitsui, joined with Queensland company Thiess Bros in an open-cut coal-mining operation to supply the Japanese market. Thiess also operates alone. Utah began its massive open-cut coal developments in Central Queensland.

In Western Australia, three major iron ore developments took place—by Hamersley (a subsidiary of C.R.A., an offshoot of R.T.Z., the British Rio Tinto group); at Goldsworthy (including Utah and Consolidated Goldfields of Australia); and at Mt Newman (B.H.P.; C.S.R., which began in sugar refining; Amax of the U.S. as marketer; and Japanese interests. B.H.P. and C.S.R. formed a joint operating company).

In bauxite, C.R.A. was also active, with its subsidiary Comalco opening a bauxite mine at Weipa, Queensland. An alumina refinery was built at Gladstone, also in Queensland, by a consortium of international aluminium companies. Comalco built a smelter in Tasmania and another in New Zealand to take advantage of hydro-electric power.

Western Australian bauxite deposits were developed by Alcoa of Australia; there is an American parent, but Australian companies such as Western Mining Corporation have an interest. The Gove deposits were developed by a consortium of local and foreign interests.

Nickel developments in Western Australia were undertaken alone—and successfully—by Western Mining Corporation. The manganese mine was developed alone—again with a large measure of success—by B.H.P.

There were a number of reasons why foreign capital was sought. First, there was the absolute size of capital needs, for social infrastructure—towns and transport—in remote areas as well as for mine development. If the Australian capital market had been able to provide such funds, other sectors would have been left wanting.

Second, there was a need for assured markets. This was particularly true of the alumina refineries, since the world aluminium industry is in the hands of a few large companies.

Third, there may have been need for foreign expertise. B.H.P. certainly felt this need when it sought a partner—ultimately Esso—in its Bass Strait petroleum leases.

If these were the reasons why foreign capital was sought, there was only one reason why foreign capital came—the same reason as it came for the pastoral industry, for the chemical industry, for the motor vehicle industry, for petroleum refining and marketing, for insurance, for advertising and for tourist development—because it sought and expected a profit. For tax purposes, the profit might not all be taken here, but further along the processing chain in another country—but the exercise was expected to yield a profit. Sometimes the exercise was to protect profit by ensuring raw material supplies.

From the end of 1972 the federal government discouraged new foreign investment, and that, coupled with depressed market conditions, meant no new developments for a few years.

With more government encouragement since 1975, and more optimistic marketing prospects, particularly for steaming coal, a new generation of development is beginning. The profit motive is still an important factor encouraging foreign companies to seek leases—e.g. petroleum marketing companies seeking steaming coal leases—but there is also interest by foreign governments and foreign public utilities in securing raw material supplies—especially of energy.

Foreign capital inflow into mining—particularly energy—will be significant in the next decade; and it is the liquid fuel crisis underlined by O.P.E.C. that has generated it.

Australia's Role in World Mineral Supply

In 1974 the First Circum-Pacific Energy and Mineral Resources Conference was held in the Mid-Pacific Conference Center in Honolulu. The Pacific region was divided into four quadrants, to ensure a wide distribution of papers, and the south-west region, of which Australia was a member, contributed significantly. The Second Circum-Pacific Conference was held in July 1978. Topics based on Australian experience or potential included natural gas exports, land use planning, coal gasification and liquefaction, mineral policy, and legal aspects of resource development in Antarctica. On our relations to the west rather than the east, there are also public discussions. For example in August 1979 the International Conference on Indian Ocean Studies in Perth will consider, amongst other topics, resource development issues for the Indian Ocean area.

Australia, then, falls into two major geographic groupings:

- (i) the Pacific Basin, where we have seen that trade in natural resources has in recent years emphasised sales of iron ore and coal to Japan, but will in future be paying more attention to Korea and China in sales of coal and iron ore. Australia's major competitors in coal sales to Japan have been Canada and the U.S., while in iron ore sales she has been losing ground to Brazil. Yet to see the U.S. as a competitor is to miss the fact that in some areas she is a customer of Australia from time to time (e.g. lead and rutile) or a potential customer (natural gas). Canada, too, though a competitor in some commodities is a customer in others.
- (ii) the Indian Ocean, where the main flow of resources has been the eastward trade in crude oil from the Middle East, where the drive towards industrialisation is creating new market opportunities for Australian resources. The Indian Ocean also provides trade routes for competitors and potential competitors in some Australian markets, e.g. South Africa and India are interested not only in

supplying the Middle East but also in exporting to Japan, Korea and China. South Africa is also prepared to supply Europe and North America, e.g. from her new and large-scale Jurien Bay mineral sands deposits, whose development will affect long-term prospects for the Australian industry.

It is easy enough to divide the world into regions and talk about trade flows in those regions. We could look at the trade flows in the Atlantic, at South Africa's ability to supply Europe and the east coast of North America, compared with Australia's ability to supply Japan and the west coast of North America. However, although distance and form of transport are important cost elements in determining trade flows, they are not the only elements involved.

Australia operates in a global scene, not just in one or two areas. Within this global scene there are limiting parameters—such as the Communist bloc and tariff walls against particular commodities. In general it will be the competitiveness of Australia's products which gains her trade. Such competitiveness includes price (which reflects grades mined, wage levels and government imposts); reliability of supply; and quality.

It is not, therefore, enough to see Australia as having a *supply* of minerals. The demand also has to be there for development, trade and income to occur; and when it is there, Australia is usually prepared to sell (although in the case of uranium she is asking purchasers to conform to her relatively strict safeguard requirements, and this could restrict the volume of sales). Australia is not parted from Europe as she serves Japan, Korea, China and the Middle East. If she *can* compete in Europe—and transport costs may be a burden for some commodities—she will try to do so.

3 Federal Policy

The politicians of mineral-producing countries often find it hard to recognise the demand constraint—that having supplies does not guarantee sales. The converse supply constraint is very well understood world-wide as a result of O.P.E.C.'s actions in petroleum supply and pricing.

The demand constraint is important in Australia, since aspirations to particular price levels, and degrees to which local ownership and local processing can be required, depend on the demand constraint. So too does the ability of governments to levy imposts. Where demand is strong and the market uncompetitive, imposts can be readily passed on towards the customer. Where demand is weak, and the market uncompetitive, imposts must be absorbed by the producer, and in the long run there is a supply constraint.

Governments need to look clearly at their objectives before they adopt specific policies, to ensure their policies are in accord with their objectives.

Some countries have simply stated objectives. Papua New Guinea in its *National Development Strategy* sees large mines as useful only for the financial assistance thus won for national goals, rather than for any national benefit they bring. South Africa's Committee for the Optimum Utilization of Mineral Resources considered a suggestion that South Africa aimed to be 'a reliable and business-like supplier of minerals, in various stages of processing, to the Western World'.¹ Canada began a federal provincial review of mineral policy in 1973. Although the final stages were not completed, proposals for relative emphasis on various objectives were made, but they were so qualified that governments still had plenty of room to manoeuvre.

Although the Canadian review does not give us a definitive guide to policy, it does exhibit some of the elements that are present in Australian discussions. It suggested that development of mining, with processing, and emphasising exports, conveys economic benefits, so that it should be encouraged by the overall fiscal climate. Case by case consideration was, however, suggested for foreign ownership aspects, environmental and

¹ W. C. J. van Rensburg and S. C. Bambrick, *Applied Commodity Economics for the Mineral Industry*, Australian Mineral Foundation, Adelaide 1977; W. C. J. van Rensburg and S. C. Bambrick, *The Economics of the World's Mineral Industries*, McGraw-Hill, Johannesburg 1978, Chapter 17.

resource depletion aspects and regional effects. Such case by case appraisal was to be in line with the overall objective of winning for Canadians the best benefits from exploitation of their minerals.

Australian minerals policy has changed markedly in the last decade. Three major phases may be distinguished, with ebbs and flows of attitudes within them.

At the opening of the decade, attitudes of earlier decades prevailed, and both federal and state governments saw the mineral industry as worthy of encouragement.

Federal tax provisions were generally favourable, with accelerated depreciation available to help generate early cash flow and repay the loans needed to finance the large-scale projects of the sixties. Exploration expenses could be carried forward for tax purposes until income was available against which they could be written off. Some expenses could be written off in the year in which the appropriation was made. The industry did not see itself as especially generously treated, but regarded such provisions as merely taking account of its disabilities—such as high risk exploration, volatile markets, capital intensity and remote location.

The industry complained that it did not enjoy the depletion allowances available in some overseas countries. It did not, however, draw attention to the 20 per cent exemption granted for some minerals (100 per cent for gold). Originally granted as an exploration incentive, this provision was by then outdated—for one of the minerals enjoying the exemption, Australia had by then, at existing world prices and the current rate of extraction, economic reserves for 300 years.

State royalty rates in general seemed low in relation to commodity prices,² although royalties at Broken Hill were an exception.

Both state and federal governments favoured development for its own sake, and had not been concerned about whether the source of development capital was local or foreign; in the early seventies, however, public awareness of foreign ownership heightened as debate spread in a number of countries concerning the economic and political roles of multinational corporations. In 1972 the federal government had moved to restrict the inflow of foreign funds.

The debate on multinationals was only one facet of a debate on the benefit which mineral-producing countries received from the exploitation of their resources. An element in the multinational debate was a query on the extent to which transfer pricing—pricing of raw materials sold abroad to associated companies—limited local gains.

Another pricing question arose in the coal and iron ore trade with Japan, where fragmented sellers met co-ordinated purchasing; and some

² See Susan Bambrick, 'Mining: The problems for Australian Governments', *Australian Quarterly*, Vol. 45, No. 1, March 1973.

politicians, economists and others saw a need for some co-ordination among sellers in an attempt to raise sales revenue.

Petroleum exploration had been subsidised for some years, following the perception that discoveries of indigenous crude were important to reduce the pressure of imports on the balance of payments. Provisions had varied over the years.

At the December 1972 federal election, the Liberal-Country Party coalition (right-wing) government, which had been in power since 1949, lost office to the Australian Labor Party (left-wing), with the Hon. E. G. Whitlam as Prime Minister, and the Hon. R. F. X. Connor as Minister for Minerals and Energy.

In the creation of the Minerals and Energy portfolio in place of the old National Development portfolio, in the transfer of senior public servants from the former department into unrelated areas, and in the appointment of a permanent head of the new department from a different area, the new government made it clear from the start that the style of government, in this as in other areas, had changed.

Rex Connor was a man of purpose. He represented a coal-mining, steel-making area on the South Coast of New South Wales. He was anti-capitalist. He was strongly nationalistic, so that he especially deplored foreign capitalists. He was not young—he died in 1977 at the age of 74—and his memories of World War II, coupled with his nationalism, made him especially sensitive to what he regarded as exploitation by the Japanese. After years on the opposition benches, he had what he saw as entrenched wrongs to right. His determination, his preference for minimum contact for himself and his department with the private sector, and his lack of dissembling made him an unpopular figure with the mining industry.

The industry, uncertain at first of how a Labor government would treat it, reserved judgment; however, once Connor had declared his hand by referring to the executives of companies with sales contracts in \$U.S. as 'mugs and hillbillies', the industry was uncertain no longer. Open hostility often characterised the industry's public attitude to the Minister, but sometimes, even in public, the industry attempted appeasement; certainly in private, the courtesies were mostly observed without strain; but Connor, through it all, declined to be either bullied or coaxed.

In the end, it was his association with a dramatic foreign borrowing exercise, 'The Loans Affair', that cost him his portfolio. It was characteristic of the man that even his bitterest political opponents could not suggest he had sought any personal gain.

Connor's personal approach to his portfolio helps to explain the events or sometimes non-events of his Ministry.³

³ The Labor government's role in mineral and energy policy is discussed more

Delays in uranium development were initially the result of Connor's firm conviction that world uranium prices would rise; he saw writing contracts at that time as a mistake and would not approve new contracts. Furthermore, he was distressed by the apparent hastiness of approval granted to some contracts by the previous government just before the federal election.

It was Connor's conviction that Australia was not receiving world prices for her exports that led him to apply the federal export control power to all exports, so his Department could scrutinise all contracts. This power had previously been used only for special cases such as ensuring acceptable prices for iron ore and wood chip contracts, forcing primary separation of mineral sands, or ensuring peaceful uses for uranium exports.

It was Connor's anti-capitalist feeling that led him to revoke the petroleum search subsidy and the tax concessions to shareholders on calls paid to mining companies. In the first case, he felt that for a government to subsidise exploration without receiving equity in successful development (or at least a repayment of the subsidy) was an unjustifiable use of taxpayers' funds, although his critics were quick to point out that taxpayers were by then enjoying a high proportion of their petroleum supplies, from local sources, at less than import parity. In the second case, he suggested that shareholders' concessions had been abused.

Nowhere was Connor's anti-capitalist feeling stronger than in the tax area. In May 1974 there appeared a Report, commissioned by him and prepared by T. M. Fitzgerald, on *The Contribution of the Mineral Industry to Australian Welfare*.⁴ Fitzgerald was under pressure to publish before the election that month. At that stage he still hoped to publish a second volume, for the one released dealt primarily with the industry's contribution to federal government revenue.⁵

Fitzgerald showed clearly the value of accelerated depreciation allowances to the industry in an expansion phase (this aspect will be dealt with in Chapter 5), and in the August 1974 Federal Budget, depreciation provisions were altered severely against the industry; the 20 per cent tax exemption for specific minerals was also removed.

Connor's anti-capitalism was naturally matched by approval for government activity, and he established a Petroleum and Minerals Authority (subsequently declared invalid by the High Court on a

fully in Susan Bambrick, *The Changing Relationship: The Australian Government and the Mining Industry*, Committee for Economic Development of Australia, M. Series, No. 42, May 1975.

⁴ A.G.P.S., Canberra, May 1974.

⁵ For a discussion of what became known as the *Fitzgerald Report*, see Susan Bambrick, *The Changing Relationship*.

technicality related to its Act's passage through Parliament) and a Pipeline Authority. Development of the North-West Shelf gasfield was delayed for a number of reasons—his announcement that the government would buy all gas at the well-head at an unspecified price; his refusal to issue export permits, because he felt the gas should be available to be transported to the east coast by pipeline if present gas supplies dried up; and his disapproval of development by foreign companies.

It was Connor's mistrust of the Japanese, and his nationalism, that led him to insist on unified negotiations by Australian coal and iron ore producers with the Japanese. It was his nationalism that led him to insist on minimum 50 per cent local ownership of new projects, with 100 per cent for energy projects.

As the Whitlam government progressed, Connor's personal power faded to some extent. The government and Peko-E.Z. hastily put together a deal for joint development of the Ranger uranium deposit, just prior to the visit of the then Japanese Prime Minister. There was some softening, on the part of the Prime Minister at least, to foreign ownership—particularly at the exploration stage (this was both because the economy was suffering severe unemployment and needed stimulus, and because there was growing concern over dwindling supplies of indigenous crude oil). The tax changes of August 1974 were realised by some members of the government to have been too severe for an industry already depressed by world market conditions and by uncertainty about the government's intentions. The Industries Assistance Commission was enquiring into petroleum and mining tax.

At the federal election in December 1975, the Labor government lost office. A Liberal Prime Minister headed a coalition with the National Country Party. That party's leader, J. D. Anthony, became Minister for Trade and also Minister for National Resources. A subsequent election in December 1977 returned this government again, with a slight reshuffle of portfolios leaving Anthony as Minister for Trade and Resources, with some of his energy responsibilities transferred to a portfolio of National Development (a name which had not been used since 1972), with the former Minister for Environment, Housing and Community Development, K. E. Newman, at its head.

When Anthony became Minister for National Resources in 1975, the industry knew he was sympathetic to its problems—particularly the oil industry, since at the time of the May 1974 election Anthony had certainly favoured a rise in crude oil prices, which had not helped the coalition party's electioneering. Communication between the public service and industry was restored to its pre-1972 levels, but in other ways the pre-1972 situation was not completely restored.

The present government retains Labor's requirements of 50 per cent Australian ownership for new mineral projects, with 75 per cent in the

case of uranium (a distinction originally made because of the supposed strong demand for uranium, but now maintained because of 'special conditions' attaching to uranium).⁶ The 50 per cent requirement is considered only as a goal, for if it cannot be achieved, the government is prepared to consider a lesser percentage. Thus although on paper the policy may appear similar to Labor's, there is a difference of degree. The new foreign investment guidelines, which ease the definition of an Australian company, have further diluted the local equity requirements.

Initially Anthony did not directly intervene in coal and iron ore marketing, although he continued to talk with the Japanese government on the industry's behalf. During 1978, however, he was unhappy with the terms of some iron ore contracts he felt bound to 'approve', and told iron ore producers they were to get together in their negotiations with the Japanese. Coal producers had already been told to get together. In October, Anthony announced that companies would have to talk to the federal government before they began negotiations. One state Premier referred to this as negotiating with 'one hand tied behind one's back'.

On 24 October 1978, the Minister for Trade and Resources, Anthony, told Parliament that henceforth he would determine the parameters—e.g. pricing, tonnages and duration of contracts—for mineral exporters wishing to enter into negotiations under new or existing contracts. This approval would have to be obtained *before* companies began negotiations, and companies wishing to change the parameters during negotiation would need to seek a variation to this approval.

Anthony said he would make his determinations against the background of continuing consultation with industry, and he also referred to advice from his department. He said he believed that 'the entrepreneurial capacity of Australian companies should be used effectively and efficiently in the commercial marketing area' and that 'negotiation of contracts will be between the Australian commercial interests and the foreign buyers'.

Nevertheless, companies are concerned that prior determination of parameters by ministers and public servants may not reflect a familiarity with the market, and that the new provisions reduce the flexibility, speed and secrecy necessary for successful negotiation in a commercial environment. While recognising these shortcomings of the proposals, companies acknowledge that it may be useful in negotiation to be able to quote rigid government requirements.

Anthony's statement received some condemnatory remarks from within the coalition and the vigour of implementation of the policy is open to some doubt at this stage.

⁶ J. D. Anthony, 'Australia's National Resources: The First Six Months Under the Liberal-National Country Party Government', address to the Australasian Institute of Mining and Metallurgy, Broken Hill Branch, 24 June 1976.

The subject of the guidelines was discussed at the Loan Council meeting in Melbourne on 6 November 1978, and commonwealth and states agreed to further discussions. The tone on both sides was conciliatory. The Prime Minister announced after the meeting that there would be commonwealth-state discussions of the guidelines at both Minister and officer levels and that companies would be involved in the discussions. He said that it was agreed that the states and companies would be consulted where necessary about the parameters for current negotiations so that they could proceed under the existing guidelines, without waiting for the review. He said the commonwealth was 'anxious to avoid a vacuum in negotiations in the immediate future as it was obvious agreement could not be reached at a single meeting'. He indicated that the discussions that day had indicated there could be some changes to the guidelines. The Queensland premier said afterwards that although he did not like the principle behind the guidelines, the meeting was not discussing their removal, but rather how to do 'the best possible for private enterprise and investment'.

Anthony's 24 October move came at a time when the Japanese steel mills were seeking reductions in coal prices and the removal of escalation clauses from contracts.

In February 1978 the Thiess Dampier Mitsui consortium had had to agree to price reductions for Moura coal of \$1.30 per tonne on sales to Japan, and to the removal of all escalation clauses for two years. When the federal government came to approve this contract it did so only for one year, hoping this would prevent the Japanese mills from using the new terms to pressure Australian coal producers whose contracts were up for renegotiation in 1979. In October 1978, and significantly only a few days before Anthony's move, Utah Development had had to break off discussions with the Japanese on renegotiation of contracts relating to their Blackwater coal. The mills had hoped Utah would accept the same conditions as Thiess Dampier Mitsui.

In the interim the Japanese mills had successfully pressured the Canadian mills into removing escalation clauses, although in contrast with the Thiess Dampier Mitsui case, the Canadians achieved a price rise of \$C1.40 per tonne for the two years. Between then and the Utah experience, the Canadian dollar depreciated by more than 10 per cent against both the Australian and American dollars. The Japanese were thus able to argue in the Utah case that Australian coal had become more expensive than Canadian coal, in terms of the Japanese yen.

Anthony's room to manoeuvre when Australian prices are under threat is illustrated by the Thiess Dampier Mitsui experience of February 1978. The company had the choice of accepting the Japanese demands and keeping its mine operating or rejecting the demands and shutting down mines. Since several Australian coal contracts are approaching expiry, a Japanese threat not to renew is a strong factor in

negotiation. Anthony doubtless considered that requiring the producers to act in concert was not enough when their very existence was threatened—that setting the parameters was the only way to achieve his aim. This had been driven home to him in the 1978 iron ore negotiations mentioned earlier—when the Japanese mills had also traded tonnage for price.

The Western Australian Premier has described Anthony's stance on mineral contract negotiations as 'socialist'. Certainly the coalition has not been afraid to adopt A.L.P. policies where they suited it.

The Liberal-National Country Party government is still involved in the Ranger uranium project, although the Atomic Energy Commission's monopoly on Northern Territory exploration has gone. Under Connor, the federal government through the Australian Atomic Energy Commission was to undertake all exploration in the Northern Territory; it was an equal partner with Peko-E.Z. in the Ranger development; and it had acquired an important shareholding in Mary Kathleen Uranium. However, the present government stated it wished to divest itself 'of the previous Government's involvement in areas that rightly belong to private enterprise'.⁷ No attempt has been made to revive the Petroleum and Minerals Authority, the government exploration, development, production marketing, processing and transport authority which Labor had tried to establish.

One of the Liberal-N.C.P. Party government's first tasks was to liberalise the minerals and energy sector's tax position. In the August 1976 Budget the coal export levy (\$6 per tonne for high-quality coking coal, \$2 for other steaming coal) was reduced, and a statement of intent to phase it out completely was made. In the August 1977 Budget the levy was further reduced, and the commitment to complete removal was repeated both then, by the Treasurer, and in subsequent speeches by the Minister for Trade and Resources. No reduction was made in the August 1978 Budget.

Initially the reduction in the levy was made to encourage new coal projects. Queensland developments have not been moving as fast as was then expected, partly because of medium-term market prospects. The degree of foreign equity varies. The Nebo project will have 80 per cent Australian participation; the Hail Creek project, which is still subject to delays, will probably have about 60 per cent Australian participation; and the Norwich Park coal project will have the equivalent of 55 per cent Australian equity—Australian participation in Central Queensland Coal Associates has been doubled to about 20 per cent, giving new Australian investors an interest in a range of Utah's projects.

A number of tax changes in the 1976 Budget affected petroleum explorers and developers, ending the previous situation where general

⁷ J. D. Anthony, 'The First Six Months'.

mining had received more favourable tax treatment than did the petroleum industry, and reflecting concern that Australia's known petroleum reserves were dwindling. One estimate suggested that by 1982 our oil imports would be costing us up to \$2 billion annually,⁸ compared with around \$850m. in the mid-seventies. Recently, further economic reserves in Bass Strait have been announced, which extend the period of real concern further into the future. These reserves have become economic because the price which they will attract is higher than was expected earlier, because the government has recognised that the level of economic reserves depends not only on physical resources but also on price/cost relationships.

Other tax changes in the 1976 Budget extended beyond the petroleum industry.

In addition to the tax changes in the 1976 Budget, the federal government has made special concessions to foster the North-West Shelf development. In 1977 it announced its intention to introduce legislation on several key areas relevant to the project. These included the introduction of a tax rebate on expenditure on offshore exploration and development, a 2-year extension of the 20 per cent investment allowance deduction, and the broadening of the definition of allowable capital expenditure to include liquefaction plants. The government also stated that it accepts the present foreign equity level of 52 per cent, that the existing levy on crude oil will not apply to condensate marketed separately from a crude oil stream and that it is prepared to provide for major projects longer-term assurances of freedom from future adverse changes to the controls on overseas borrowings.

After the equivocation on the North-West Shelf's development under Labor, the current feasibility study and presumption of development is providing a major impetus to petroleum exploration, including exploration in deep water on the Exmouth Plateau. When Connor had stated that the government would buy all gas produced at the well-head (at an unspecified price) and subsequently pipe it through his national pipeline grid (apparently uncoded), he had also said that Woodside-Burmah's shareholders would receive a reasonable return on their funds, but the size of the return was not given. The Pilbara Study Group, investigating the idea of a Pilbara industrial complex based on natural gas, had to do so in the absence of any firm guidelines on gas pricing. Exports were not countenanced. It was only with Anthony's 'development' outlook that exports were permitted and immediate development became possible.

⁸ R. C. Sprigg, 'The Place of the Indigenous Australian Petroleum Explorer', Australian Petroleum Exploration Association Symposium, Canberra, 20 September 1976.

Ironically, this coincided with a fall in the foreign ownership which Connor deplored. Burmah's financial difficulties caused it to divest itself of its interest to B.H.P. B.H.P. and Shell then joined their interests (with the necessary financial adjustments) to become equal partners in North-West Shelf development which holds 43 per cent of Woodside-Burmah N.L., now Woodside Petroleum Ltd, which in turns holds 50 per cent of the Shelf. The other 50 per cent of the Shelf is held in equal shares ($16\frac{2}{3}$ per cent each) by Calasiatic, B.P. and North-West Shelf Development. (The exception is the northern area of the leases, where Calasiatic does not have the same interest, so North-West Shelf development has another $16\frac{2}{3}$). The 57 per cent of Woodside-Burmah held by the public is held by 47,000 shareholders.

In the August 1978 Budget, the federal government announced that it had decided that all crude oil produced from presently known Australian fields would in future be priced to refiners at import parity. Energy consumers would thus in future be paying prices for petroleum products which would take into account the full replacement cost of crude oil consumed in Australia.

The government's policy for producers' prices has not changed. Producers will still receive import parity prices for an annually increasing proportion, or 6 million barrels per annum, whichever is the greater, of crude oil produced from each field or new development within fields discovered before 14 September 1975, with the remainder of production sold at fixed prices below import parity. However, for consumers, the government's decision represents a faster progression towards import parity than had been announced in 1977. Under the previous pricing arrangements, the average into-refinery price of indigenous crude oil would have been about 60 per cent of import parity in 1978-9, and the average into-refinery price of all crude oil processed about 75 per cent. Under the new arrangements, both these figures will be 100 per cent.

The faster progression to import parity for into-refinery prices was in line with the first of the targets for the government's energy policy, announced in an election policy statement in November 1977, which were:

- (i) moving crude oil prices towards import parity;
- (ii) restraining the rate of growth of energy consumption, particularly in liquid fuels;
- (iii) achieving the highest practicable level of self-sufficiency in liquid fuels;
- (iv) developing economic oil and gas reserves;
- (v) encouraging major export projects;
- (vi) providing support for increased energy research and development.

The second objective may also be partly met by the faster progression of into-refinery prices to world parity, but in addition the 1978 Budget

set aside \$50,000 for preliminary research and planning for a national energy conservation publicity campaign, which would be part of Stage 1 of a co-ordinated national energy conservation program, agreed to by commonwealth and state Energy Ministers at the meeting of the Australian Minerals and Energy Council in Darwin in August 1978.

The faster progression to import parity could also be expected to eliminate the distortions in resource allocation which had arisen with Australia's artificially low indigenous price. The Minister for National Development, the Hon. Kevin Newman, said in a press statement of 15 August 1978 that several large fuel users had been able

to switch their 'c.i.f.' contracts from furnace oil to industrial diesel oil, and thereby confer valuable entitlements of cheap local crude on their suppliers. The resulting misuse of industrial diesel oil, which has a significantly higher value in end use and is more costly to produce, was undesirable, and it was necessary for him to take administrative action to prevent this under the pricing arrangements previously in force. As another example, low indigenous crude oil prices have retarded the penetration of natural gas into the fuel oil and diesel oil market, especially in the Sydney area.

In a press statement of 12 September 1978, the Minister said:

Increased usage of natural gas, consistent with price relativities, would help conserve liquid fuels and encourage an optimisation of product output from a given input of crude oil. At the same time, utilisation of locally produced natural gas as an alternative fuel to liquid petroleum fuels offers advantages in relation to import requirements and the balance of payments. If market factors result in a surplus of fuel oil, other alternatives for disposal need to be considered including export opportunities.

The government had said in its energy policy statement of November 1977 that 'encouraging major export projects' was one of its objectives for coal, natural gas or uranium.

Under Labor, uranium development seemed imminent, with the government and Peko-E.Z. jointly developing the Ranger deposit. Then the proposal was made subject to an environmental enquiry. The Ranger Enquiry, conducted by Mr Justice Fox, who has subsequently become Australia's ambassador-at-large on uranium, produced two reports. The first was interpreted by some as giving 'the green light' to uranium mining in Australia while recommending strict government control over marketing and suggesting that the six projects awaiting development proceed sequentially rather than simultaneously. The Commission recommended, however, that the development of uranium resources in the Northern Territory—where four of the projects are located—be postponed until the second report was released. This delayed a decision on whether uranium mining and export should be

permitted. The second report has now been released. It recommends sequential development of a limited scope, and the government has approved mining. There are still major issues to be resolved—nuclear safeguards, union attitudes, Aboriginal approvals and compensation, environmental safeguards, national parks, even ownership.

At the time of writing, the trade union movement in general, as represented by the A.C.T.U., has not endorsed uranium production and export, ostensibly because it is not happy with nuclear safeguards. It has not prevented exports from the existing mine (Mary Kathleen) or from the government stockpile to meet existing contracts; but it does not at present endorse the development of new mines, even to meet existing contracts. As Australians know only too well, government approval for any project is of little use if there is not union support, and the long-term attitude of the trade union movement as a whole is not certain. A prospective uranium miner indulging in scenario planning would have quite a range of scenarios to consider—involving not only whether uranium mining became a fact in the Northern Territory, but also in which particular order mines were developed. In the case of some mines, the foreign ownership question could become important.

The Aboriginal rights issue has two parts to it—first, whether mining will be permitted, and second, with what monetary compensation to the Aboriginal people? These questions will be considered further in Chapter 7.

Aboriginal land rights is but one problem faced by the uranium industry; union attitudes linked to environmental concern are another. The environmental issue is not confined to uranium, for under federal legislation environmental impact statements and perhaps public enquiries may be required for any project. One operation has ceased as the result of such an enquiry. This was the Fraser Island mineral sands operation in Queensland, which was halted by the federal government's use of its export control power. Compensation was offered to the companies but they consider the sum inadequate.⁹ Compensation was also offered to the Queensland government (which had issued the production lease), to provide alternative regional employment. Federal-state conflict and co-operation in environment protection will be discussed further in Chapter 9.

Two issues which will be of increasing importance to governments in the future are the development of offshore resources and Australian claims to the resources of the Australian Antarctic Territory.

Lauterpacht has described how the clear distinction between

⁹ On 31 March 1977, D.M. Minerals submitted to the Australian government a claim which mentioned a going concern value of \$23m. The Australian government offered D.M. Minerals an *ex gratia* payment of \$4m. (See D.M. Minerals, *Fraser Island: Why Just Compensation is Due*, June 1978.)

territorial seas and high seas,¹⁰ which prevailed from the early seventeenth century, has in the latter half of the twentieth century been qualified by the emergence of the concepts of the continental shelf and the exclusive economic zone.

Australia in 1953 claimed under customary international law rights over the continental shelf. This proclamation is the basis for exploration and development of Bass Strait and the North-West Shelf. Australia did in 1963 become a party to the Continental Shelf Convention which had been drawn up in 1958. Since then agreements have been reached on continental shelf boundaries with Indonesia (1971) and West Irian and Western Timor (1972). Negotiations on delineation of continental shelf boundaries for Heard Island (with France), Norfolk Island (with France and New Zealand) and Macquarie Island (with New Zealand) have yet to be undertaken.

A concept that has developed more recently than that of economic sovereignty over the continental shelf is the concept of the 200-mile exclusive economic zone. The two concepts have been linked in the Law of the Sea Conference, which has for some years been debating the idea that revenue from offshore operations, on the continental shelf, but beyond the 200 mile limit, should be shared.

The idea—that not only coastal states should benefit from economic resources offshore—underlies much of the discussion of the Law of the Sea Conference; that Conference has had several sessions and the number of participating states increased from 87 in 1958 to 146 in 1977. Discussions have been slow moving. This is not surprising where there are so many conflicting interests (developed versus developing countries, as well as coastal states versus non-coastal states).

The exclusive economic zone is regarded as economic. Full sovereignty of coastal states applies only to the 12-nautical-mile limit of the territorial sea. Beyond that the sovereignty is only economic and includes the conservation and management of living resources, including setting maximum fishing catches and having first option on fishing. Exploration and exploitation of non-living and mineral resources is also mentioned.

The economic zone question becomes especially important for Australia's interest in her declared Antarctic Territory. I write 'declared', because I remember well my surprise (during a visit to the Antarctic section of the National Science Foundation in Washington some years ago) when I realised that U.S. maps of the Antarctic did not delineate the Australian Antarctic Territory. Further investigation to

¹⁰ E. Lauterpacht, 'International Legal and Political Factors Affecting the Exploitation of Australia's Offshore Resources', *Australia's Offshore Resources—Implications of the 200 Mile Zone*, Science and Industry Forum, Report No. 11, Australian Academy of Science, 1978.

remedy my naïveté showed that there were a number of overlapping claims to various sections of the Antarctic continent, including a South American claim based on a Papal Bull of 1642.

The Antarctic Treaty has allowed scientific work on the continent, and co-operation for scientific purposes. Parties to the treaty have agreed not to extend their claims to territorial sovereignty in the area for the duration of the Treaty, but this does not mean that such claims are forever precluded. Politically if not legally, the Treaty probably also precludes the proclamation of exclusive economic zones based on claims to Antarctic territory. Both in discussions of the exploitation of offshore resources and in discussions of onshore resources on the Antarctic continent itself, there is pressure by some nations to regard the resources as part of 'the common heritage of mankind', to be shared by all. Others see them as morally belonging to the less developed countries.

As the Law of the Sea Conference moves slowly, so the U.S. Congress has moved faster to produce its conditions for exploitation of the seabed, e.g. for manganese nodules. So too the Antarctic Treaty is no guarantee against unilateral action by one of the parties or by an outsider.

At the moment, the mineral resources of the Antarctic offer no immediate prospect for economic exploitation, but it is in Australia's long-term interest to maintain her presence in her territory and to lay claim to the exclusive economic zone that that territory carries with it. At the moment, even if she declared it, she could not hope to police it against the fishing vessels of nations which do not recognise her claim. However, the prospectivity of the continental shelf for petroleum is considered to be quite high and Australia may (if technology and economics should become favourable) eventually consider the area worth exploring. Taylor explained that when the southern coast of our own continent began moving away from Antarctica 50 million years ago,¹¹ this led to favourable conditions along the Australian coast (especially the formation of the Gippsland Basin) and some exploration geologists expect that similar conditions would have developed along the Antarctic coast. The Australian government should be bearing this in mind in maintaining Australian claims.

¹¹ G. H. Taylor, 'Australia's Offshore Mineral Resources', *Australia's Offshore Resources*, Science and Industry Forum Report No. 11, Australian Academy of Science, 1978.

4 Taxation: *Some Concepts and Provisions*

Taxation of the mining industry has been a major political issue of the seventies. As mentioned in Chapter 3, the federal Labor government altered taxation radically during its term of office, 1972–5, partly in response to a Report by T. M. Fitzgerald on *The Contribution of the Mineral Industry to Australian Welfare*. That government also charged its Industries Assistance Commission with an enquiry into petroleum and mining taxation.¹ The subsequent Liberal-N.C.P. government in 1976 altered taxation conditions once again, this time in favour of the industry, although most sections were not as well off as they had been before 1972.² In 1977, further concessions were made to encourage development of the North-West Shelf.

At the same time as the government was easing the mining and petroleum industries tax positions, a move was afoot that brought the industry further disquiet. This was the discussion of a form of additional tax.

The Industries Assistance Commission had had referred to it the question of the pricing of Australian crude oil, originally priced above import parity, with government regulation to ensure its use, but by 1976 priced well below import parity. Apparent scarcity of indigenous crude oil, in the face of rising world prices, had led to suggestions for price rises to limit demand, to encourage exploration, and to improve recovery. The I.A.C. recommended some price increases,³ and in doing so discussed the possibility of a petroleum rent royalty, and mentioned the petroleum revenue tax applied in the United Kingdom. This is a form of rent tax.

¹ See W. C. J. van Rensburg and S. C. Bambrick, *The Economics of the World's Mineral Industries*, Chapter 6 for an outline of the terms of reference of the enquiry, and of the discussion paper circulated before the Commission's public hearings; there is also some discussion of the Commission's draft Report, and the recommendations of the final report.

² For an outline of the 1976 tax changes, see van Rensburg and Bambrick, *The Economics of the World's Mineral Industries*, Ch. 17.

³ Phasing up to 49 per cent of world parity by 1980 for 'old oil' from the Gippsland fields, with full import parity before 1985; import parity (less the \$2 a barrel levy) for the relatively insignificant Barrow Island and Moonie crude from the beginning of 1977; and the same price for fields discovered before September 1975 but not yet in production; and to oil from expansions and extensions if substantial new installations are required.

During his Budget Speech in August 1977 the then federal Treasurer, the Rt Hon. Philip Lynch, said that his government would be considering resource rent taxes for the petroleum and uranium industries, while the Australian Labor Party, at its conference in Perth in July 1977, supported the idea of an additional profits tax for the mining industry.

However, on 2 July 1978, the federal Treasurer, the Hon. J. W. Howard, and the Minister for Trade and Resources, the Rt Hon. J. D. Anthony, announced that the government had shelved plans for a resources tax on crude oil and uranium production, although the government had budgetary problems. They said the decision had taken into account the possible adverse effect of such a tax on exploration and development decisions and on investor confidence.

The announcement said that discussions had been held between officials and representatives of the oil and uranium industries on the matter, and written submissions received from many of the companies; it said that much research was subsequently carried out and that the government had given the issue long and earnest consideration.

In discussion, Anthony stressed the adverse effect any resources tax would have had on foreign investment. He said the government had been under pressure from investors in the mining industry, and said there had been a reaction 'around the world' that if Australia had gone ahead with the tax it would have had a detrimental effect. It appeared that the Prime Minister, the Rt Hon. J. M. Fraser, had found strong opposition to the idea of a resources tax from potential investors on his overseas trip in the first half of 1978. Some of those investors have operations in other parts of the world which attract taxes other than Australian-type corporate income tax.

There was no stipulation that the funds from increased oil prices should be spent on exploration when the resource rent tax proposal was shelved, but in the August 1978 Budget, when oil prices were raised to import parity more rapidly than previously expected, it was only into-refinery prices, not producers' prices, which increased.

The removal of the immediate threat of resource rent tax for the uranium industry was somewhat different, as the industry was not actually operating.

Although the Liberal-N.C.P. government may have dropped the resource rent tax idea at the present time, the issue is still alive for the federal opposition.⁴

⁴ For a detailed discussion of the issue, see Susan Bambrick, *Resource Rent Taxes*, Committee for Economic Development of Australia. This examines the concept of economic rent and tax neutrality, the practical application of a rent tax, and the situation in some other countries. It pays special attention to the Australian petroleum industry. A summary paper is also available.

On 13 February 1978 the Hon. W. G. Hayden, Leader of the Opposition, cited Utah's \$158.3 million net earnings in 1977 as justification for the federal government imposing a resource rental tax. He called the resource rental tax 'a form of excess profits tax', and said that what he had in mind was a tax similar to that in operation at the Bougainville copper mine. Although Utah paid corporate tax, withholding tax, royalties, transport charges and other levies by governments, he said, its return on funds was breath-taking. He reported:

This year close to 90 per cent of Utah's \$158.3 million profit was distributed as dividends and 90 per cent of this went overseas. In the latest year \$126 million of the \$141 million in dividends paid by UDC went to the US parent company, Utah International.⁵

(Utah was not subject to withholding tax as it used a branch structure rather than a subsidiary structure. Australian tax law in this respect did change in 1978, although as Chapter 5 illustrates, U.S. companies may still see advantages in the branch structure.)

There is an interesting sequel to the federal government's mid-1978 decision not to proceed with its idea of a resources tax: it almost simultaneously sought a way of recovering further tax from mine employees, by taxing company-subsidised housing. A circular to Queensland employers from the Commonwealth's Taxation Department, signed by Queensland's Deputy Commissioner, after quoting Section 26E of the Income Tax Assessment Act on how assessable income should be defined, says,

Where, for example, a taxpayer is supplied with premises for the use of himself and his family it is considered reasonable to accept in normal circumstances that the value to the taxpayer would be equal to the rental which a private tenant might be expected to pay for the accommodation provided.

This department expects that, as a general rule, values in the vicinity of \$988 per annum should be adopted where an employee is provided with a residence.

Where an employee pays some rent this is to be deducted from the \$988 before assessable income is determined. Where small or sub-standard premises are made available, the \$988 was to be reduced, but the circular suggested that managers and other senior employees would have imputed rent in excess of the \$988 suggested.

Employers were requested, in the absence of agreement with the Taxation Department or valuation by the Department, to include a minimum value of \$988 on group certificates relating to employees provided with premises for the year ended 30 June 1978.

The more stringent application of existing law was thus not intended

⁵ *Australian Financial Review*, 14 February 1977.

to be retrospective, but it did mean an instant difference in take-home pay for employees on pay-as-you-earn taxation deductions. One estimate suggested that a worker on about \$200 a week would be paying \$7 extra a week in tax. Some sections of Queensland industry immediately went on strike. The strike lasted only a few days. The government decided not to act immediately but to await the outcome of an official review of the issue. The delegation from the mining unions to the federal Treasurer on the issue (on 11 July) was led by one of the government's own backbenchers. Subsequently the government decided against pressing this point.

Part of the Industries Assistance Commission's enquiry into petroleum and mining taxation had been concerned with general conceptual issues such as prospects for competitive leasing, a system where companies bid at auction for exploration or development leases—the bids may be in terms of lump sum payments, royalty rates, sums to be expended on the lease, or some combination of these.

Much of the discussion, however, related to the write-off provisions for capital expenditure. This followed the concern in the May 1974 *Fitzgerald Report* with the accelerated depreciation allowed to the mining industry, and the August 1974 Budget changes to those depreciation provisions.

In the following discussion I have taken for a number of categories of expenditure the position at May 1976,⁶ and indicated what changes if any have been made to them since that date.

I Exploration or Prospecting expenditure (general and petroleum mining)

As at May 1976 under Section 122B of the *Income Tax Assessment Act* 1936–75 a deduction was allowed from income of the tax year in which general mining exploration expenditure occurred up to but not exceeding the net income earned during that tax year in mining or associated activities. Where net income was not available for deductions to be made against it, any excess of deductions could be carried forward for deduction in subsequent years. Where the enterprise had no mining income it could carry exploration expenditure forward until mining income was earned. The exploration expenditure did not have to be incurred in the same geographic region where the income was subsequently earned.

The Industries Assistance Commission recommended that both mineral and petroleum exploration expenditure should be immediately deductible from any source. Since 17 August 1976 deductions for petroleum exploration expenditure have been available against all income, and not only income from petroleum mining. Thus the

⁶ *Income Tax for the Mining Industry*, A.G.P.S., Canberra, 1976.

petroleum industry is now treated more favourably than general mining with respect to its exploration expenditure. Previously, under Section 124AH, petroleum exploration or prospecting expenditure had been deductible in the tax year in which it was incurred, but only against the net assessable income earned in that tax year from the sale of petroleum produced in Australia. Where income was not available for deductions to be made, then excess deductions could be carried forward for subsequent deduction. As with general mining, exploration expenditure did not have to be in an area which subsequently produced for it to be deductible.

Under Section 122J (general mining) exploration is deemed to include geological mapping, geophysical surveys, systematic searches for mineral-bearing areas, and detailed searches for deposits, e.g. by drilling. Once an ore body is located, search by drives, shafts, cross-cuts, winzes, rises and drilling is deductible, so long as this expenditure is directed only to discovery and not to extraction, when the deduction rate would have been less favourable.

Under Section 124AH (petroleum mining) exploration is deemed to include geological, geophysical and geochemical surveys, exploration drilling and appraisal drilling. Development drilling and operations in the course of exploiting the petroleum field are not deductible under Section 124AH; but they are allowable capital expenditure deductions and will be treated below.

II Allowable Capital Expenditure on Mining and Certain Treatment of Minerals

As at May 1976, this expenditure was subject under Section 122D to annual deductions over the life of the mine, subject to a minimum deduction of one twenty-fifth of the undeducted expenditure.

The deduction available in any tax year was calculated as follows: allowable capital expenditure in that year was added to the undeducted expenditure from previous years, and the residual capital expenditure was then divided by the lesser of (i) the number of whole years remaining of estimated life of the mine at the end of the tax year or (ii) twenty-five years.

Where net income was insufficient for the resulting amount to be deducted in the given tax year, the amount as yet undeducted formed part of residual capital expenditure and was eligible for deduction in later years. Where a company did not wish its deduction limited to the net income of the given tax year, it could opt to have the limitation waived, and have any loss carried forward for up to seven years, and deducted when income was available.

Under Section 122H a mining enterprise had the right to elect that normal depreciation provisions should apply to expenditure on plant in place of deduction of the cost of the plant as allowable capital

expenditure. The company could substitute normal depreciation provisions for some or all of its expenditure on mining or treatment plant.

The Commissioner of Taxation determines annual depreciation rates on the basis of the effective life of the unit. The percentages allowed as at May 1976 under the prime cost method for some items were as follows (rates for the diminishing value method are 50 per cent higher): heavy duty motor trucks 20 per cent, normal motor trucks and bulldozers 15 per cent, rubber belt conveyors 15 per cent, mechanical coal-mining plant 12.5 per cent, mine cars 10 per cent, mining machinery and plant in general, including skips in coal mines and motors, drive and structure of conveyor systems 7.5 per cent, railway trucks for coal transport 2.5 per cent. Depreciation was available against assessable income from any source, not only mining income.

Section 122A outlined categories of expenditure which qualified for special deductions available to mining enterprises. Although the industry's opponents claim these were special privileges for the industry, in fact the categories were not of the type that other industries usually have to make. They included

- (i) the purchase costs (within given limits) of prospecting or mining rights or information. The first category is seen as including licences, authorities to prospect, and mining permits, as well as exploration or mining leases. The second category related to geological, geophysical or other technical data relevant to the existence or extent of mineral deposits (excluding petroleum) in an area. The limit to the deduction was so much of the cost as was stated in a notice signed by both purchaser and vendor and submitted to the Commissioner of Taxation. It was limited to so much of the vendor's expenditure on prospecting and development as had not been allowed as deductions. To this was added any sum on which the vendor is taxed as a result of the sale;
- (ii) preparation of the mine site, including removal of over-burden;
- (iii) buildings, improvements and plant necessary to extraction—offices, stores, workshops, mine-shafts, tunnels, bulldozers and drilling equipment;
- (iv) expenditure on housing and welfare at the mine site or adjacent to it. Houses, flats and other residential accommodation to be deductible had to be for employees in mining or its associated activities. Works to provide roads, water, electricity and communications for residents were also deductible. Health, recreational and educational facilities, to qualify, had to be for employees and their dependants, had to be at or adjacent to the mine site, and could not be operated for profit. Such facilities included hospitals, clinics, infant welfare centres, swimming pools, sports ovals, schools and libraries;

- (v) provision of water and electricity to the mine site—including reservoirs, electricity-generating plants;
- (vi) communications with the mine site, e.g. telephone lines;
- (vii) access to the mine site.

For the infrastructure items (v)–(vii), if a government authority supplied facilities, any contribution made by the company to the authority was deductible.

One of the tax areas under discussion for some years has been how far down the processing chain the special deductibility provisions for mining should be allowed to operate. As at May 1976, treatment plant was eligible for special deductions only up to and including the concentration stage—although by then the location of such plant had ceased to be important for tax purposes. It no longer had to be located close to the mine site. Qualifying plant included that used in cleaning, leaching, crushing, grinding, screening, grading, or sizing a mineral and concentration by flotation, gravity or magnetic or electrostatic methods. Plant used in producing alumina, in producing pellets or other agglomerated forms of iron or in sintering or calcining minerals was not included in the special deductions allowed to the mining industry.

As at May 1976, other exclusions from special deductibility included transport plant or facilities outside the mine site. Thus while vehicles used exclusively for extractive operations at the mine site had special deductibility, road vehicles transporting minerals or their products, railway rolling stock and ships qualified only for normal depreciation allowances. Section 123B authorised a deduction over twenty years for the capital costs of roads, railway lines, pipelines and other facilities for the transport of minerals (including petroleum and natural gas).

One of the mining industry's complaints over a number of years has been that expenditure on housing and municipal amenities for port employees had not qualified as allowable capital expenditure in the same sense as they did at the mine site. Roads, harbour surveys and dredging and expenditure on plant or buildings used in connection with the port was also excluded from special deduction. Wharves and wharf plant did, however, qualify for normal depreciation allowances.

On the questions of deduction and depreciation of capital expenditure for general mining, a number of changes have been made since May 1976.

- (i) Allowable capital expenditure after 17 August 1976 is deductible on a diminishing value basis over five years or the life of the mine, whichever is the less (i.e. there is a minimum deduction of one-fifth of the undeducted expenditure). Capital expenditure incurred up to and including 17 August 1976 is now referred to as 'residual previous capital expenditure' and remains deductible over twenty-five years or the life of the mine, whichever is less. The Industries Assistance Commission had recommended that 'allowable capital

expenditure on assets used for mining or petroleum operations or for the transport of minerals and petroleum be deductible at the option of the taxpayer on a straight-line basis over the life of the asset, the life of the mine, or 15 years whichever is the least'. In the draft *Report*, issued some months before the final *Report*, and the subject of further public hearings, the majority recommendation had used 'the life of the asset, the life of the mine or 25 years, whichever is the less'. It had been the minority *Report* that had recommended fifteen years.

- (ii) Capital expenditure after 17 August 1976 for mineral transport facilities is now deductible over ten years, although taxpayers may opt to deduct expenditure over twenty years, the period previously enforced.
- (iii) Some port establishment costs—for harbour surveys, initial dredging of channels and harbours, and the installation of navigational aids—are now included amongst capital expenditure eligible for allowance as transport facilities, provided they are located in Australia and do not constitute plant.

One of the final recommendations of the Industries Assistance Commission enquiry had been somewhat more generous—that 'allowable capital expenditure be extended to cover expenditure on ports and related facilities, including housing and welfare facilities located at the port site'.

The Commission had also recommended that 'the full cost of mining and exploration rights and information be allowable capital expenditure . . . subject to the net proceeds of the sale being taxable in the hands of the vendor'.

III Allowable Capital Expenditure on Petroleum Mining

As at May 1976, provisions were similar to those for general mining—annual deduction under Section 124AD of not less than one twenty-fifth of annual expenditure over the estimated life of the field; the right under Section 124AG to opt for normal depreciation instead; and the availability of depreciation deductions against income from any source, while allowable capital expenditure was available as a deduction only against income from the sale of petroleum mined by the taxpayer in Australia or from sale of products of that petroleum. Allowable capital expenditure after 17 August 1976 is subject to deductions calculated by reference to the life of the field with a minimum deduction of one-fifth of undeducted expenditure. Expenditure incurred up to and including 17 August 1976 (now referred to as 'residual previous capital expenditure'), remains deductible over twenty-five years or the life of the mine, whichever is less.

Since 17 August 1976 allowable capital expenditure can be deducted against income from any source.

Section 124AA defines allowable capital expenditure for special deduction available for petroleum mining to include:

- (i) drilling plant and the cost of drilling except that used in exploration or appraisal drilling;
- (ii) plant at the well-head used to remove gas, water or other impurities from the petroleum;
- (iii) pumping plant;
- (iv) storage tanks at the well-head;
- (v) pipelines;
- (vi) infrastructure costs such as the cost of providing water, light or power for use on the petroleum field or access to or communications with the site of the petroleum mining operations; and
- (vii) expenditure on housing and welfare if these improvements are situated on or adjacent to the site of the petroleum mining operations; and within specified limits, the cost of acquiring a petroleum prospecting or mining right or petroleum prospecting or mining information. The allowance of the deduction is dependent upon a written notice of agreement between the vendor and the purchaser being lodged with the Commissioner of Taxation under Section 124AB. Deduction is limited to the total of: the residual capital expenditure and the unrecouped previous capital expenditure of the vendor in relation to the area at the end of the tax year in which the sale is made; undeducted expenditure on exploration (other than expenditure on plant in use at the date of the sale) by the vendor at the end of the same tax year; and any amount included in the vendor's assessable income as a result of the transaction.

As an incentive to development of the North-West Shelf gasfields, definition of allowable capital expenditure has been extended to include capital expenditure from 25 August 1977 on plant for use solely in liquefying natural gas obtained from the taxpayer's petroleum mining operations.

As for general mining, there are special transport provisions referring to railways, roads, pipelines and other transport facilities for petroleum and natural gas. These categories are therefore not included as allowable capital expenditure for special deductions for the petroleum industry. Expenditure on plant for use in the refining of petroleum or of its products is also excluded, although it can qualify for deduction under normal depreciation provisions.

Rates of depreciation (prime cost method) for some classes of petroleum mining plant are as follows (the rates for the diminishing value method would be 50 per cent higher): seismic survey equipment 20 per cent, drilling plant and down-hole equipment 20 per cent, oil rigs 10 per cent, survey equipment (other than seismic) 10 per cent, pipeline, underground tanks, pumps, motors, control gear and fittings (except major units) 7.5 per cent, plant and machinery in general, generating

plant (power and steam) and above-ground tanks 5 per cent, and wharves and jetties, concrete or timber 2.5 per cent.

IV Transport of Minerals (including petroleum and natural gas)

As we have seen, special deductions apply for the cost of railways, roads and pipelines. This deduction is not applicable to the costs deductible under special mining provisions for general mining or petroleum mining. Thus transport facilities wholly within the mine-site, or which are an integral part of petroleum mining, are deducted under mining or petroleum provisions and not under the transport provisions. The latter would, however, apply for facilities used to transport crude oil and natural gas between the oil or gas field and a refinery or other terminal; it would not apply to facilities transporting petroleum products or distributing gas to consumers. Transport provisions apply to facilities for transporting raw minerals and some specified products of processing—such as iron ore pellets, alumina and blister copper.

The federal government has used short-term variations in its company income tax provisions as an incentive to investment spending within a specified period by the private sector; this has encompassed the mining sector (for relevant categories of expenditure) as well as commerce and manufacturing industry. Measures used have included accelerated depreciation allowances which have effectively doubled depreciation rates for eligible plant and equipment, and investment allowances.

The investment allowance applies to new plant ordered on or after 1 January 1976 that is depreciable for income tax purposes. As far as the general and petroleum mining industry is concerned new plant purchased or constructed and first used or installed ready for use will generally be eligible for the investment allowance; although the allowance does not apply to plant for use in exploring or prospecting for petroleum or other minerals where the cost is claimed as an outright deduction under Sections 122J or 124AH. If a company opts to claim depreciation in lieu of an outright deduction under the general provisions of the income tax law on the cost of plant of this kind, the investment allowance may be available. The investment allowance does not apply to capital expenditure on a railway, road, pipeline or other transport facility which is deductible under Division 10AAA.

The investment allowance is additional to taxation deductions by way of depreciation, or under the special provisions relating to petroleum and general mining companies, for the full cost of the plant. For plant acquired under a contract entered into by 30 June 1978 and first used or installed ready for use and held in reserve by 30 June 1979, the rate of deduction is 40 per cent of the cost. For plant acquired under a contract entered into after 30 June 1978 and first used or installed ready for use

and held in reserve by 30 June 1986, the rate of deduction is 20 per cent of the cost.

Two other major amendments to income tax law have recently been made. The one of widest applicability is the provision for trading stock valuation adjustment.

Section 82D allows to firms and companies holding eligible trading stocks for business purposes a special income tax deduction measured by reference to the annual increase in the index for the goods component of the Consumer Price Index. The range of eligible trading stock includes most goods properly accounted for as trading stock for income tax purposes. It excludes property which is not classed as 'goods'—land, building, construction work in progress, shares, securities and other legal rights of industrial property such as patents and copyrights. Minerals brought to account as trading stock on hand are subject to the scheme.

The deduction representing the annual adjustment is calculated as a percentage of the value of trading stock of goods on hand at the start of the tax year or at a relevant time. The value of trading stock adopted for these purposes will be the same as that accepted for income tax purposes or, if this is less, the cost price of the stock.

In calculating the amount of the deduction the percentage to be applied is one-half of the percentage increase, measured on a June quarter to June quarter basis, in the index of the goods component of the Consumer Price Index during the tax year.

The second amendment refers to the sale of mining rights by prospectors. Under paragraph 23(pa) a special exemption is available in relation to income derived after 26 October 1977 from the disposal of rights to mine in Australia for gold or for a specified range of metals or minerals. The eligible list is as follows:

Asbestos	Rutile
Bauxite	Silimanite
Chromite	Vermiculite
Emery	Zircon
Fluorspar	
Graphite	Ores of—Antimony
Ilmenite	Arsenic
Kyanite	Beryllium
Magnesite	Bismuth
Manganese oxides	Cobalt
Mica	Columbium
Monazite	Copper
Pyrite	Lithium
Quartz crystals (piezo-electric quality)	Mercury
Radio-active ores	Molybdenum
	Nickel

Ores of—

Osmiridium

Platinum

Selenium

Strontium

Tantalum

Tellurium

Tin

Tungsten

Vanadium

Such exemption applies (i) where a person (not a company) has contributed to the expenditure incurred in prospecting and developing the area, and (ii) where a person (not a company) has carried out the whole or the major part of the field work of prospecting for gold or the prescribed metal or mineral. The exemption is also available to a company that has itself carried out all or most of the field work.

The exemption does not apply to amounts paid to a prospector by a company in which he has a controlling interest. More generally, bona fide prospectors, whether or not they reside in Australia, are entitled to the exemption unless one of the parties to the transaction has the power to control the activities of the other party.

Where a prospector has been permitted deductions for expenditure on exploration or prospecting in the area which is the subject of the sale of mining rights, the amount of exempt income is decreased by the amount of those deductions related to the area for which the rights have been sold, transferred or assigned.

5 Taxation:

Discounted Cash Flows and some realities

One of the major foundations of the *Fitzgerald Report* discussed in Chapters 3 and 4 was that, since money has a time value, tax which is deferred has a real present value which is less than the same sum of tax paid now. The technique of discounting is used to bring financial values spread over a number of years to equivalent values in a given year so that they may be totalled and compared.¹

The lower real present value of deferred tax may be thought at first sight to arise because the real value of money falls with inflation but inflation is not the only factor that means \$x in a year's time is worth less than \$x now. Even in a situation where prices are constant, money has time value because \$x available now can be invested, at say 9.7 per cent p.a., so that in a year's time the investor has \$1.097x. \$1.097x in one year's time is therefore worth \$x now—or, to express this another way, if \$1.097x in a year's time is discounted to the current period using a discount rate of 9.7 per cent, the answer is \$x.

Money values may thus be moved in either direction through time.

A government wishing to compare the present value of future tax streams from competing projects may use for each project the formula

$$P = \frac{T_1}{1+r} + \frac{T_2}{(1+r)^2} + \frac{T_3}{(1+r)^3} - \frac{T_n}{(1+r)^n}$$
$$= \sum \frac{T_n}{(1+r)^n}$$

where T_n = tax in year n , and r is the rate of interest.

¹ For a detailed discussion of discounting see A. J. Merrett and Allen Sykes, *Finance and Analysis of Capital Projects*, Longman, London, 2nd ed. 1973 or their *Capital Budgeting and Company Finance*, Longman, London, 2nd ed. 1973. van Rensburg and Bambrick, *The Economics of the World's Mineral Industries*, McGraw-Hill, Johannesburg, 1978 discuss the concepts involved in discounted cash flow (D.C.F.) analysis and illustrate the economic evaluation of a mineral investment project. The case study used illustrates one of the methods of allowing for inflation, where all cash flows are expressed in the money values of the periods to which they refer so that the D.C.F. rate of return calculated is an apparent rate. Inflation can also be allowed for by expressing cash flows in constant money values and

Different tax schemes can also be evaluated using these formulae—e.g. suppose Scheme A and Scheme B, each applied to a specific project, yield total revenue of \$1000 over three years, but this sum is distributed differently over the years.

	Scheme A	Scheme B
Year 1	100	400
Year 2	200	300
Year 3	700	300

The net present value of tax receipts under Scheme B is higher than under Scheme A, because tax payments are made earlier. Companies being taxed would obviously find Scheme A preferable. At first glance it may be assumed that governments would prefer Scheme B.

If Fitzgerald's view prevails, they would do so because public benefit from taxation appears higher; but if the existence of Scheme B means that a project does not proceed—when it would have proceeded under Scheme A—the government may have no tax revenue at all; nor will its population enjoy the employment and income effects of the project.

It is important that those involved in formulating tax policy should understand the techniques of company planning, so that they are aware of the implications of the policies they recommend. Discounted cash flow analysis may be the cornerstone of company planning;² with the political and economic uncertainties of recent years companies have also turned to scenario generation.

Debates on both the *Fitzgerald Report* and the Industries Assistance Commission's Report on its petroleum and mining enquiry showed clearly that most people outside the industry had little idea of how taxation regulations, and changes in them, affect profitability and project viability. A number of symposium papers since then have been concerned with taxation and profitability.

The first of these, by Gillies and Thomas, was entitled 'The Effects of Changes in Taxation Legislation on Australian Mining Company Profitability'.³ This study was based on annual reports and financial statements, using Fitzgerald's selected companies with the exception of the two companies engaged in petroleum mining.⁴ Since Fitzgerald's

calculating real rates of return. This is illustrated in Susan Bambrick, 'Development of Australia's North-West Shelf Gas Reserves', *Resources Policy*, December 1978.

² See Brian W. Mackenzie, *Mineral Economics*, Australian Mineral Foundation, Adelaide, 1978.

³ Aus. I.M.M. Conference, Hobart, May 1977.

⁴ Fitzgerald provided company figures for Hamersley Holdings Ltd, Mt Newman, Utah Development, M.I.M. Holdings Ltd, Commonwealth Aluminium Corporation, Queensland Alumina, Comalco Aluminium (Bell Bay), Alcoa, C.G.F.A., W.M.C., Peko-Wallsend, Esso, Hematite Petroleum Pty Ltd, and North Broken Hill Ltd.

company selection was criticised, we must assume that any paper based on his selection is open to the same criticism. Since no selection will be universally considered representative (even if the companies cover a wide range of minerals, their financial experience will differ) we may regard only 100 per cent sample as suitable. If we are cautious, we may not even want to generalise too far from that.

Gillies and Thomas's sensitivity analysis used the consolidated accounts of Consolidated Gold Fields of Australia, which gave no indications for subsidiaries, nor did it consider the proportion that was non-mining income. North Broken Hill has most of its income from investments. Peko-E.Z. would not be expected to show much change, because of Peko's gold-mining activities.

The period chosen for study was as near as possible the 1975 calendar year and the use of one year in isolation must be regarded as a limitation. The variable chosen for study under different tax regimes was the cash flow rate of return, or the ratio of cash flow to shareholder equity. Cash flow was obtained by adding after-tax profit to cash generated but 'not specifically allocated to some form of "provision" fund'. Depreciation was the most significant of these figures added to profit.

The authors first examine the sensitivity of cash flow rate of return to changes in the income tax rate. Not surprisingly, the sensitivity of each company was related to the proportion of its cash flow, as defined, which was accounted for by taxable profit and the proportion accounted for by depreciation. Perhaps it should also be said that a study based on a single year may include atypical proportions for particular companies, depending on their expansion history and the tax laws relating to depreciation.

The second section examined the quantitative effect of the removal of partial tax exemptions for prescribed products. These exemptions, which related to shortages current in 1942, could be regarded as seriously distorting resource allocation by the time they were removed in 1974. Again not surprisingly, the extent by which companies could be seen to be affected depended on the proportion of their activities which centred on the prescribed minerals. Comalco Ltd, with most of its revenue from bauxite mining, and Western Mining Corporation, whose profitability is largely based on nickel, were both seen to be significantly affected.

No attempt was made to quantify the effect of the removal of tax deductibility for some share calls, but the authors did say that such removal

no doubt had a bearing on the amount of mineral exploration undertaken in Australia, and especially that undertaken by smaller companies. A reduction in the willingness of investors to finance exploration must lead to an increase in its cost and consequently in the cost of proving a new ore deposit.

To examine the effect of changes in depreciation provisions on company profitability, the authors cited evidence considered by the Industries Assistance Commission. C.R.A., Goldsworthy and W.M.C. gave estimates of the effects of changes in depreciation provisions on company profitability, comparing the 1973 situation (allowing recouping of expenditure in a few years) with the post-August 1974 situation where write-off periods were measured in decades. A number of different cases were considered by each company. In contrast with the cash flow rate of return concept Gillies and Thomas used elsewhere in their paper, they have here used the companies' figures which were based on the more usual concept of the discounted cash flow rate of return. Perhaps the most surprising thing about this table is the relatively small effect that changing the tax depreciation provisions has—it may be large enough to render previously viable projects non-viable, but the changes are not of the order one might expect from the outcry the industry made at the time. Hamersley's Tom Price Mine, for instance, based on replacement, shows a reduction from 8.1 to 5.8 per cent; Goldsworthy's Area 'C' shows a reduction from 16.3 to 15.0 per cent and W.M.C.'s estimate for a nickel project drops from 20.8 to 17.6 per cent.

Gillies and Thomas next examined changes to account for the effects of inflation, both a stock valuation adjustment and a depreciation adjustment. Not surprisingly, for each of the eight companies considered, adjusting for inflation would have increased the cash flow rate of return.

Finally, Gillies and Thomas looked at the introduction of resource rent taxation, which has been considered elsewhere.

In applying the Bougainville scheme to some companies, the authors achieved a higher return on capital. Australia at that time had a company tax rate of 47.5 per cent, while the Bougainville rate was $33\frac{1}{3}$ per cent, so the higher return could perhaps be expected.

At the 15th A.P.C.O.M. Symposium (Brisbane, July 1977), 'The Impact of Taxation on a Capital Intensive Mining Project' was the subject of a paper by Barnett, Rosser and Staude. They used published estimates for the Nebo coal project, and compared the effect of five tax policies on cash flow: Liberal 1969, Liberal 1976 with and without the coal levy, Labor 1975 and Labor 1976. They considered cash flows, internal rate of return, and net present value. Since it may be said that under a system of deferred taxation the community suffers due to its diminished real value, they also calculated the social net present value of the taxation stream.

They concluded that 'current Liberal taxation policy tends more towards Labor policy than towards 1969 Liberal policy' and that

the latest Labor policy tends toward Liberal policy much more than 1975 Labor policy. In terms of the return available to the

miners and the public, Labor in its proposed 1976 policy has shown a much greater shift in its taxation platform than has the current government.

Nevertheless, 'returns currently available to industry on the type of project studied are still somewhat greater under Liberal policy than under Labor and . . . the return to the public is slightly lower'. Those results, too, are not particularly surprising.

'The 1976 Liberal policy (with levy) and the 1976 Labor policy produce quite similar results for . . . the project considered. [Both] . . . show a trend toward a mean internal rate of about 13.5%', i.e. 1.5 per cent less than the internal rate of return with 1969 Liberal policy, and nearly 2.5 per cent less than the internal rate of return with the 1976 Liberal policy without the coal levy (the levy was reduced in August 1976 and August 1977, and is to be phased out).

In summary, removal of the export levy would raise the internal rate of return on this project by more than 2 per cent, and would be more generous than the 1969 Liberal policy, despite the higher company tax that prevailed.

Not surprisingly, discussion of this paper at the conference centred around details of the calculation, and in particular the treatment of the investment allowance. The authors assumed that the investment allowance (40 per cent) applied to all capital, whereas actually it applied only to that which was not subject to normal allowances for mining facilities, e.g. coal washing and concentration. This error was corrected in a later paper, by Barnett and Braham to the First Australian Coal Conference, Surfers Paradise, April 1978.

It is necessary to stress that both the Gillies and Thomas paper and the Barnett, Rosser and Staude paper deal with particular cases. Individual case studies are valuable in that they give experience in determining the impact of specific policies on specific projects; the danger of individual case studies is that unwarranted generalisations may be drawn from them.

In an economic model I constructed of the development of the North-West Shelf gasfields I concluded that the real D.C.F. rate of return was just below 15 per cent,⁵ which is fairly widely regarded as the minimum acceptable rate of return. It more than covered the interest rate that would have to be paid on borrowed funds. Whatever the cost of capital sought there must be sufficient margin between it and the expected D.C.F. rate of return to allow for risk—e.g. the risk that the expected market demand will not eventuate, the risk that construction costs will be higher than estimated, and the risk that there will be unforeseen and expensive difficulties.

⁵ Susan Bambrick, 'Development of Australia's North-West Shelf Gasfield', *Resources Policy*, December 1978.

There is also the possibility that assumptions incorporated in any model are pessimistic. Real product prices, for instance, may turn out to be higher than expected.

So in exercising caution in generalising too far from specific models we have first to recognise that any model is only as realistic as the underlying assumptions; we have then to recognise that just as the model is specific so are its parameters unique: and conclusions drawn from it cannot be applied in detail to other cases. Thus, for my model of the North-West Shelf, I calculated that if real product prices doubled, the D.C.F. rate of return would rise to 24 per cent, well above the requirement for viability; I then assumed that the government imposed an additional profits tax so that tax on \$500m. annually is at the standard 46 per cent rate; tax on income between \$500 and \$600m. is at 66 per cent; tax on income in excess of \$600m. is at 86 per cent. This tax took the D.C.F. rate of return to 8 per cent, so that if the real price and the tax changes had been foreseen, the project could well not have proceeded.

The only generalisations that can safely be made from this model could be made *a priori*—that if the model underestimates product prices, the actual rate of return will be higher than the forecast rate; and that it is possible to devise a tax scheme which will render a previously profitable scheme non-viable.

This last is an important point; we cannot say that the scheme postulated would render every project marginal or non-viable. Some schemes may remain within the margin of profitability; but at least one would not. We may also note the disincentive to efficiency that a progressive scale may bring—once firms are in the 66 per cent tax bracket the incentive to move into the next group may not be strong. Higher costs—in the form of benefits to management, for instance—may be preferred.

van Rensburg and Bambrick give an example of a hypothetical nickel mine whose apparent D.C.F. rate of return is 39 per cent with depreciation over the seven year life of the mine.⁶ (Under present world market conditions, nickel producers would consider the mine *very* hypothetical!)

We would expect that if all capital expenditure could be written off in the year it occurs, and that the company has other income against which it could be written off, then the D.C.F. rate of return estimate would rise. It does—to 56 per cent—but the proportionate rise would be applicable only to this project. Similarly the rise in costs—of 20 per cent per annum—reduces the apparent rate of return to 19 per cent. If there were an inflation rate of 10 per cent per annum, this leaves only 9 per cent to cover the real cost of capital and the risk margin. For this particular

⁶ *The Economics of the World's Mineral Industries*, Chapter 9.

model, the 20 per cent per annum cost increase—quite plausible in practice—produced a much more deleterious effect on profitability than did the introduction of a 20 per cent royalty based on taxable income.

Since every mining project is unique, it is not possible to generalise from experience of one project to give conclusions of industry-wide relevance, but working with project evaluation figures for a wide range of projects, and with differing tax possibilities, is a useful background to tax policy recommendation. Marginal projects, for example, may proceed or not according to the prevailing and expected tax climate.

What is a marginal project? Opinions vary between companies, and between projects, according to risk amongst other things, but it is said that any proposal with a D.C.F. return under 15 per cent would have little chance of proceeding. The lack of new developments in the industry in recent years has reflected not only relatively poor market prospects in some areas but also uncertainty as to government policy in many areas, including taxation.

Where companies seek outside finance, they have to convince those providing such funds that repayments can be met. Lenders traditionally have examined closely the market situation; and in the case of iron ore developments in the north-west in the sixties, companies needed to secure long-term contracts (hitherto unusual in resources trade) to secure finance. Tax provisions then in force assisted companies to achieve an early cash flow.

Tightening tax provisions makes finance harder to obtain. Uncertainty of tax conditions also makes financing difficult, which is why, when the federal Treasurer in his 1977 Budget Speech foreshadowed a resource rent tax, there was pressure for some immediate decision because of difficulties for those seeking to put together a financial package for the North-West Shelf.

A study by the Exporters' Division of the Australian Coal Association in 1976 showed that if the coal export levy were removed, and new projects were to proceed, the multiplier effect on national income would yield increased personal income tax which would ultimately offset the loss in tax revenue from removal of the levy.

The coal exporters in their 1977 submission argued that the removal of the levy was still necessary to encourage new projects (although Norwich Park was by then committed). The resulting rise in profitability would give an incentive to these new projects, and would also go some way towards financing them. It is interesting to compare the company profitability figures in this submission. Listed below are the figures for individual but unidentified companies, with the first figure referring to the situation with the levy and the figure in brackets being an estimate for a no-levy situation.

**Coal exporters: return on gross assets, six months ended
31 December 1976**

%	%
32.6 (42.2)	13.4 (19.0)
30.2 (38.9)	12.3 (13.5)
27.5 (33.5)	11.9 (15.0)
26.5 (41.3)	4.6 (9.3)
22.7 (27.3)	4.1 (6.4)

These figures show not only the effect of the levy, but also that there is a break in the range of company profitability—in the case with the levy, there are no companies between 13.4 and 22.7. Some companies are highly profitable, and the removal of the levy makes them more so. It is this phenomenon which leads to pressure for the resource rent tax.

At the 1977 ANZAAS Congress, I was invited to read to Section 3 a paper entitled *Mining Finance, Profits and Taxation*, with the sub-title *Fitzgerald Revisited*.

After the *Fitzgerald Report* was released, one of the criticisms made of it was that the six years selected, an expansionary phase, were unrepresentative, and that when this phase ended, the 'deferred' tax, which was not deferred for ever as the *Report* implied, would ultimately be paid. In fact, the period since the *Report* was released has been rather different from the boom years of the sixties, and it is interesting now to see what they have brought in the way of tax payments. However, as usual in the social sciences, we cannot have a controlled experiment. In the intervening period we have had two major changes in tax provisions (August 1974 and August 1976), so actual figures tell us little. M.I.M. has estimated taxes that *would* have been paid under earlier provisions, but for other companies the best that can be done is to update Fitzgerald's tables.⁷

Table 5.1

**Current Income Tax of Selected Companies,
1970, and 1972-6
(\$m.)**

	Hamersley	M.I.M.	Esso	C.G.F.A.	W.M.C.
1970	0.001	23.40	nil	2.84	nil
1972	0.001	1.40	nil	3.00	—
1973	0.002	4.10	nil	3.39	0.06
1974	0.15	49.20	19.03	4.80	0.12
1975	24.58	51.70	43.98	11.41	5.03
1976	41.06	28.00	60.4	4.99	6.49

Sources: *Fitzgerald Report*, and the relevant companies.

⁷ This was done in Susan Bambrick and Norman Miskelly, *Mineral Development Decisions and Government Policy*, Australian Mineral Foundation, Adelaide, February 1978.

Table 5.1 shows for five companies how current tax payments moved after 1973, the last year in Fitzgerald's tables. The five companies, selected because of comparability of data, are Hamersley Holdings Ltd, M.I.M. Holdings Ltd, Esso Exploration and Production Inc., Consolidated Gold Fields Australia Ltd, and Western Mining Corporation Ltd. Some of the changes are accounted for by changes in tax provisions, e.g. lengthening the period over which capital expenditure is written off. Some of the changes reflect a downturn in market conditions so that expansion is not undertaken. The table does illustrate some dramatic rises—e.g. for Hamersley, from \$150,000 in 1974 to \$24.6m. in 1975; M.I.M. from \$4m. in 1973 to \$49m. in 1974; Esso from nil in 1973 to \$19m. in 1974. It certainly appears as though some 'deferred' tax may have been paid, although Fitzgerald claimed that 'deferred tax provisions imply no liability whatever on the company's part'.⁸

Although M.I.M.'s current tax rose twelvefold between 1973 and 1974, from a base of \$4m., it should be noted that tax payments in 1970 had been \$23m. The timing of tax payments reflects the activity cycle, i.e. capital expenditure patterns of the relevant company. Although Hamersley's current tax in 1970 and 1972 was only \$1000, and \$2000 in 1973, it had been \$568,000 in 1968. C.G.F.A. has a smoother pattern of current tax payments (for the years shown) than do other companies, partly because of the spread of its activities and their stage of development, and also some degree of non-mining income.

Utah, which is not included in the table (because figures were not strictly comparable), also showed rising tax payments during this decade, from \$4.1m. in the year ending October 1972, through \$4.7m., \$12.0m., \$35.1m., and \$67.6m. to \$121.1m. in 1977.

Fitzgerald pointed out that in the seven years to December 1973, Hamersley had made provisions for current income tax payments amounting to less than \$1m., and provided for 'deferred tax' more than \$111m. Referring to Hamersley's 'great expansion', he said:

There has been a mutually reinforcing relationship between the growth of productive capacity and the tax concessions. The growth rate creates the tax concessions, and the tax concessions help to finance the growth while also providing incentives for growth.⁹

What has happened to deferred tax provisions for Hamersley and others since 1973? Table 5.2 shows that in general, they have fallen, although C.G.F.A. was atypical in 1974.

The general downward trend is also shown in Table 5.3 for Pilbara

⁸ *Fitzgerald Report*, p. 17.

⁹ *Ibid.*, pp. 24–5.



A walking dragline uncovering a coal seam, Goonyella mine, Bowen Basin, Queensland. By courtesy of Utah.



Above: Zinc Corporation leases, 1936.

Below: The same scene twenty-five years later. By courtesy of C.R.A.



Iron, whose deferred tax provisions rose between 1970 and 1973, then fell in the next four years. Table 5.3 shows deferred tax provisions moving inversely with capital expenditure.

Table 5.2

**Deferred Income Tax of Selected Companies,
1970, and 1972-6**
(\$m.)

	Hamersley	M.I.M.	Esso	C.G.F.A.	W.M.C.
1970	20.97	15.9	8.62	6.72	—
1972	21.65	15.3	26.96	3.57	—
1973	10.67*	18.7	40.42	2.80	7.71†
1974	12.89	4.2	28.13	6.40	6.06
1975	(4.05)	(16.7)	10.93	(3.36)	4.52
1976	(1.36)	(5.1)	0.59	(3.35)	1.45

Sources: *Fitzgerald Report*, and the relevant companies.

* This is Fitzgerald's figure; Hamersley's figure is 10.11.

† This is Fitzgerald's figure; W.M.C.'s figure (adjusted in the 1974/5 assessment) is 6.54.

Table 5.3

**Fitzgerald's Mt Newman Extrapolations,
1970-3, updated to 1977**
\$(m.)

	Deferred tax provision (Pilbara Iron only)	Capital expenditure
1970	1.6	72.0
1971	5.1	96.0
1972	7.3	117.0
1973	7.4	121.0
1974	4.9	40.5
1975	3.1	83.6
1976	1.5	108.4
1977	1.3	47.0

Sources: *Fitzgerald Report*, and company data.

Table 5.4 shows the percentage current tax represented of profit before tax for the five selected companies in 1970, and 1972-6. Utah is included here. The rise in the mid-seventies compared with the early seventies is evident for all. The difference in the *levels* of the mid-seventies ratios between companies is interesting. Utah and W.M.C. seem to have fared better in 1975 and 1976 than other companies, which

is accounted for by differing interests. Utah would have been subject to the coal export levy (in whole or in part) for some of the period.

How far can changes such as the above be attributed to the *Fitzgerald Report*?

Table 5.4

Current Tax as a percentage of Profit before Tax for Selected Companies, 1970, and 1972-6

	Hamersley	M.I.M.	Esso	C.G.F.A.	W.M.C.	Utah
1970	0.00	24.7	nil	10.3	nil	—
1972	0.00	3.3	nil	16.2	—	14.3*
1973	0.01	7.5	nil	19.4	0.3	12.8
1974	0.42	33.9	18.3	19.5	0.6	13.8
1975	52.1	60.1	34.7	50.6	20.7	19.7
1976	48.3	62.8	42.2	61.1	31.7	28.1

* Based on Utah's figure, not Fitzgerald's.

Fitzgerald claimed that a mining company could 'avoid' paying income tax if it expanded at a 'reasonable' rate. The capital involved in the expansion could be written off at an accelerated rate and this nullified the higher tax payments which should be made after establishment capital had been written off. This, he said, had happened in the case of M.I.M., where capital had accumulated at an average of 12 per cent per annum. The current tax provision at June 1973 was \$87m. and represented 18.2 per cent of pre-tax earnings. This is less than half the amount of tax implied by the nominal tax rate. He also noted that, under Section 23A of the Tax Act, 20 per cent of income from copper mining was exempt from tax.

Two major changes to the taxation laws applying to the mining industry were introduced in 1974 to eliminate the above situation. First, accelerated write-off provisions of Section 122E, F and G were withdrawn and replaced by a life of mine depreciation rate. The life of mine was set at a maximum of twenty-five years. Consequently the depreciation rate for the mining industry was reduced to an average of about 4 per cent diminishing value. Second, Section 23A provisions were withdrawn.

How did these 1974 changes affect M.I.M.? There are two striking features:

- (i) the cumulative current tax provision over the three years 1974-6 is nearly 50 per cent larger than the total for the sixteen years to 1973. It represents about 47 per cent of pre-tax earnings compared with 18.3 per cent for the previous 16-year period.
- (ii) there was a net withdrawal of \$17.7m. from the deferred tax

provision compared with a more or less continual build up over the sixteen years to 1973.

There are four reasons for this:

- (i) The changes to the depreciation rates for tax purposes: the most important change was the withdrawal of Section 122E and G which were the accelerated write-off provisions. This resulted in an effective depreciation rate of about 4 per cent diminishing value for these categories of capital. Over the three years to 1976, M.I.M.'s depreciation was about \$27m. less under the new provisions than it would have been under the pre-1974 provisions. The tax effect from this was about \$12m. In addition to this, the ability to appropriate for capital expenditure under Section 122G was withdrawn. As the amendments did not come into force until 18 September 1974, the effect was spread over two years. The withdrawal of Section 122G is estimated to have increased tax by about \$23m. in 1975 and \$4m. in 1976.
- (ii) A decrease in the rate of capital expenditure. Fitzgerald calculated M.I.M.'s growth in assets to be 12 per cent per annum and he claimed that, because of the accelerated depreciation provisions, this asset growth has caused the low effective tax rate. Over the three years 1974-6, asset growth averaged only 8.9 per cent and was as low as 5.5 per cent in 1974. Because of the lower rate of capital expenditure it is estimated that taxable income was about \$29m. higher than it would have been if capital growth was 12 per cent per annum. The resulting increase in tax payments is about \$13m. over the three years.
- (iii) The loss of Section 23A provisions for the tax exemption of 20 per cent of copper income. Under Section 23A, M.I.M. was allowed to claim 20 per cent of income from copper operations as being exempt from tax. This was withdrawn in 1974. The estimated increase in tax from this change is about \$6m. over the three years.
- (iv) An increase in the average accounting depreciation rate. In 1973 accounting depreciation represented 3.7 per cent of the historical value of assets before depreciation. This rose to 5.3 per cent in 1974 and averaged about 5.2 per cent over the three years 1974-6 due to depreciation from the copper expansion capital. It is estimated that this higher depreciation has increased the withdrawal from the Deferred Tax Provision by about \$8m. over those three years.

One major criticism of *The Fitzgerald Report* has been that the author did not consider all costs and benefits to governments at all levels when he calculated his give-and-take relationship. The only non-federal item he considered was royalty receipts by state governments, and that not in all contexts.

The 1976 M.I.M. Annual Report shows that payroll tax, withholding tax, royalty and income tax together accounted for 47c of the pre-tax

profit dollar in 1973. In 1976 the corresponding figure was 63c. In addition to this, there are other payments to governments, e.g. local government charges, fees, sales tax, contributions to community infrastructure, etc.

In 1974, the Queensland government changed from a royalty based on a percentage of after-tax profit to one based on the value of metal in ore. The new royalty method ignores the effect of cost inflation on the company's 'ability to pay'. As a result, royalty payments rose from 5c in the pre-tax profit dollar in 1974 to 19c in 1976. For 1974-6 the royalty bill was \$30m.

In addition to this the M.I.M. group has paid about \$11m. in payroll tax over the three years 1974-6 and sales tax on direct purchases only is currently about \$1m. per year. For infrastructure items M.I.M. is spending around \$2m. per year on civic and community services and has contributed just over \$15m. of the \$30m. cost of the recently completed Lake Julius Dam.

Table 5.5

M.I.M.'s Payments to Government, 1974-6		
Income tax under 1973 conditions		\$71m.
Add increased tax due to lower rate of capital expenditure		13
<i>M.I.M. tax before 1974 amendments</i>		<u>\$84m.</u>
Add increase in tax due to		
• changes in depreciation rates including Section 122G withdrawal	\$39m.	
• Section 23A withdrawal	<u>6</u>	<u>45</u>
<i>Total M.I.M. tax 1974-6</i>		<u>\$129m.</u>
In addition to this, M.I.M. paid the following amounts to the state and local governments over the three years—		
Royalties		\$30m.
Contributions to community infrastructure		
• Lake Julius Dam	\$15m.	
• Civic and community services	<u>6</u>	<u>21</u>
Payroll tax		11
Sales tax (direct purchases only)		<u>3</u>
		<u>\$62m.</u>

Table 5.5 summarises the effect of the 1974 amendments on M.I.M.'s tax for 1974-6, suggesting that tax was \$58m. (or 82 per cent) higher than it would have been under 1973 conditions, and that total tax payments to government—income tax, payroll tax, sales tax and royalties—amounted to \$173m. over the three years.

M.I.M.'s income tax represented 60 per cent of pre-tax profits in 1975, compared with 44 per cent for all industries, but while M.I.M.'s percentage has risen during this decade from a relatively low base (24.7 per cent in 1970, 7.7 per cent in 1971, 3.3 per cent in 1972), the all-industries figure has fluctuated between 43 and 47 per cent.

Inter-industry comparisons are relevant to discussions of inter-industry equity, and also to consideration of resource allocation. Where international capital flows are discussed, international comparisons of tax regimes are made. It is often argued that some funds in the world will be directed peculiarly to mining, and that international tax comparisons will be one factor in determining its location.

A number of comparisons have been made of mining tax here and abroad.¹⁰ C. T. Gibbons compared cumulative tax payable by the Hamersley project under various policies.¹¹ A similar analysis for an established mine owned by the Zinc Corporation had been included by C.R.A. in its 1975 submission to the Industries Assistance Commission.

	Hamersley (\$m.)	Zinc Corporation (\$m.)
Australia 1973-4	288	45
Canada (50 per cent rate)	206	42
Australia 1976	187	—
Australia 1968	157	41
Peru	127	28
U.S.A.	125	32
South Africa	114	38
Brazil	65	27

Although there was some re-ordering among Peru, South Africa and the U.S., Australia and Canada appear as high-tax countries. However Barnett and Braham suggest these conclusions are not definitive as tax streams have not been discounted (ignoring the time value of money can seriously distort conclusions),¹² and state taxation appears to have been ignored.

Barnett and Braham, using a model of a coal mine, compare recent

¹⁰ For example, Industries Assistance Commission, *Petroleum and Mining Enquiry Report*, 1976; van Rensburg and Bambrick, *The Economics of the World's Mineral Industries*; Susan Bambrick and Norman Miskelly, *Mineral Development Decisions and Government Policy*.

¹¹ *Effects of Recent Taxation Developments on New Mining Projects*, Mining Economics Symposium, University of N.S.W., September 1977.

¹² Donald W. Barnett and Benjamin Braham, 'Are We Really Overtaxed', Paper to the First Australian Coal Conference, Surfers Paradise, April 1978.

Australian tax policies with a selection of overseas policies—South Africa, the U.S. (Wyoming and Montana) and Canada (Saskatchewan and Alberta). They conclude that under the Whitlam government the mineral industry was definitely overtaxed, as illustrated by international comparisons and by the ratio of the returns to the public to the returns to equity. Although they suggest the present return to the public from mining activity 'can only be considered as most satisfactory', they feel the current Liberal policy is reasonably moderate and that the industry is not overtaxed.

Public opinion, faced with a company's absolute annual profit figures of over \$200m., might agree that the industry is not overtaxed, and may support a resource rent tax. Although the federal government is not now contemplating such a tax, least of all on coal, it is responding in another way.

Late in 1977, repatriation of funds to U.S. parents by Ford and Utah highlighted the fact that branches of foreign companies do not pay withholding tax on such funds, while subsidiaries sending funds abroad are subject to 15 per cent withholding tax in Australia. The distinction between branches and subsidiaries is significant, for if the Australian government fails to collect tax, the effect can be to raise tax receipts of foreign governments. What is the U.S. tax situation?

Consider the case of a U.S. corporation which has a branch operation in Australia and so pays Australian company income tax. In the U.S. the corporation will be credited with company income tax already paid in Australia. If taxable income is the same in each country (which is unlikely because different countries have different definitions and provisions for deductions); and if the U.S. tax rate is 48 per cent, and Australia 46 per cent, then the U.S. will receive only 2 per cent. If Australia had no company income tax, the effective U.S. tax rate would be 48 per cent.

Such credit for foreign tax applies only to income tax—other taxes such as payroll tax and royalties are regarded only as deductible. For oil companies operating in the Middle East and Saudi Arabia payments to the host governments used to be considered to be income taxes, but are now treated as royalties—and can be deducted in arriving at U.S. taxable income. They are no longer credited. However, the scale of the problem has changed with increasing nationalisation.

If a profit-based resource rent tax were introduced in Australia how would this be regarded for U.S. tax purposes? It would probably be creditable in the computation of tax, but before companies could assume it creditable either: (i) the Internal Revenue Service would have to rule it creditable; or (ii) the fact that it were creditable would have to be written into a treaty, which would then assume precedence above the law and the Internal Revenue Service. Such tax credits come under Section 901, which applies to both corporate and individual taxpayers

and encompasses credit for direct tax, including tax on dividends. The U.S. tax treaty with the U.K. has been revised specifically to allow crediting of tax on North Sea oil. In general, direct taxes directly comparable with the U.S. income tax are automatically creditable.

In the case of subsidiaries the Australian government has a 15 per cent withholding tax *on remittances*, in addition to company income tax on profits. Dividends from foreign subsidiary corporations (not persons) qualify for a 'deemed paid' tax credit in the computation of U.S. tax.

Net pre-tax income of subsidiary	\$2000
Australian tax (assuming 45 per cent rate)	900
Net income (post-tax)	<u>\$1100</u>
Dividend to U.S. parent (say 50 per cent of post-tax income)	\$ 550
Australian withholding tax at 15 per cent is \$82.50, say	80
Remittance to U.S. parent	<u>\$ 470</u>
In its own tax return, the U.S. parent, which received a dividend of	\$ 550
reports a figure 'grossed-up' by income tax/2, i.e. the proportion of income tax relating to its dividend	450
This gives the U.S. parent's dividend for tax purposes as	<u>\$1000</u>
Assuming tax rate 50 per cent (actually 48), tax	= 500
	<u>\$ 500</u>
901 credit	\$ 80
902 credit ('deemed paid' credit)	450
Total tax credit	<u>\$ 530</u>

Tax is eliminated in this case, but in practice, companies even here would be likely to pay a small percentage despite excess credits, simply because of the mechanics of computation—e.g. 'deemed paid' credits are computed on the basis of U.S. tax law, although tax is paid in Australia. Countries differ in their computation of taxable income.

What is the payment to the U.S. government if the Australian tax rate were to be drastically reduced to 20 per cent (such analysis would apply also to cases where deductibility of expenditures is increased or advanced, or investment allowances were given).

Net pre-tax income of subsidiary	\$2000
Australian tax	\$ 400
Net income after tax	\$1600
Dividend to U.S. parent	\$ 800

Withholding tax	\$ 120
U.S. parent receives	\$ 680
Gross-up by	\$ 200
Dividend for U.S. tax purposes is still	\$1000
U.S. tax is still	\$ 500
Total credit is	\$ 320

and the U.S. government received \$180 because Australian tax has been reduced.

Nevertheless, if the Australian tax reduction was meant to be an incentive to the company it is not entirely wasted, as the company has received some incentive. Further, there are two sides to every picture—we will come later to a case where the U.S. government would regard itself as having 'subsidised' foreign development through its tax law.

This example is worked for a reduction in tax rate, and assumes the computation of taxable income by both governments is the same—if however Australia were making investment allowances, these 'investment credits' would not be allowed in the U.S. computation.

Why have mining companies such as Utah preferred a branch approach? This is not only because of the absence of Australian withholding tax on repatriated dividends. It is also because, under the U.S. tax deal, the branch organisation has had advantages. In the past, mining has used the U.S. corporate organisation because it has been allowed percentage depletion. Originally, the allowance for oil and gas was 27.5 per cent, i.e. 27.5 per cent of gross income was deducted to arrive at taxable income. This has now been eliminated for foreign petroleum production, and applies domestically only to small individual producers, e.g. in Texas; depletion, however—not necessarily at 27.5 per cent—is still allowed for local production of coal and other minerals.

Until 1977, foreign tax credits were allowed on alternative bases at the discretion of the taxpayer: either per country (where in calculating U.S. tax, tax was calculated separately for income from each country, with taxes from that country offset) or else overall (where excess credits from one country could be offset against a tax haven situation). This benefit remains.

The per country basis was eliminated in 1977 and it is no longer possible to offset development losses against U.S. income. (This was the situation referred to earlier where the U.S. government felt its tax revenues were subsidising foreign development, then the foreign country received the revenue.) Before that, there had been 'recapture provisions', where if there had been development losses in a foreign country, credit for foreign taxes had subsequently been reduced. With the old 'loophole' closed, such development losses can now be offset only against foreign income.

Nevertheless, it is still useful to companies to use the U.S. corporation approach, since the U.S. allows consolidated tax returns. At the option of the taxpayer, the returns of the parent and all U.S. subsidiaries can be consolidated.

At the present time, the Australian government plans to introduce withholding taxes on branch profits remitted abroad.

6 Finance for Australian Mineral and Energy Projects

One of the reasons advanced for a high degree of foreign ownership in Australia's mineral developments of the sixties was that the Australian capital market was too small to provide finance of the scale required. Even if the local capital market could have provided the finance, other sectors such as home-building would have been squeezed.

The federal Labor government, 1972-5, planned to use the Australian Industry Development Corporation, a statutory corporation established by its predecessor, as a significant vehicle for Australianisation. Its plans were not fully achieved, but the A.I.D.C. still occupies a central role in the opposition party's policy for mineral development.

How does the A.I.D.C. operate at present? It is governed by a Board of eleven directors. Most of these are from the private sector and have extensive experience in management and/or as company directors. Two members of A.I.D.C. Board are heads of federal government departments (Trade and Resources, and Industry and Commerce), and the Chairman is a former departmental head.

The A.I.D.C. provides or arranges development finance to new and established Australian enterprises over a wide range of industry. It promotes both Australian ownership in industry and the development of Australian resources. It provides access to overseas development funds for Australian companies.

Finance may take the form of loans, leases or equity capital; the amount of finance provided is usually in excess of \$250,000. Loans denominated in foreign or Australian currency may be short-term or medium-term loans at fixed or variable interest rates. Medium-term loans may be up to eight years, where there are variable interest rates, reset periods may be from ninety days to two years. Loans in Australian dollars may also take the form of bridging finance or revolving credit facilities.

Lease finance may be provided for the purchase of plant and equipment, and there may be debt or equity participation in leveraged leases.

The A.I.D.C. can become a joint venturer or shareholder in specific projects, but this is not seen as a permanent measure. The intention is that the A.I.D.C. should sell its equity to other Australian interests once the objectives are achieved. Where it does not take equity itself, it may

help to find, and perhaps to finance, new equity partners to strengthen a company or project.

Other financial services provided by the A.I.D.C. include arranging project finance from Australian and overseas sources, including facilitating partnerships of Australian and foreign interests; helping companies to prepare proposals for financing new developments including expansion and rationalisation; and facilitating the increase of Australian participation in the Australian operations of foreign companies.

During the year 1977-8, the A.I.D.C. examined seventy-five financing proposals in detail (apart from short-term lending). Finance was committed in twenty-one cases. New financing committed during the year amounted to \$79m., bringing the cumulative total of A.I.D.C.'s commitments during its 7-year life to \$454m. This was not by any means all committed to the mining industry since the A.I.D.C. also assists other industries; but to put it into perspective, it may be set against the figure of more than \$5 billion which is perhaps a conservative estimate of possible project financing requirements in Australia over the next half decade.

Part of A.I.D.C.'s loan commitments for 1977-8 went to a company with interests in a central New South Wales coal prospect; it also provided finance to companies for the development of infrastructure for a new nickel project in Western Australia—so that, it said, 'the companies concerned will be in a position to supply product when the currently depressed international market revives'. The A.I.D.C. has assisted an existing nickel project at Windarra for a number of years. It had provided funds to the original developer, Poseidon Limited, which later became a 50 per cent joint venture partner. Western Mining Corporation operates the project. Poseidon ran into financial problems, and the A.I.D.C. had then to try to facilitate development without loss to the Corporation. Present joint venturer with Western Mining is the Shell Company of Australia Ltd, but production has been suspended because of market problems.

If the nickel industry is in a depressed state, oil exploration in Australia is booming. The A.I.D.C. has a 25 per cent joint venture interest in 'Ocean Endeavour' and 'Ocean Digger', two semi-submersible offshore oil-drilling rigs. During 1977-8 only one rig was in use for most of the year, but both are expected to be in operation during the full year 1978-9. The operating company for both rigs is Australian Adoco Pty Ltd.

Although the copper industry has faced difficult times in recent years, the output of copper oxide from the Burra operation in South Australia can command relatively satisfactory prices, because it has sought-after properties for specific purposes in chemical manufacture. The A.I.D.C. provided development finance for a venture at Burra operated by Samin

Limited, a subsidiary of Poseidon; the assets of Samin Limited have now been purchased by Adelaide and Wallaroo Fertilisers Limited, which produces acids, chemicals and, of course, fertilisers.

Where do the A.I.D.C.'s funds come from? The 1970 Act which established the Corporation provided \$100m. for its capital, to be called upon as required. Until 1976-7, paid capital remained at \$50m., but in that year it rose to \$62.5m., where it remained during 1977-8. The Corporation's borrowings base is the total of this paid capital and its reserves. At 30 June 1978 reserves amounted to \$10m. The Corporation may borrow up to five times its borrowing base, i.e. at 30 June it could have had outstanding borrowings of \$362.5m. In fact only \$229m. was outstanding. Of this 62 per cent was from overseas, including \$15m. of overseas debt denominated in Australian currency.

Borrowings in the domestic market in 1977-8 were through issues of A.I.D.C. Registered Stock, through the newly introduced A.I.D.C. Negotiable Certificates of Deposit, and through accepting deposits from the short-term money market. No new borrowings in foreign currency were made during 1977-8, nor were any new overseas borrowings denominated in Australian dollars made during the year, for there had been a change from the situation of 1976, when the A.I.D.C. made its first Australian dollar issue internationally and the rate paid was lower than for domestic issue (by an amount equivalent to the 10 per cent per annum interest withholding tax that would be applicable).

The A.I.D.C. is subject to the same income tax rate as public companies, and earnings after tax are transferred to reserves, after which both borrowings and loans (or investments) can increase by five times the amount of the transfer. Operations can thus expand without calling on remaining capital funds from the Commonwealth—so long as there are positive post-tax earnings.

The Corporation's establishing Act has been severely criticised because it does not make provision for the Corporation to pay a dividend to the government, and this, the critics claim, is one factor allowing the Corporation to operate without what they regard as adequate commercial restraint.

While the A.I.D.C. has been operating for seven years, the Australian Resources Development Bank Limited has been operating for over ten years. It is a larger-scale operation than the A.I.D.C. In September 1977 it had outstanding loans of \$622m., while total commitments during its life had amounted to \$1151m. While the A.I.D.C. is prepared to invest in a wide range of industries, the Australian Resources Development Bank Limited deals only in resource projects. It is *not* a government instrumentality, but is owned by the Australian trading banks—of which the Commonwealth Trading Bank is only one. Under the Banking Act, the Australian Resources Development Bank Limited is accorded bank status.

Like the A.I.D.C., the Australian Resources Development Bank Limited gathers funds from various sources at home and abroad. Loans can be denominated in either U.S. or Australian dollars, or in some combination. The bank provides medium- to long-term debt. Sums involved may be larger than those available from the A.I.D.C.—perhaps \$50m. The Bank can also take equity in a project, such equity being either direct or indirect.

As with the A.I.D.C. one of the Bank's objectives is to facilitate Australian ownership and participation in resource projects, and it was perhaps a sign of tiredness in Liberal-Country Party government policies towards the end of a 23-year term that the trading banks were ahead of the government in this regard. A project must have some degree of local ownership before it can approach the Australian Resources Development Bank Limited for funds.

Financing is not confined to mining, but can extend to processing, transport and the provision of infrastructure.

The Australian Resources Development Bank Limited may pass the credit risk, or part of it, to its shareholders, the trading banks, for a direct client loan; while for their part the trading banks may refinance their medium-term project loans with the Australian Resources Development Bank Limited. Trading banks are also important sources of short-term bridging finance and of working capital. The trading banks do not have Australian equity as a lending prerequisite.

As at November 1978, trading banks could compete for deposits up to four years maximum, and most deposits held were for under twelve months. Such short maturities do not encourage long-term resource financing, but encourage the trading banks to concentrate on their traditional role of financing working capital.

In January 1978 the major trading banks in Australia had \$492m. of actual advances outstanding with the mining industry. This was 3.8 per cent of total actual advances, compared with 13.1 per cent in manufacturing, 11.4 per cent in commerce, 10.6 per cent in agriculture, 4.8 per cent in finance, 3.1 per cent in building and construction and 1.7 per cent in transport. Of these advances, \$375m. or 76.2 per cent of total advances to mining, were in term loans; the term loan component as a percentage of the aggregate outstanding to the sector was 25.6 for manufacturing, 13.2 for transport, 8.5 for finance, 8.2 for agriculture, 6.2 for commerce, and 3.8 for building and construction.¹

Merchant banks provide discount facilities for trading bank accepted bills and commercial bills. These facilities may be for up to 5-year terms.

¹ M. Brunckhorst, 'The Phasing of Resources Development and its Relationship to Australia's Financial Capability in the Perspective of the Size of the Financing Problem for the Private Sector', Committee for Economic Development of Australia, Policy Forum, *Dollars for Minerals and Energy*, Melbourne, November 1978.

Limits may be up to \$50m. for trading bank accepted bills and \$25m. for commercial bills. Arrangements for drawdown and repayment vary. Extensions of time may be available. Merchant banks can make funds available for longer-term credit than the trading banks.

Australian life insurance companies have invested significantly in minerals and energy development, but the proportion of insurance and superannuation funds that can be invested in such ventures is limited—not only by the managers' appraisal of risk and profitability but also by government requirements that substantial funds be invested in the public sector.

At the end of the first quarter of 1978, life insurance companies in Australia held \$11 billion in assets. More than half of this was in commonwealth, local and semi-government securities, in housing mortgage loans or in fixed assets. The \$4.5 billion available for other business were primarily in company shares, debentures and notes, and in mortgage loans.

The savings bank content of the total money supply is reserved for housing and government requirements. The Stock Exchange, however, can be a source of development finance. The Industries Assistance Commission in its May 1976 *Report* noted that over the ten years from 1965, share issues had accounted for around 30 per cent of total capital raised by the petroleum and mining industries for their Australian operations; 40 per cent had come from overseas loans, the other 30 per cent from local loans, of which two-thirds were long-term loans.

However, it should be noted that, even allowing for inflation, the development spending we now contemplate for the next few years is probably greater than the expenditure of that decade. Over the period 1967 to 1977, total new capital spending by mining in Australia was \$6 billion in money terms, while we are considering \$3 billion for the North-West Shelf development alone over the next few years. The federal Department of Industry and Commerce has estimated that about \$4.4 billion could be spent for projects over the next three years, and \$13 billion over the next ten years. \$1.2 billion worth of projects already have funds arranged.

I have emphasised in discussion of commodity sales, of further processing, and of pricing that supply is not enough—there is a demand constraint. In financing, the reverse applies. Just because an Australian project needs funds, it cannot be assumed that the Australian capital market is prepared to provide such funds, at least on competitive terms, and recourse may be had to overseas funds.

This does not mean that Australians do not save. In 1977, the ratio of total saving (household, government, company, depreciation) to gross national product was 24.3 per cent;² this was the same proportion as in

² Australian Bureau of Statistics, *Australian National Accounts* and Reserve Bank of Australia, *Financial Flow Accounts*, December 1977.

1976, but in 1975 the figure was slightly higher at 25.5 per cent (the same figure as in 1950). In 1974 total savings represented 27.7 per cent of gross national product. The comparable figure for Japan was 36.2 per cent, for the U.S.A. 29.6 per cent and for West Germany 25.0 per cent.³ Total Australian savings in 1977 amounted to \$20 billion.

Brunckhorst defined the local pool of funds at any time as the sum of the public's holding of notes and coins, deposits at call with the trading banks, term deposits of the trading banks and savings bank funds.⁴ Since the banking system is banker to other financial intermediaries (apart from companies operating in the official money market), the total of those sums was the total available for deployment. Total trading banks deposits at August 1978 were \$20 billion; the total funds for deployment were \$40 billion. Brunckhorst said of this sum: 'At any given time in Australia it is almost totally committed. Our internal ability to support our own development will be determined by the extent to which it grows in volume or can be re-directed or turned over.'

The federal Treasurer, Howard, has indicated that the government was considering whether an enquiry into the Australian capital market would be appropriate, and what form it should take.

I began this chapter by considering the Australian Industry Development Corporation, which now appears very small-scale in relation to the total funds Australia will be seeking. Where, then, will the money come from?

It seems that projects will be financed individually as before; each will probably have both local and overseas funding—on the consortium principle for large projects. There may be various types of funds invested, including retained earnings where these are available. Equity may be more important than in the past, simply because market conditions (including firm long-term contracts with fixed volume and price) are difficult.

M. C. Deverell defined 'project financing' as financing 'so structured that, whilst the lenders indeed look to the project itself for repayment, they also have the benefit of a variety of covenants, albeit (if there is more than one Participant) on a several basis'.⁵ He noted that joint venture participants can be different in size and in nature, and that no single financing structure will appeal equally to all participants and their

³ Figures presented to the Committee for Economic Development of Australia, Policy Forum, by Gordon Jackson. Differences in sources of saving between countries is illustrated by a comparison of ratios of personal saving to personal income—Australia 15 per cent, Japan 25 per cent, the U.S.A. 7 per cent and West Germany 15 per cent.

⁴ 'The Phasing of Resources Development . . . '.

⁵ 'Where would the money come from? Financing the L.N.G. Trade. The Risks and Assurances Required', *West Coast L.N.G.*, University of Western Australia Extension Service, December 1977.

shareholders. He referred to the fundamental difference between project finance and traditional balance sheet lending as being one of approach since 'rather than looking at the whole spectrum of a company's activities, project finance gives lenders the opportunity to look at one project in great detail'. Lenders in fact will be evaluating projects in as much detail as the joint venturers or company concerned.

For the North-West Shelf, Deverell outlined risks requiring assessment by lender, and by the joint venturers, as including the size of reserves, the capability of the operator, industrial relations, export controls, price, creditworthiness of gas customers, royalties, tax changes (including changes in investment allowances and the possible introduction of new taxes), and project completion.

Tilley has identified general risks of any project as related to construction, supply to the project, the project's operation and the projects market,⁶ e.g. whether the project has a 'take-or-pay' sales contract from customers or owners who are technically and financially strong. He has also outlined other interests of lenders as including sovereign or political risks, and the issues of domestic and international enforceability.

In the past, ventures interested in project finance have looked to foreign financial intermediaries to construct any finance package involving foreign funds, except for large companies which may go straight to the market. Although Australia cannot supply all her own development funds, it is possible that in the future her institutions may be able to participate more fully in providing financial services and earning the commissions involved. Brunckhorst gave two illustrations of how the Australian banking system might produce a financial package.⁷ The first was for a \$500m. project, with equity of \$200m. and loans of \$300m. Of the latter, he saw the maximum commitment of the Australian banks as perhaps \$150m. with about \$50m. from local sources (principally through the Australian Resources Development Bank) and the remaining \$100m. from borrowing in Euro markets. Of the \$150m. risk *not* assumed by the Australian banks, some might be from local loans, some overseas funds.

In the second case, for a project costing \$250m., one of Australia's major banks might arrange a package with \$100m. equity and loans of \$150m. The lead bank might take responsibility for \$40m. (\$10m. local, \$30m. overseas). A further \$40m. might come from a syndicate of Australian banks, insurance offices and the Australian Resources Development Bank (in its dual role as direct lender and re-financier).

⁶ Harold W. Tilley, 'Mobilising Funds from Domestic and International Capital Sources to provide the needs of Project Financing', *The Resources Challenge*, Sixth Australian Conference on Chemical Engineering, Surfers Paradise, Queensland, November 1978.

⁷ 'The Phasing of Resources Development . . . '.



Above: Aerial photo of mining at Bridge Hill Ridge.

Below: Mineral Deposits' 1500 tonnes per hour operation.
By courtesy of Mineral Deposits.





Marlin seals, at the Esso-B.H.P. rig in Bass Strait. By courtesy of B.H.P.

The remaining \$70m., together with the lead bank's \$30m., would come from overseas through a syndicate of local or overseas risk takers.

Although overseas financial markets offer greater scope for project finance than does the Australian capital market, Australian projects will be competing for them and will have to meet the market's lending criteria and accept the interest, security and repayment terms it dictates. They will also be bearing some foreign exchange risk. The denomination of initial loans, relative to the denomination of capital expenses and perhaps much more importantly sales receipts, is important.

The exchange risk will be particularly important for state government instrumentalities who are, for the first time since the late twenties, able to borrow abroad on their own account (if funds cannot be found in Australia). The Loan Council on 6 November 1975 approved borrowing for development projects over the next ten years of \$1767m. for twelve proposals such as South Australia's Redcliff petrochemical project and Victoria's Loy Yang power station. States will bear the exchange risk, but power stations, unlike mineral exporting companies, cannot protect themselves to some extent by having loan repayments denominated in the same currency as some of their sales. Costs of 'hedging' through deals with marketing boards for primary producers or with mineral exporters have been investigated, but seem to have been found too high.

The fact that mineral exporters may have more opportunity to protect themselves against foreign exchange risks than do power stations does not mean all mineral exporters face no exchange risk. Western Mining Corporation's experience illustrates that Australia's exchange rate changes over recent years have had serious implications for its nickel operations.

7 Aborigines and Mining

One of the major policy issues at the government-mining interface in the next decade will be the power of the Aboriginal people to determine whether some mining projects should or should not proceed; and to determine, if they do proceed, what monetary compensation should be paid to the Aboriginal people.

The obligation of mining companies to indigenous people is an issue in many countries. Rausch and Taylor have said that 'the overwhelming concern of indigenous people is that their rights be protected even in the face of powerful forces which they feel threaten them'.¹ They also suggest that 'if an outsider is genuinely concerned about the well-being of those with whom he deals, social conflict will be less likely to develop'. They identify some important considerations:

- (1) that indigenous people expect to derive benefits from their lands, resources and cultures and will defend their right to receive such benefits;
- (2) that indigenous people are proud of their cultures and life styles, believing their perspective of the world to be correct. Their concepts of time and work ethics may differ from those accepted in western society;
- (3) that indigenous people view outsiders from technologically advanced cultures as a threat to the life style they wish to preserve for they do not seek change for its own sake;
- (4) indigenous people are sensitive to attitudes, preferences and prejudices on the part of outsiders.

On Australia Day 1977 the Aboriginal Land Rights (Northern Territory) Act was proclaimed. This was one of a group of four Acts which had their origin in the report of the Aboriginal Land Rights Commission. The others were the Aboriginal Land Fund Act, the Aboriginal Councils and Association Act and the Aboriginal Loans Commission Act.

The objectives of the Land Rights Act are to 'provide for the granting of traditional Aboriginal land in the Northern Territory for the benefit

¹ Donald O. Rausch and Michael N. Taylor, 'Social Responsibility and Obligations to Indigenous Populations', *Aus. I.M.M.—A.I.M.E. Conference Proceedings*, Canberra, May 1978.

of Aborigines and for other purposes'. The Minister for Aboriginal Affairs said in June 1976 that the Act confers upon traditional Aborigines 'inalienable freehold title to land on reserves in the Northern Territory and provides machinery for them to obtain title to traditional land outside reserves'.

The Act provides that mineral exploration and development will be allowed on Aboriginal land only with their consent, and it is here that there has been some public concern, expressing the view that Aborigines have been granted greater privileges than have been accorded to other Australians. There is, however, a provision for Land Council decisions against mining to be over-ridden 'in the national interest'. The nation has yet to see whether the power of the Aborigines is more apparent than real, and/or whether this provision leads to serious conflict.

If Aboriginal Land Councils are economically motivated, the chances of development are greater, for the Councils have the power to negotiate agreements for financial benefits and compensation from projects they approve. They must, however, consent only when the traditional owners agree. If negotiations fail, there is provision for a 'fair' agreement to be determined by an arbitrator.

How much of the Northern Territory will be claimed as Aboriginal land? In April 1978, 18 per cent of the Territory was accounted for by Aboriginal reserves, 23 per cent by unalienated Crown land. Claims can extend beyond these.

Will all claims be granted? The Commissioner, in reporting on claims to Crown land, alienated or unalienated, is required to take account of the 'strength or otherwise of the traditional attachment by the claimants', the effect that granting the claim would have on existing or proposed regional land use patterns, the possible disadvantaging of persons and communities (including other Aboriginal groups). Where alienated Crown land is being considered, account must be taken of 'the cost of acquiring the interest of persons in the land concerned'.

The Aboriginal Land Commissioner, although taking account of these matters in his enquiry, merely reports to the relevant Ministers (the Minister for Aboriginal Affairs and the Minister for the Northern Territory); the Commissioner does not recommend. Even where the Minister for Aboriginal Affairs decides that the grant should be made, the land need not be compulsorily acquired but can be acquired in the market. Some economists would argue that for land subject to claim the market place would hardly reflect the economic value in the absence of the claim.

Once Aborigines have had their land claim recognised, and have decided to consent to mining on their land, there are no guidelines for financial negotiations. The Woodward Report, which was the origin of the Act, described the difficulty of setting 'advance conditions . . . fair to both Aborigines and mining companies', and Sections 43 and 44 intend

that the parties themselves agree. Mr Justice Woodward thought such agreements might include both royalties and equity.

The Act specifically excludes mining entitlements and agreements made prior to its operation.

How does the mining industry regard the question of land rights and compensation? D. F. O'Driscoll, writing in the April 1978 *Mining Review* said 'the long-term result must be a severe reduction in exploration activity, and, eventually, in the mining operations on which the new State must largely depend for its existence'. He also pointed out that, although a government could decide to over-ride an Aboriginal veto on exploration, this had to be in the 'national interest', but that it was difficult to assess the 'national interest' when the potential was not known. (In time of war, if a strategic mineral was sought, the national interest would be clear in the absence of demonstrated potential, but at other times the picture would be less clear.)

J. P. Elliston, in the same edition of the *Review*, said,

If the Land Councils are to successfully represent the interests of the Aboriginal landowners in the very large areas which they are to manage, they should seek to avoid the image of unauthorised totalitarian control by a minority group working against the interests of the Australian community at large. Minerals are a national, not an Aboriginal, asset. Access to minerals and to profits from mineral mining is and should be for Aboriginal citizens as for any other Australian.

Elliston expressed the view that,

Aboriginal demands such as that for Ranger I are so totally unrelated to the value of what is to be provided by the Aboriginal landowners that hopefully they will never be met. But while there is no doubt that they are unjustified, there is a danger that they will find some support from politicians and Government officials. Substantial payments from local mining operations to the Aboriginal Land Councils would have the appearance of reducing, or containing, the rapidly escalating cost of Aboriginal welfare. Such sums as are paid directly do not have to be found from the Treasury, provided for in the national budget, nor subject to the scrutiny of the Auditor-General and the Parliament.

Elliston said that against this must be set the fact that

the substantial burden and adverse effects on the Northern Territory segment of the mining industry tend to remain hidden. The money it has cost to discover, prove up, and develop existing resources has already been spent. Whether it is retrieved or not, or how profitable mining existing resources burdened with extra cost might be, is a lesser public concern. The growth in industry and further processing and upgrading of Australian mineral products that profitable mining would make possible are not seen until they

happen. The disastrous effects on mineral exploration where the incentive for this high risk investment has been removed or sharply reduced relate to deposits not yet discovered and therefore not missed. At least they are not missed until the industry begins to decline with such effects as increasing unemployment, shortages of essential mineral products, or declining revenues which compel eventual reconsideration.

The question of negotiation is not an academic one, as discussions have been undertaken over compensation in the Northern Territory Uranium Province. Galarrwuy Yunupingu, Chairman of the Northern Land Council, said in November 1977:

We want not only royalties, but a fair share of the profits once these rise above an accepted level. In this way at the expense of big companies we will be able to pay for better housing and other necessary improvements in our lives with less expense for our fellow Australian taxpayers.

On 7 March 1978, federal Cabinet considered its position on the issue of compensation but deferred its decision. The Press reported next day that the Northern Land Council (representing the Aborigines) might be called upon by the government to rethink its proposals for compensation for the mining of uranium in the Northern Territory.

It was suggested that the government is divided on the compensation issue, with the Treasury and the Department of Aboriginal Affairs favouring larger payments than the Department of Trade and Resources. (Treasury's view is explained by the fact that it would prefer its partners in Ranger, Peko-E.Z., to compensate the Aborigines rather than have them seek funds from Consolidated Revenue.)

The Northern Land Council was seeking, in a draft agreement with Peko-E.Z., 36 per cent of gross operating profits. The mining industry, however, not only believed that Aboriginal claims for compensation that relate to the value of the minerals on their land are contrary to the law but blamed the land rights legislation for giving Aborigines unrealistic expectations. There seemed to be some agreement between the mining industry and the Department of Trade and Resources on the compensation question. At a press conference on 7 March, the Minister for Trade and Resources, Anthony, expressed the view that 'the greatest problem confronting the development of uranium was going to be dealings with the Northern Land Council'.

The industry was reluctant to pay above the level of royalties that Mr Justice Woodward described in the second land rights report as 'not unreasonable', with reference to an offer by Queensland Mines to Northern Territory Aborigines in 1974 of a lump sum payment of \$600,000 and an extra royalty of 1.25 per cent of the value calculated in accordance with the Northern Territory Mining Ordinance. This 1.25

per cent royalty, combined with the royalties of 2.5 per cent that must be paid by the Commonwealth to the Northern Territory Aborigines would have brought their total payments to an equivalent of 3.75 per cent.

Another contentious issue is that of compensation to the Northern Territory for royalties forgone. The government will have to decide who compensates the Northern Territory, the companies or the government.

The majority party in the Territory has argued that as the Aborigines are receiving a royalty that would otherwise have gone to the Territory, which is reaching statehood, then it must be reimbursed by payments equivalent to those royalties that would flow to other states from uranium mining. At present negotiations are under way between the Northern Territory majority party and the federal government. The government, the mining industry and the Northern Land Council are all agreed on one issue—no royalty payments will be made to the Territory.

However, provisions in the Aboriginal Land Rights legislation stated that royalties paid to Aborigines must be twice those that would be paid to the Northern Territory. The Northern Territory Mining Ordinance allows royalty payments of 1.25 per cent to be made to the Territory but the majority party will be wanting compensation for an amount at the very least the equivalent of a 2.5 per cent royalty.

The mining industry has been pressing for guidelines to be established for compensation payments, but there is a fundamental difference between the Aborigines and the industry on compensation. The Aborigines believe that the value of the minerals should be taken into account while the mining industry argues that minerals are the property of the Crown, and that Aborigines should not have rights denied to other Australians.

Some sections of government consider the Land Rights legislation inadequate, and see it leading to continued confrontation. There is some concern that Aborigines will be able to withhold consent to mining in uranium-rich areas outside the present Ranger project area, because of the provisions of the Land Rights legislation. Their argument then points out that this power to withhold consent will lead to even greater leverage for the Northern Land Council to extract heavy compensation from the mining companies. There is thus considerable pressure on the government to put a time limit on Aboriginal claims for land in the Northern Territory, based on a fear that although companies may hold exploration licences across the Territory subsequent successful claims by the Aborigines to Northern Territory land will thwart their plans and subject them to further complicated negotiations on the compensation for and conditions of mining.

In February 1978 the Australian Mining Industry Council released a paper arguing that the Aboriginal Land Rights (Northern Territory) Act, 1977, would discourage mining investment in the Northern

Territory and would cause 'costly delay' to a particular project, presumably Ranger. A.M.I.C. referred to 'extravagant claims' that the Northern Land Council has made as a result of the 'framework' of the Act.

G. Paul Phillips, Executive Director of A.M.I.C., said, 'The application of the Act has led to demands from the Northern Land Council for what amounts to a 36 per cent share of gross profits from one uranium project.' He said this would be equivalent to an interest more than double that of private enterprise, and that this 'compensation' is

so disproportionate to the area of land involved, and, in any case, so unreasonable, that it will inevitably cause costly delay until the issue is forced to arbitration. AMIC recommends that the Government set out guidelines for the computation of financial compensation and other terms and conditions required by the Act for areas of Aboriginal land included in mining tenements.

Phillips says that the Act

has permitted the Northern Land Council to seek powers which would effectively override governmental authority in respect of all aspects of mineral activity in the Northern Territory, to invade normal business privacy and to impose conditions on mining projects which would override management authority and responsibilities.

The Northern Land Council is criticised for its demands for a share of profits, disclosure of cash flow projections and inspection of accounts and records of the Commonwealth and mining companies relating to any shipment, sale or use, of products of the project. These demands are said to be 'inconsistent with the normal basis for determining compensation for mining on private land' and based on an 'unjustifiable assumption of a right to a share in the proceeds of mining companies, combined with an expectation of the vast capacity of mining companies to pay from their existing resources and future cash flows'. These have 'given rise to demands which are excessive and without any relation to the value of the land surface involved'.

It is also argued that the Fox recommendation that the Northern Land Council enforce environment protection provisions will bring in its train open-ended costs and will seriously prejudice the mining companies and jeopardise the projects. A.M.I.C. recommends that the government review its acceptance of this recommendation and reserve to the government alone the power to terminate or suspend mining operations. A.M.I.C.'s complaints of the 'invasion' by the Northern Land Council of the 'proper authority of management' stems from the Land Council's requirement that the Commonwealth ensures that the project adopts improved pollution control equipment if it becomes

available in the future, even if environmental damage has not been detected. A.M.I.C. also criticises the Land Council's proposal to approve employment targets that a stated percentage of all persons employed on the project be local Aborigines.

A.M.I.C.'s criticisms refer to the draft agreement the Northern Land Council furnished to the Ranger partners; these partners' strong objections to the agreement will mean that, according to government policy, an arbitrator could be appointed as intermediary between the Ranger partners and the Northern Land Council. This inevitably would delay the project. The Land Council is, however, quoted by A.M.I.C. as saying that they intended 'to fight the mining companies' to force renegotiation of existing mining agreements.

Referring to the Land Council's recommendation of the withdrawal of an agreement by local Aborigines which allows local employees to visit hitherto recognised recreational areas in Aboriginal reserves, A.M.I.C. raises the problems of isolation in the Northern Territory and concludes:

There is a real danger that the affected mining communities can find themselves in a disadvantaged minority situation in areas of Aboriginal land with restrictions unparalleled in a democratic society able to be placed upon them at a whim of an individual or a group of individuals.

The draft agreement prepared by the N.L.C. and sent to the Ranger partners (Peko-E.Z.) and the government did include strict provisions covering environmental safeguards, Aboriginal employment, town planning, local business development by Aborigines, safety and health, the use of infrastructure and compensation payments for Aborigines for mining on their land.

The Northern Land Council proposes that an Aborigines benefit trust account be paid royalties of 2.5 per cent as well as a payment to be made to the Council under a specific formula that would amount to around one-third of the gross operating profits from the Ranger project. The industry estimated that the Northern Land Council's demands would approximate 36 per cent of gross operating profits, while the Council itself has argued that this is a bargaining position only.

Whatever level of payment is finally agreed upon, the Council has incorporated into its draft agreement other provisions which would ensure that the Ranger partners do not artificially reduce their profits.

Section 6.1 of the draft agreement states that

the Commonwealth shall ensure that all fees, charges and reimbursements paid to Peko-Mines Ltd, Ranger Uranium Mines Pty Ltd, their agents, employees, contractors and affiliates are not higher than fees and charges customarily made in the uranium mining industry internationally in dealings between parties at arm's length.

If fees and charges paid or approved by the Commonwealth for the project are higher than those customarily made in the uranium mining industry the excess of such charges and fees over customary levels shall not be allowed as a deduction in calculating amounts due to the council, the draft agreement states.

The draft does include requirements that the N.L.C. can inspect the partners' accounts and records and any aspect of the project's operation.

The Chairman of the Northern Land Council, Gularrwy Yunupingu, released the draft agreement publicly, because he felt the Ranger mining companies had committed a 'serious breach of confidentiality by giving the draft agreement to the other miners and to the Australian Mining Industry Council'. He said that all the miners had done was complain about how much the agreement would cost them, but that if the government was going to allow the mining of uranium a fair share of the big profits should go to look after the Aboriginal people and their lands.

The formula that the council used for calculating compensation payments is one-third of the sum of $R - (O + F - C)$ where R is 40 times the royalty rate of 2.5 per cent, O the direct operating costs of the projects operations, F the amount of interest that would be payable if the project were financed in equal instalments over ten years at an interest rate of 10 per cent and C new capital expenditure incurred for the year in question.

The Northern Land Council has also proposed that Aborigines shall have the right to use all project infrastructure located outside the boundaries of the project area and infrastructure within the project area which is outside the boundaries of any authority to mine. The Land Council proposes that any infrastructure that is desired by Aborigines on completion of mining should be transferred to them free of charge.

The draft proposes that no non-Aborigines be permitted to reside in the town unless employed or related to someone who is employed in the project and that all non-Aborigines would be required to obtain entry permits issued by the traditional owner or the Northern Land Council. The Council further states that it should 'retain the right to refuse the issue of an entry permit to any particular individual for any reason whatsoever'.

The draft states that as many local Aborigines be employed as is practicable and that the Commonwealth establish employment targets to be approved by the Land Council. The Commonwealth also should sponsor further training and education schemes, adjust working hours and conditions to suit the requirements and culture of the local Aborigines as far as practicable and 'promote, support, encourage and lend assistance to local Aborigines desirous of establishing businesses providing goods and services for the project'. The draft in fact requires that a business development program be established to develop

Aboriginal businesses and enterprises associated with the project. It also suggests that all employees of the project and all adults resident in the town should be required to attend instruction in Aboriginal culture and tradition. It states that no licences for the consumption or sale of alcohol in the project area or town should be granted without the consent of the Northern Land Council.

The draft includes the following provisions for environmental protection.

- The project should employ the best technology developed anywhere to prevent environmental pollution.
- The Commonwealth will ensure that the project adopts pollution control equipment if it becomes available in the future even if environmental damage has not been detected.
- Tailings and any stockpiles of low grade ore remaining after milling ceases should be replaced in or on other of the pits.
- An impervious membrane is required to seal both the walls and floor of the tailings dam or a seepage collector system.
- A plan for the rehabilitation of the project area shall be submitted to the Northern Land Council before the start of production.
- The Commonwealth shall ensure that the joint venture provides adequate finance, a sinking fund for example, to carry out such rehabilitation.
- A comprehensive environmental monitoring program shall be established according to plans approved by the Northern Land Council.

The Australian Mining Industry Council has recommended that the government establish 'a satisfactory mechanism for co-ordinating and expediting the consideration of and review of draft agreements for mining projects in the Northern Territory'. It is concerned that 'the more protracted negotiations prove to be, the more adversely will the mining companies be affected (quite apart from considerations of the public economic interest), and the more they will be prejudiced in negotiations'.²

The Council emphasises the problems facing an emergent state, which will need to depend on mining. Yet the Council feels the Aboriginal land rights legislation will discourage mining investment, and that the claims by the Land Councils on mining profits will leave little room for state imposts.

They conclude, however, that the

biggest problem facing the new State, is that it will have seriously curtailed powers of administration over Aboriginal land, and indications are that land of any value in the Northern Territory will be claimed by and be granted to the Aboriginals either as the

² *Mining Review*, March 1978.

traditional owners or under the principle of secondary succession as proposed by the Fox Report.³ As the Federal Government has made it clear that it intends to remain responsible for Aboriginal welfare, the new State seems likely to have the chaotically impossible task of administering pockets of land bordering on, and perhaps surrounded by, what for all practical purposes could be termed foreign territory. As the realisation of all this dawns on the Northern Territory non-Aboriginal community, as it experiences a major extra-territorial situation over what could, in the light of claims made or foreshadowed, involve more than half the area of the territory and finds growing costs of Government falling on fewer citizens and smaller resources, enormous racial confrontation may well be the result.

Is this an unnecessarily gloomy forecast? The Mining Industry Council draws attention to a situation where the Northern Land Council's advisers have recommended the withdrawal of an agreement by local Aborigines by which Department of Aboriginal Affairs permits are normally issued to local employees to visit hitherto recognised recreational areas in Aboriginal reserves, such withdrawal is supposed to 'encourage' the mining company to increase payments to Aborigines. The result has been an apparent climate of confrontation.

The Mining Industry Council says that

the fact that these tactics are affecting community relations with local Aborigines where once an excellent relationship was being developed is of serious concern to the industry, as in the long term, such divisions must reflect themselves in the national scene with disadvantage to the nation as a whole. What should be of particular concern to the Government is that the use of militant tactics by the Land Council is resulting in a denial of privilege and/or established right to other Australians, a situation which, at the moment is being accepted somewhat good naturedly in an expectation that it will only be short lived. If this is not the case, then, serious racial disharmony, which will by no means be confined to the remote mining areas, will be the result.

A.M.I.C. concedes that the Aboriginal Land Rights (Northern Territory) Act protects existing operations, but is concerned that actions such as these are designed to force renegotiation which it sees as beyond the government's intention.

A.M.I.C. said that it is not sufficient, in 1978, to assert that there has always been restriction of movement of non-Aboriginal people in Aboriginal lands. It said that the situation now exists whereby communities of Australians of essentially European culture are isolated within the areas described as Aboriginal reserves and which will become

³ Report of the Ranger Uranium Environmental Enquiry, A.G.P.S., Canberra, 1976.

Aboriginal lands; that they are being confined and denied normal citizen rights.

In reply, D. O. Hay, Secretary of the federal government's Department of Aboriginal Affairs, said that he accepted A.M.I.C.'s point that the Land Rights Act, although specifically exempting prior mining entitlements and agreements, may have kindled Aboriginal interest in renegotiating the existing Gemco mining agreement.⁴ He said that the federal government, while exempting existing provisions from the Land Rights Act, must be even-handed, and could not prevent Aborigines from exercising their previously existing rights under previous legislation to restrict the access of outside visitors to their land.

Aborigines are not interested only in Northern Territory mining. The U.S. consultant, Dr Steven Zorn, who advised the Northern Land Council on uranium negotiations, is assisting the Oombulgurrie tribe in Western Australia in negotiations for compensation for diamond mining; but it is on uranium that the eyes of the nation and to some extent of the world have been focused in 1978.

After all the preliminary skirmishing, what happened to the negotiations over Ranger? On 12 July 1978, the *Financial Review* reported that commonwealth government negotiations for the Ranger consortium had offered the Northern Land Council a 4 per cent royalty, but that the Council was holding out for 18 per cent, which represented a significant change from its original position. The next round of talks, the fifth, was set down for early August, and the government was anxious to reach agreement then so work on the project could begin during the 1978 dry season. It was not anxious to go to arbitration, as this would have meant delays. By September the negotiations were regarded as complete by the Chairman of the Northern Land Council and the Ranger partners, but there was discontent on the Aboriginal side, and complaints that the traditional land owners had not been consulted in the manner legally required. After court action, such consultations were begun. On 12 October the then Minister for Aboriginal Affairs, Ian Viner, said the federal government was disappointed that meetings of traditional owners in the previous three days had not led to ratification of the Ranger agreement. He indicated that the commonwealth might take independent action, which could mean the appointment of an arbitrator to decide the terms and conditions of mining.

The *Financial Review* reported on 30 October 1978 that the chief uranium negotiator for the Northern Land Council, Dr Zorn, had 'accused the council of "serious errors of judgment" which threatened its standing among Aborigines and the Australian public'. In the letter

⁴ *Mining Review*, April 1978.

to the Northern Land Council Chairman discussed by the *Review*, Dr Zorn was also reported to have said that there was evidence that delegates to the Council were subjected to pressure to ratify the Ranger agreement, and that there were points in the agreement that he would have expected 'to be unsatisfactory to the people in the Aboriginal communities affected'. Weaknesses mentioned included the fact that the royalty rate payable to Aborigines was 'certainly too low'; that there was no guarantee that when mining ceased both pits would be filled; and that the outstation movement was not clearly supported. Dr Zorn apparently suggested that the Council should demonstrate in the Ranger case that it was 'a true representative of aboriginal interests and not just a tool of the Government'. The release of the letter occurred just before the Northern Land Council was due to meet, at Bamijili in the Northern Territory, with the Minister for Aboriginal Affairs.

Before this meeting, and perhaps in preparation for its possible outcome, the Uranium Task Group, a commonwealth inter-departmental Committee, had examined the options open to the commonwealth if the Northern Land Council did not accept the Ranger agreement. Although arbitration was provided for as the means of solving disagreements, there was concern in commonwealth quarters that such arbitration could delay the project a further two years, and it had been evident for some time that the government was anxious to proceed speedily with development. By late October, it had become increasingly evident that if the Ranger agreement was not accepted quickly, an attractive option to the federal government could be the amendment of the Aboriginal Land Rights Act. While there was no doubt that this would cause political turmoil, the turmoil could be expected to be greatest amongst those who did not support the government anyway, so that the possibility of protest was not necessarily seen as a strong deterrent to amendment of the Act.

However, on 3 November 1978 the Ranger agreement was signed by the Chairman of the Northern Land Council and the federal Minister for Aboriginal Affairs; and the Minister for Trade and Resources said at a press conference on 5 November that he hoped an agreement between the Northern Land Council and Queensland Mines over the Nabarlek uranium deposit would be signed before the end of the year. If it were, he saw Nabarlek as the first mine to come into production, since Queensland Mines expected to be producing within two years, whereas Ranger would take three years.

Perhaps for dramatic impact, we should give the last word on the Ranger saga to an Opposition Member of the House of Representatives, Tom Uren. After the signing of the Ranger agreement was announced, he predicted that Ranger uranium would never reach world markets. He mentioned Labor's policy to repudiate any non-Labor government's

commitments to mine, process and export uranium, and said the Labor Party had given

clear warning to the mining companies and the financiers that they would be taking exceedingly high risks with their investments ploughed into uranium mines on the off chance that Labor will not be elected in 1980 or in any election over the 20-odd year life that the mine was trying to sell uranium.

8 Aspects of Energy Policy

At the beginning of the seventies, the Club of Rome focused public attention on the non-renewable nature of some of the world's resources. This was reinforced by the actions of the O.P.E.C. nations, which precipitated the oil crisis of 1973. It is now widely accepted that petroleum is in limited supply and likely to become more expensive in real terms. Substitute fuels are not always readily available, or in some cases acceptable; and even where they can be supplied, this may be at greater relative cost than the purchaser is used to paying.

This so-called 'energy crisis', while politically important at the present time, may turn out to be ephemeral. While it is true that oil is in finite supply, alternative energy sources will become increasingly available and the apparent petroleum supply crisis may move further into the future. The world's oil resources, though limited, exceed current economic reserves, and as price rises more reserves become economic, and the incentives for further exploration improve. Furthermore, while price rises are expanding the supply they are contracting relative demand as they make other energy sources more economic, and it is on these two counts that the crisis point moves out.

As a customer Australia has been partly insulated from the so-called 'energy crisis', for she has been able to enjoy around two-thirds self-sufficiency in crude oil requirements. This rosy picture was expected to change rapidly as domestic oil production began its imminent decline. However, the price rises recommended by the Industries Assistance Commission in 1976 (which meant import parity for almost all production in the 1980s) have had the desired effect. In September 1977, B.H.P.'s chairman announced increased oil reserves for Bass Strait, enabling an extension from 1981 to 1982-3 when oil production would begin its decline. At the April 1978 Conference of the Australian Petroleum Exploration Association it was revealed that production is now expected to be maintained until 1984. Further, B.H.P.'s partner, Esso, has achieved a significant breakthrough in its interpretation of Bass Strait seismic data which makes it confident of more success. The group believes there is a reasonable possibility of discovering small fields capable of producing 100,000 barrels a day, which would enable a 360,000 barrel-a-day rate to be maintained until 1990. Further announcements since April 1978 indicate such optimism is justified.

Esso-B.H.P. has decided to bring forward the date of commencement of production from the Mackerel field, the development of the Tuna oil field, the Snapper gasfields and the Cobia-2 subsea completion are proceeding. Development of the West Kingfish field will begin in 1979, with initial production possible by 1982. These developments in total are estimated to cost \$700 million.

How has Australia fared in the energy crisis as a producer? She has had the opportunity to gain from increased overseas interest in her resources of alternative fuels—for example, of steaming coal for electricity generation and of coal suited to gasification and liquefaction.

One issue that has assumed political significance is the question of whether Australia has maximised and/or will maximise her gains from the exploitation of her energy resources. Some politicians criticise the role given to multinational corporations in natural resource extraction. In petroleum retailing, exploration and even production companies there are certainly foreign corporations. There are examples in Australia of their diversification into other areas, as they move to acquire coal leases in response to developments on the supply side of the petroleum industry. Already active in the coal industry are a number of other corporations which fit the public image of 'the multinational', and it must be recognised that overseas governments are also entering the scene—the National Coal Board of the United Kingdom, for example, has been taking an interest in Queensland coal leases.

In addition to normal concerns with foreign ownership, there is special concern in Australia about foreign control of energy resources, in relation to 'too-rapid' depletion of resources. The federal government, through its export control power, can control the rate of resource depletion if it feels individual states, in granting production leases, are pursuing short-term regional growth at the expense of national needs. Refusing export permits for an established operation is politically difficult. Limiting the establishment of new operations through local equity requirements achieves a similar effect one step earlier, and because it favours local equity is politically attractive.

On the other hand, one argument advanced in Australia for foreign equity is that local capital market is limited, and that foreign funds are necessary to facilitate growth. Other arguments advanced include the need to ensure markets, and access to overseas technology.

The Labor Minister for Minerals and Energy, 1972–5, was strongly of the opinion that foreign funds could be obtained without yielding equity. One project he especially favoured was a uranium enrichment plant, owned by the Australian government, with a considerable proportion of the finance being in the form of Japanese loan funds. At the time, he judged Japanese interest in enriched uranium to be sufficiently strong to ensure both sufficient markets and adequate finance.

The year 1977 saw the development of Japanese pressure for equity in steaming coal deposits. Japan has viewed with apprehension the surge of interest in coal by multinational companies, especially oil companies—and has naturally taken the view that if equity is to be yielded to foreigners, customers have a right to be considered as potential equity holders. What arguments can be advanced against such a view? The first applies only where a company which may be operator or marketer for a project arranges sales to itself or to associated interests at a price which does not fully reflect the market. The second applies where a customer's bargaining position is improved because he has direct access to cost information.

The N.S.W. State Electricity Commission is entering into at least one joint venture with the Japanese. In another move which foreshadows where Australia's future coal markets may lie, R. W. Miller has, with the approval of the N.S.W. government, granted a 20 per cent interest in its Mt Thorley coal deposit to the Pohang steelworks of South Korea. The N.S.W. Premier reported U.S. interest in steaming coal after a recent visit. It would not be surprising if New Zealand sought interests in Australian coal.

In the granting of offshore petroleum leases, the federal government has the ultimate power, although the state governments may act as 'designated authorities'; the federal government sets the prices of indigenous crude oil and charges excise; the federal government shares offshore royalties with state governments. It is thus in a position to control what has been termed 'the total remuneration package', or, looked at other ways, we might call it the 'total incentive package', or the 'total taxation package'. It thus has the power to 'optimise' tax, recognising that there is a trade-off between tax and development incentives. In the case of uranium, the federal government is in a similar position because, although onshore, the majority of large known deposits are in commonwealth territory.

In the coal industry, the states issue leases—e.g. black coal deposits in Queensland and N.S.W.; Victorian brown coal is mined by the state, and it is the state that has been encouraging interest in liquefaction and gasification of brown coal.

Only in the case of coal exports is the commonwealth in complete control.

If resource rent tax were imposed on coal, what would be its relationship to state royalties? Resource rent tax is occasionally suggested as a replacement for royalties and income taxes (instead of additional to them)—with a single profit-based tax responsive to super-normal profits. It is hard to see the states willingly surrendering their right to levy royalties. On the contrary, it is possible that state governments, resenting a federal resource rent tax, would raise their own royalty levels and in the case of Queensland coal, their rail freights, to

acquire revenue for themselves rather than have the federal government take it at a later date for redistribution over a larger population.

The federal government might try to compensate for this revenue loss by refusing deductibility for royalties for either or both of income tax and resources tax, by raising secondary tax rates or by widening the application of secondary taxes, e.g. by lowering the threshold rate of return. In the first instance the main losers would be the companies concerned, although ultimately the nation as a whole might suffer because of lack of incentive to explore and develop. The potential dangers of federal-state tax struggles are best illustrated from one Canadian province where for a short while total federal and provincial taxes could exceed taxable income.

Foster has described a possible profit-related secondary tax to replace the existing excise levy on crude oil,¹ to be politically and economically acceptable to the government, and to provide an incentive to reinvestment by those who make the highest profits.

He takes issue with assertions by economists 'that a resources (i.e. secondary) tax would have absolutely no impact on a company's incentive to invest', saying 'this claim is only true in certain narrow circumstances of limited practical application'. He cites the case of an oil company, with available exploration funds, considering investment in Australia. The possibility of a secondary tax on production reduces the expected value of any investment unless the Australian government were prepared to refund the unsuccessful explorer the same proportion of his exploration costs as the proportion of after-tax profits which the tax would have represented if he had been successful. Even with this arrangement, the incentive to invest would be impaired unless the explorer could be certain that the secondary tax rate would not rise during the production life of any field he discovered—a period of perhaps twenty years.

Foster suggests that:

- (i) the secondary tax on companies should stretch from their exploration activities, through production, transport and processing to the terminal stage;
- (ii) assessable income for this tax should be revenue from the above stages, less company tax, less dividend or interest income, less operating costs including royalties, and less all capital expenditure on exploration and development, but excluding interest payments and loan redemptions;

¹ Bob Foster, 'A Second Income Tax for the Australian Petroleum Industry', paper presented to the Petroleum Exploration Society of Australia, South Australian Branch, 18 November 1977.

- (iii) there should be unlimited carry forward of exploration, development and operating costs;
- (iv) net secondary income should be taxed at a flat rate.

A number of safeguards are suggested 'to prevent the secondary tax from applying indiscriminately to cases of marginal, modest and high profitability'. These were allowances to be deducted from gross secondary income in deriving assessable income for the purpose of this tax.

The first was a profit safeguard to ensure that part of the secondary profit is always free of secondary tax. The deduction suggested was a production allowance per field per year, to encourage the development of new fields, to prolong production from declining fields, and to provide a minimum profit free from secondary tax.

Capital expenditure safeguards were suggested to protect the real present value of the investor's capital outlay between the time of outlay and the time when income is available against which it can be expensed for the purpose of this tax. Thus the present value safeguard would multiply outlay by a factor taking account of 'a company's need to earn profits which compensate for the time-value of money'. An inflation factor would compensate for declining money values and hold the present value safeguard constant in real terms. Foster concludes that 'provided adequate safeguards are incorporated, such a secondary tax could be introduced with a minimum of prejudice to investor-confidence in Australian petroleum exploration'.

The confidence of investors must be a major factor in Australia's consideration of policy for the petroleum industry over the next few years. Without further domestic discoveries she could from the mid-eighties be increasingly at the mercy of world producers and could once again find her economic policy dominated by balance of payments considerations, themselves determined by the import bill for crude oil. It was such a situation that led to government encouragement of petroleum exploration in earlier decades—and that was ultimately remedied by the establishment of domestic production.

The optimists among us need not become too dejected about the possible economic effects of the estimated crude oil import bill to the year 2000—we may make further local discoveries; demand may not rise as has been predicted; we may well develop economic substitutes for crude oil, using local raw materials; world oil prices may not rise as has been predicted, perhaps because world reserves may turn out to be much larger than is usually estimated.² Even if the crude oil import bill does

² 'Price Change—its Role in the Development of Fossil Fuel Resources', Paper by Peter Bzandell in the *Proceedings*, Australian Academy of Technological Sciences Energy Symposium, Canberra, October 1977.

turn out to be as high as predicted, or even higher, it could well be offset, mostly offset or even more than offset by increased export earnings for coal, by export earnings for natural gas (e.g. from the North-West Shelf) and by uranium exports.³

Despite such optimism, the federal government has reason to desire an increase in petroleum exploration activity in this country,⁴ hoping for some successful finds; and it has reason to encourage maximum recovery from existing fields. Its reasons for agreeing to raise prices for indigenous crude to world prices—new discoveries immediately and producing fields gradually (with special arrangements for known fields not yet producing)—include not only encouragement of exploration and maximum recovery, but also conservation on the part of consumers.

In the August 1977 Budget, a coal research levy was imposed. Although exporters are paying much less in levies than before, companies producing for local consumption—and in particular B.H.P., producing for its steelworks—face a new impost. The destination of the coal research funds thus acquired seems uncertain at this stage (recommendations on distribution of funds and research priorities will be made by a Committee advising the Minister for National Development).⁵ Submissions have been sought, and can be expected from organisations such as CSIRO (Commonwealth Scientific and Industrial Research Organization), and A.C.I.R.L. (Australian Coal Industry Research Laboratories), the universities, and industry.

This could be an example of a political move inadequately considered. Research on coal liquefaction and coal gasification is an issue on which governments gain electoral mileage; a levy on the export industry would also have been an electoral advantage; but to have the levy on domestic production as well will raise domestic costs (not only for steel), and could limit B.H.P.'s capacity to expand its own already-substantial and commercially-oriented coal research—an odd move indeed from a government which claims to support private enterprise and which wishes to limit the growth of the public sector. It is to be hoped that some of the levy proceeds will be returned to commercially-oriented research.

³ For estimates relevant to the balance of payments see e.g. the March 1977 Report of the Trade Development Council Working Party on 'The Implications of Australia's Demand for Crude Oil Imports' and the *First Report* of the Ranger Environmental Inquiry (the Fox Report).

⁴ For a dramatic illustration of the relationship of petroleum exploration (in terms of footage drilled) to political and economic factors (ministries, price, subsidies, tax, capital inflow requirements, offshore legislation, etc.) see Figure 3 in D. J. McGarry's 'Impact on Australian Petroleum Exploration of the North-West Shelf Development', *West Coast L.N.G.*, University of Western Australia Extension Service, December 1977.

⁵ The National Energy Research, Development and Demonstration Council.

The coal research levy is unusual amongst government revenue measures, since most funds received enter consolidated revenue and are not tied to particular disbursements.

In the short to medium term, coal supplies appear to be both adequate and economic for electricity generation. A former attraction of nuclear power plants to Australian utilities—their low labour force, and the resultant reduction in vulnerability to industrial action—has probably disappeared, as industrial action would doubtless hinder the construction of any nuclear plant. Australia can probably hope to move from fossil fuels to solar energy for the uses where the latter becomes economic, without recourse to nuclear plants. An exception could be in relatively dry areas with large water requirements, e.g. a Pilbara industrial complex, Perth, Adelaide—where power plant and desalination could go hand in hand and the package could be economically attractive. At the present time, such plans would face environmental opposition—but both technology and public opinion are subject to change. The Western Australian government has expressed an intention to develop a nuclear plant.

What practical progress is being made in solar energy research in Australia? In addition to university and CSIRO work, there is a small project funded by thirteen companies, administered through the Australian Mineral Industry Research Association, and conducted from B.H.P.'s Melbourne Research Laboratories. This is aimed at assessing the economic feasibility of solar energy use in each company's mining operations.⁶ Interest in the project arose because of high electricity costs in remote mining areas relying on diesel-driven generating sets. These high and rising costs mean that solar energy can be economic in these areas at much higher cost than would render it economic in major cities. Since air conditioning accounts for around 30 per cent of energy needs in northern mining areas, and since the peak cooling load and the peak energy input from the sun match closely, the comfort cooling area has received most attention, although work is also proceeding on the conversion of solar energy to mechanical energy. The expected outcomes of the project are at least low cost solar collectors, and, for remote areas, cost effective solar air conditioning. This project is currently receiving no government assistance—but then the thirteen companies involved see some possible economic benefit, either through cost reductions or new product opportunities. The market incentive is working.

The dwindling supplies of petroleum, which have changed the economics of harnessing renewable resources and led to research into solar power, have also roused interest worldwide in wind power, tidal

⁶ See R. G. Ward, 'Solar Energy—The Alternative for Low Grade Heat', B.H.P. Energy Symposium, Melbourne, 26 September 1977.

power, wave power and geothermal power. Since the first real shortage we are likely to face is in conventional transport fuel, there is worldwide research on coal liquefaction and gasification. We can expect advances in the electric car, which may be in general use sooner than we think. We may see the use of gas and powdered coal as transport fuels. Vegetable matter is being investigated as a source of fuel.

None of these forms of energy is new. Australia has had solar hot water systems and windmills for years, in circumstances where they have been economic. Geothermal power is in use in other parts of the world, and the possibility of generating electricity from the tides has been proved.

Coal liquefaction to provide transport fuel was carried out in Germany during World War II, and is currently successfully performed in South Africa where a sizeable new plant, SASOL II, has recently been completed. Tokyo taxis run on LPG because of its low pollution factor, and it is used as a transport fuel in Australia. During World War II, Queensland motor spirit contained an element produced from sugar cane. Powdered coal was used successfully experimentally in a Victorian car some years ago. The Detroit electric car was built in 1904.

However, with the availability of relatively cheap oil there has been no incentive to develop these further; it is only as the price of oil rises and its long-term availability is called into question that the incentive arises in Australia to improve the economics of coal liquefaction for commercial production; to consider harnessing tidal power for the north-west of Australia (admittedly a remote possibility); and to look at sugarcane and, as in South America, other vegetable material as a source of fuel, although there are suggestions that the overall energy balance of the process may be negative—taking more energy to produce the fuel than the ultimate product.

Both politics and economics are important in energy policy. It is politics—public concern about its domestic comfort and its ability to move freely round the country—that creates pressure for government-funded research and development. Ultimately, however, economics becomes important. For private enterprise research, economics is usually important from the beginning.

Politics have been important in Australian energy policy at two levels—at the national level, where concern is with the so-called 'energy crisis', which may turn out to be ephemeral but is certainly global; and at the inter-governmental level—the perennial problems posed by a federation, the possibilities for interstate rivalry and for federal-state conflict. An example of the first is the question posed for the North-West Shelf: transcontinental pipeline versus exports. An example of the second is provided by possible conflict over the administration of, and returns from, offshore leases.

Take the North-West Shelf gas field. Western Australia has in the

past for purposes of federal grants been treated as a 'claimant' state. With Queensland and Tasmania in particular it has been regarded as an economic poor relation by New South Wales and Victoria. However, with the mining boom in the sixties, its development of iron ore, bauxite and nickel deposits brought again the heady goldrush days of the nineties. As prospects for these commodities were seen to be limited, at least in the short term, Western Australia looked to immediate development of the North-West Shelf gasfield to maintain the economic momentum of the sixties. This required immediate exports to give the sales volume necessary to make the project economic, but the commonwealth government was concerned by this stage with Australia's energy future and questioned the wisdom of export.

The A.L.P.'s Federal Minister for Minerals and Energy, Connor, followed his Liberal predecessor the Hon. Reginald Swartz in concern for Australia's long-term supplies of natural gas, regarded as a premium fuel. Swartz had placed an export embargo on natural gas from Palm Valley and Meereenie when the Pacific Gas Light Co. of California was exhibiting interest in the discoveries. He said his embargo was temporary, while the government assessed Australia's long-term position.

That embargo was continued by Connor for North-West Shelf gas. By this stage anxiety was apparent over the long-term future of New South Wales' supplies of cheap gas from the Cooper Basin. The Bass Strait reserves supplied Victoria, but New South Wales hoped it might manoeuvre an interest in them if necessary. Bass Strait was not by then seen as a secure supply into the next century. Connor envisaged a transcontinental pipeline in the future to bring North-West Shelf gas to Sydney.⁷ Although there has since been a cost study of a possible pipeline (performed for the Pipeline Authority by the Snowy Mountains Engineering Corporation), the transcontinental pipeline was not then costed. Since New South Wales is abundantly supplied with coal, it may well prove more economic to use that in various forms rather than import Western Australian gas; but at the time when Connor was in office the 'premium' nature of natural gas as a relatively low pollutant was widely regarded as extremely important. Even when exports were again contemplated, one suggestion pressed by New South Wales interests was that gas should be exported from Sydney, having traversed the continent by pipeline. It was suggested that as South Australian reserves dwindled, North-West Shelf gas could be progressively diverted from exports to supply New South Wales.

⁷ A cost benefit analysis of the transcontinental pipeline was given in a paper to the Conference of Economists in Hobart in May 1977 by G. L. R. Dixon, B. J. Ferguson and D. McPherson, 'Natural Gas Exports on Transcontinental Pipeline? A Quantitative Comparison'.

The present commonwealth government (Liberal/N.C.P.) has not supported the idea of a transcontinental pipeline, at least in the short term. About half the known reserves of the Shelf are to be exported from Dampier.

Little has been heard lately of the grand plans for a Pilbara industrial complex, proposed by the state government just before an election and subsequently made the subject of a federal-state study which reported in 1974.⁸ The report was not without its limitations,⁹ which included inadequate emphasis on the demand for the proposed products and as subsequent events have shown demand has not been favourable. The study group also suffered from a number of handicaps, one of which was that the project rested on cheap gas from the North-West Shelf, but no price had been determined. The possibility of cheap gas has now receded, partly because the premium nature of the fuel is recognised and partly because it is a private, not government, operation. The immediate implementation of the Pilbara proposals has also receded.

The question of pricing policy is very important because of its implications for use and its significance for exploration and development decisions. Long-term U.S. pricing policy is responsible for its current supply position. The pricing situation in South Australia has affected sources of exploration capital, and the state government has decided to explore itself rather than give significant price rises to producers.

Pricing policy and taxation policy both affect incentives, and the overall situation has to be considered when we are looking at our long-term energy situation. When we look at exploration, we realise that tax concessions do not ensure discoveries; but then the \$57m. the government has been advised (by the National Energy Advisory Committee) to spend on energy research over the next three years does not ensure commercial propositions either;¹⁰ however, without any expenditure, nothing can be achieved.

Can Sydney, Melbourne, Brisbane and Adelaide be assured of a gas supply in the twenty-first century? (A separate question is whether they should—do they need it for cost of pollution reasons, or will most of them be adequately served by black or brown coal in one form or another?) Imagine a situation without interstate and intercompany clashes of the type that bedevilled the initial negotiations over the sale of Bass Strait gas. The logical, rational development of Australian gas reserves has been said in retrospect to have required Bass Strait to supply Sydney and Melbourne, maybe even Adelaide, initially, with South

⁸ Pilbara Study Group *Report*, A.G.P.S., Canberra 1974.

⁹ See Susan Bambrick, *The Changing Relationship: The Australian Government and the Mining Industry*, C.E.D.A. M Series, No. 42, May 1975.

¹⁰ The Report suggested that the Government should be prepared to finance over a longer period pilot projects costing up to \$100m. each.

Australian reserves, if available, coming in at a later date, and Western Australian reserves available *after* that. Yet Perth would want to see the North-West Shelf developed before then; and the potential developers would not want to wait that long. It has been suggested that eastern states gas distributors might pay the potential developers to keep their reserves in the ground for subsequent use in the east.

In a monograph on Natural Gas Policy for Australia,¹¹ Foster says:

Australia has at present no natural gas policy in name, but a policy exists nevertheless. It consists of many decisions in many areas which, deliberately or inadvertently, influence the way the natural gas industry grows and operates. It is a *co-ordinated* natural gas policy which Australia lacks. This paper seeks to develop a co-ordinated policy based on the elimination of existing constraints and distortions, free operation of market forces wherever feasible, and limitation of government involvement to those areas where the market cannot achieve the results required by society.

A number of recommendations on natural gas policy are made, including the recommendation that a bipartisan energy policy be sought with the federal government initiating discussions with the leader of the opposition (at present the Hon. W. G. Hayden) and the Shadow Minister for Minerals and Energy (at present the Hon. P. J. Keating), and that these develop into regular and frequent discussions on significant long-term issues in energy policy.

Foster recommends that encouragement be given to exploration for natural gas:

- (a) That acreage be made available to potential explorers on the basis of the best work programs submitted, subject only to confirmation of the technical competence and financial strength of the participants.
- (b) That there be minimum discrimination against foreign companies.
- (c) That areas of the Barrier Reef Province that overlie sedimentary basins and are remote from reefs be opened to exploration specifically for gas.
- (d) That special efforts be made to upgrade the sedimentary basins currently considered to be of such low prospectivity that the private sector is unwilling to explore them. Government geological survey and geological information collection activities be expanded to include reconnaissance seismic surveys and stratigraphic drilling in such cases.
- (e) That exploration expenditure continue to be deductible against income from any source for the purposes of calculating company tax, and from any petroleum production income for the purposes of calculating resources tax (if introduced).

¹¹ Committee for Economic Development of Australia, Monograph M54, Energy Background Report No. 8, 10 May 1978.

- (f) That government agencies, including gas utilities, be not inhibited from participating directly in exploration, provided they are subject to the same rules as other explorers.
- (g) That all exploration knowledge be placed on open file not more than two years after date of acquisition.

The next recommendation is for development of gas discoveries:

- (a) That cash flows from gas development projects be protected from taxation until pay-back is reached, by allowing capital expenditure as an expense item in the calculation of company tax.
- (b) That funding of gas development outlays be protected from the operation of the Variable Deposit Reserve scheme.
- (c) That present value of gas development ventures be enhanced by allowing capital outlay to be expensed against income from any source in the calculation of company tax (as already introduced).
- (d) That capital expenditure for gas field development be deducted before calculating resources tax (if introduced) on any petroleum income of the same company.
- (e) That there be no discrimination against foreign companies in terms of equity proportion held.
- (f) That dividend withholding tax for foreign companies be replaced by an equivalent which is applicable to repatriation of both dividends and profits.
- (g) That entry by foreign technical experts be neither prohibited nor delayed.

Foster favours the maintenance of a free market for gas, and the free negotiation between producers and customers (or gas distributors and large-scale consumers) without government interference. He suggests:

- (a) That there be no action by government to supplant the energy buyer's freedom of choice by imposing end-use allocation on gas sales.
- (b) That there be no action by government to limit a gas distributor's ability to set prices to its customers.
- (c) That gas-liquid prices be freely negotiable, without price fixing, end-use control, export restriction, excise levies, or other forms of government intervention.
- (d) That the subsidising of the major competitor to gas, fuel oil, be eliminated—by bringing indigenous crude oil to full import parity as soon as feasible after 1980, thus eliminating the need for crude oil allocation with its attendant distortions.
- (e) That the powers of the Pipeline Authority to set gas prices or to direct gas-liquids specifically to motor-spirit production be repealed.
- (f) That natural gas and gas-liquids be proscribed from the jurisdiction of the Prices Justification Tribunal. [Since Foster's paper was written, there has been a major reduction in the Tribunal's powers.]

The monograph suggests that gas exports be allowed in particular circumstances defined in advance: that Australia export gas to the energy-short world, except where such export is contrary to our own long-term interest, and that all gas liquids, in excess of Australian requirements at free market price, be available for export. He suggests that all gas discoveries in the south-eastern portion of Australia be reserved for use within the country, subject to possible exception on a case-by-case basis and that half the gas discoveries in the northern and western parts of Australia be available for export, with possible additional availability on a case-by-case basis.

The protection of flexibility in gas transport is endorsed. The author does not wish to see gas transport subsidised, but would hope all pipelines would be constructed against throughput contracts sufficient to permit cost recovery. He would like to see all long-distance pipelines licensed as common carriers, with the Pipeline Authority's Act amended to make it a common carrier.

Foster endorses the initiation of research into natural gas substitutes and hopes that ultimately a gas-from-coal industry will develop. He suggests that overseas work be used to best advantage; and that local effort be as broadly-based as possible in terms of participants but narrowly-targeted to get the maximum return from limited available funds. He hopes that government research agencies will stay abreast of overseas research progress in conversion of coal into substitute natural gas and that these government research agencies will test the applicability of new overseas conversion techniques to specific Australian coals at laboratory and pilot-plant scale. He would like to see private enterprise encouraged to build pilot-scale and demonstration-scale substitute natural gas plants by allowance of the outlay as a deduction against taxable income from any source in the calculation of company tax and, if introduced, resources tax. He recommends that gas distribution utilities, government or private, should not be inhibited about participating directly in research, technology-development, or pilot and demonstration-scale plant operation, and that academic research groups should be encouraged to conduct basic research in selected aspects of coal conversion, both in-plant and *in situ*. He suggests that governments should develop and maintain a register of field intersections of uneconomic coal as a first step in the ultimate development of *in situ* coal gasification.

The monograph recommends that the exploration for coal by private enterprise be allowed and encouraged in all states; that tenure in coal discoveries be secured; and that companies be allowed to mine their own coal for use in their own conversion plants. The author suggests that the development of the fiscal and environmental rules which will ultimately apply to conversion plants be begun now; that opportunities for early production of substitute natural gas as a by-product of solvent-refined

coal or oil-from-coal projects be sought; and that neither private-enterprise companies nor gas utilities be inhibited from participating in the production of substitute natural gas.

Foster suggests some administrative changes in the energy field:

- (a) That at both federal and state levels, the regulatory (legislative, licensing, monitoring and data gathering) and participatory (planning, policy, development, direct involvement in energy research and production) portions of government functions be separated in different branches or departments.
- (b) That at the federal level, the division of responsibility between the two energy-related departments (National Development, Trade and Resources) be rationalised so that for the present one covers all regulatory, and the other all participatory, functions; and that when feasible, participatory functions be transferred to a new Federal Department of Energy, leaving only regulatory functions in the hands of a non-specialist Department of National Development. A single Minister could then control both federal departments.
- (c) That at the state level, separate branches be established of a single Department of Minerals and Energy (or equivalent) to administer the separate functions, and that the participatory organisations of each state be supplemented by a State Energy Advisory Council representing energy producers, distributors, and consumers plus broader community interests.
- (d) That the planning/policy energy organisation of the federal government be supplemented by a National Energy Policy Institute with a full-time chairman and secretariat, and a membership representing both the energy industries and community interests; and that the National Energy Advisory Committee (N.E.A.C.) be transformed into the more formally independent, strongly staffed, and heavily funded National Energy Policy Institute.

One of Foster's recommendations was that exploration for natural gas be increased; in fact the gas which Australia has discovered may perhaps be regarded as a by-product of the search for oil.

Exploration for petroleum (oil and gas) is once more increasing. In 1978 more exploration wells had been completed or were in progress than in any of the past three years. Although there is interest onshore in the Cooper Basin of South Australia and in the Surat Basin of Queensland, the main activity is offshore in Western Australia. One factor encouraging such exploration is that the federal government has approved exports from the North-West Shelf, so companies finding gas have some hope of development.

Another inducement is the government's agreement that new oil discovered should attract import parity price. Another is the apparent ready market for new oil discoveries in Australia. About fifty

companies, in various groupings, are preparing to spend up to \$400m. on exploration offshore in the west.

This figure of \$400m. has received considerable publicity, but its firmness, and the time period over which it will be spent, are not usually mentioned. It is the total of successful bids made by companies for exploration acreage, and is thus the sum that will be spent over six years provided companies execute the exploration programs they plan at this stage. Since, however, they can in general relinquish their acreage at almost any time, there is no guarantee all that money will be spent. A company drilling a series of successive dry holes may not wish to keep to the full 6-year evaluation program. If they do, at the end of the 6-year program they relinquish half their acreage.

Which companies are exploring? There are five blocks in the Exmouth Plateau region, the two southern ones being held by Esso/B.H.P., the successful Bass Strait partnership. One is held by a consortium led by Philips—other members being Mobil, Gulf, B.P. and M.I.M. A primarily Canadian group, headed by Hudson Bay, holds a permit with A.O.G. The northernmost area of the Exmouth Plateau is held by the Woodside group. North of the plateau is an area held by Shell/B.H.P. and Getty. Getty is also active elsewhere in offshore Western Australia. Woodside and Wapet have various areas, and Western Mining Corporation and Esso hold Abrolhos acreage. Esso has already had gas shows in that area. Other companies exploring are Conoco, City Service, Canadian North-West Land and the Australian company Magnet Metals.

One problem for governments wanting to encourage petroleum exploration is to determine the tenement areas that will be offered. Where large areas are held for a long time by a few operators, this may slow down exploration. If areas are too small, or if expenditure requirements are too great, companies may not be interested in taking up areas.

One reason why areas have recently been available in the north-west is that large acreages were relinquished by companies such as Wapet and the Woodside group when, for political reasons, development prospects seemed less favourable.

The north-west is regarded as being geologically similar to the North Sea. Ten years ago, the North Sea's exploration record was of major gas discoveries, with only small oil finds. Then, to the north of known gas fields, major oil finds were made, and it is widely believed that there will be further major oil discoveries.

A factor important in the revival of Australian exploration is the recent revolution in interpretation of seismic data. Current tenement holders are able to reprocess the results of earlier seismic surveys available to them.

In addition to improvements in the processing data, the quality of

data acquired has improved over the last four or five years. On the North-West Shelf, for instance, re-surveying has brought improved data, although this has not been the case for all areas.

It is important to distinguish between discoveries which are economic and those which are not at present commercial, because of either technical or economic inaccessibility. About a quarter of the wells that have been drilled on the Shelf have struck oil or gas, but not all of these are currently regarded as commercial discoveries.

The Exmouth Plateau is considered highly prospective, and the first few wells to be drilled in its deep waters may indicate whether it is likely to be a major source of oil or gas. Even if discoveries are made, there will be difficulties in development. Water depths range from 700 to 2000 metres and deep water costs are likely to be so high that for a field to be commercial it would need reserves of around 500 million barrels, and it would need to be able to sustain a high production rate.

It is impossible to generalise too far on costs, as the shape of the field can be important—a deep, narrow, vertical field may need only one production facility, whereas a flat field may require several. The high rate of productivity is important because it allows rapid recovery of development costs.

Of course, technology in the petroleum industry changes rapidly and new techniques of exploitation could be developed. This has already happened for somewhat shallower waters, where it is now possible to exploit small fields, previously considered uneconomic, using seabed installations both for the well-head and for tanker loading. Esso-B.H.P. plans to use seabed installations to produce from small structures in Bass Strait—structures with reserves as low as 20 million barrels, or two months of current Australian production.

If similar technology can be used in deeper water, then offshore exploitation may cease to be so expensive relative to onshore production.

This exploration boom is occurring despite the fact that the federal government had been considering the imposition of resource rent taxes, initially on old oil and uranium, but realists in industry were aware that such a tax, once imposed could be readily extended. The petroleum industry hoped that if it were imposed, it would be designed in consultation with industry, to have minimum impact on investment decisions; they also hoped that if it were imposed it would replace the existing crude oil levy. Now it has been announced there will be no such tax.

If exploration and taxation are discussed together, there are three important points that have to be made. The first is that exploration will occur only if companies see some profit proceeding from development, and that profit has to be high enough on successful fields to cover the costs of unsuccessful exploration. This is a very risky business, and

hundreds of millions of dollars can be spent without success, so companies need to see a chance of sufficiently high profits on their successful exploration to make the risk worthwhile.

The second point is that it is profits that provide the funds for future exploration. The third point is that exploration funds are committed on a global basis, and if Australia's overall situation offers no incentive there will be no exploration. Australian consumers can thus suffer in the long run from over-taxation of the industry.

For the last few years, Australians have been at least partly insulated from the world energy crisis. If the current level of exploration is successful, such partial insulation may continue. However, some of the questions the government might ask are—

- (i) Is the nation prepared for either a disruption to supply of imported fuel or a substantial price rise?
- (ii) How does Australia see the changing balance of power? What is the nation's attitude to funds invested abroad by Middle East countries? There will be surplus funds seeking outlets. Is Australia prepared to (a) have Middle East governments own and operate Australian pastoral properties; (b) enter into mineral processing operations with Middle East governments, either here or abroad; (c) use Middle East-owned shipping and airlines; (d) permit portfolio investment in a wide range of Australian industry by Middle East governments?
- (iii) Should Australia be spending significantly more on research on alternative uses for her coal reserves, e.g. on coal liquefaction and gasification, with a view to selling either the technology or the product abroad? (This is the type of approach envisaged by the coal research levy, but its ultimate success cannot, of course, be guaranteed in advance.) Or should Australia be prepared to buy technology and equipment overseas, as envisaged by government enthusiasm for links with West German interests?
- (iv) Should Australia be spending significantly on solar energy research, and/or prepared to purchase technology and equipment overseas?
- (v) Should Australia be looking towards co-operative efforts with other countries in energy research?
- (vi) What are the implications of the world energy scene for Australia's defence planning? What should she be doing in/about Antarctica?
- (vii) It has been said 'Energy Saved is Energy Supplied'. Should Australia be following countries such as Canada in efforts towards more efficient *use* of energy?
- (viii) The government has looked at the international consequences of uranium policy and has judged that export (with safeguards) is necessary for world peace. Not all Australians support such

export. Potential consumers (such as Iran) have balked at the safeguards (in Iran's case, the provision against reprocessing). Will the government be able to abide by its attitude?

The Australian government is prepared to participate in international energy discussions, and the Minister for National Development and the Secretary of his Department accepted invitations to participate in an international discussion at the East-West Center, Hawaii, in July 1978 to assess the prospect for formation of an Asia-Pacific energy studies consortium. Other delegates came from Canada, India, Indonesia, Iran, Japan, Pakistan, the Philippines, the South Pacific Bureau for Economic Co-operation, and the United States. There was a representative of the Circum-Pacific Council for Energy and Mineral Resources, and observers from Mexico, Kenya and France.

The proposed consortium is seen as perhaps considering:

- (i) growth of energy demand for meeting basic needs and related national development objectives, matching types and quality of energy to emerging demand requirements;
- (ii) changes in energy use, efficiency, substitution and equity in the rural agrarian sector;
- (iii) vulnerabilities of petroleum importing and exporting nations at all levels of development, to disruptions in the flow of petroleum;
- (iv) scale and duration of the environmental and social impacts of all energy technologies;
- (v) prospects for nations in the region moving to use alternative energy sources such as hydro-electric, geothermal, solar (including wind and ocean thermal) and biomass energy systems;
- (vi) decisions to develop nuclear energy generation, reprocessing and waste disposal systems at national and regional levels.

The consortium is seen as establishing an agenda for co-operative research to inventory and assess energy availability, needs, uses and development in the Asia-Pacific area. It is hoped that by balancing requirements for national energy self-sufficiency and the practicalities of regional interdependence, the consortium would develop planning and policy options for regional energy development, and help to decrease the uncertainty which now surrounds such options.

In introducing the conference, the Resource Systems Institute at the Center pointed out that the nations of the Asia-Pacific area have different degrees of energy self-sufficiency. Japan, the U.S.A. and most of the developing countries are heavily and increasingly dependent on imported oil. Others, such as Iran and Indonesia, are present or potential energy exporters. The countries of the area are thus interconnected within a system of energy production, processing, transfer and use. The system is evolving as each region's supplies and

demands alter, and most nations would like to increase the efficiency with which they use energy and thus decrease short- and long-term dependence on outside sources.

The Institute points to the strategic importance of energy supplies, which are so important to the welfare of every country that there is a large potential for strains in the relations among countries due to changes in the international energy system. The Institute also points out that the countries in the area have a common need to understand the systems sufficiently well so that each can modify its dependence on exogenous sources of energy, this modification taking the form of developing alternative sources, changing the mix of energy demands, or increasing the efficiency with which energy is used to satisfy human needs.

Since each country has its own set of energy problems based on its own particular requirements and resources, then in the short run at least the approaches to solving these problems will differ considerably among countries. Japan may thus need nuclear power on a large scale while the United States uses coal and shale and the U.S.S.R. uses oil. Diverse energy sources themselves are more useful for certain applications than for others. Crude oil, natural gas, oil shale, and coal probably should be increasingly reserved for chemical use as distinct from the production of heat and power. Nuclear energy is particularly suited for power production and solar energy for heating and cooling. The Institute suggests that, in general, each task must be examined to see what source is most suited to it, and an attempt made to achieve the maximum flexibility with the mix of energy sources available.

The Resource Systems Institute distinguished two types of change affecting the energy systems of the world and needing to be considered in effective planning. The first is the incremental change that occurs through the development of new kinds of technology, economic growth, shifts in population, the build up of adverse environmental feedback, the decay of natural ecosystems, and the gradual approach toward depletion of known energy resource deposits. The second comes from sudden changes due to a discontinuous rise in world energy prices, imposition of trade barriers, international conflicts, bad weather, nuclear accidents and so on. The relative impacts of these two kinds of change will vary among nations, but failure to consider and guide the coming incremental changes in the best way possible will not only increase each country's vulnerability to sudden changes but will also increase the likelihood of their occurrence. The Institute suggests that, no matter what its long-term economic, political or technical goals may be, each country needs better information about the character of these incremental changes, for such information reduces uncertainty.

One of the countries missing from the official list of Pacific countries at the East-West Center Conference is Australia's neighbour, New

Zealand, which contemplated joining the Australian Federation before it was forged in 1901, but decided against the move.

Unlike Australia, New Zealand has been vulnerable to rapidly rising oil prices. By 1975, the value of oil imports represented over 20 per cent of export receipts. Volumes were subsequently reduced so that the proportion fell to just over 15 per cent in 1977. (The average in the ten years to 1973 was between 5 and 6 per cent.) New Zealand imports 87 per cent of her oil requirements, and transport (accounting for 71.5 per cent of oil consumption) depends on liquid fuels.¹²

If New Zealand wants to reduce her requirements for imported oil, she has to divert natural gas to the transport sector from the thermal power stations currently planned. Small hydro schemes could be substituted but these have implications for land use. Nuclear power may be a long-term possibility depending on the outcome of a Royal Commission.

The New Zealand government issued a Public Discussion Draft in an attempt to achieve a national energy strategy. It discusses all forms of energy, including wind, biomass, hydro, solar, nuclear and geothermal power. The Draft looks at policies for specific energy sectors such as gas and oil.

With a long-term perspective, the government has decided not to permit L.P.G. exports—and has insisted on holding a 50 per cent participation in commercial proposals now being developed at Maui that will enable the integration of marketing of L.P.G. from both Maui and Kapuni.

A study undertaken by the government has identified two possibly viable uses of Maui gas in the production of nitrogenous fertilisers and methanol, both of which would require substantial investment in plant. Research is proceeding on the technical feasibility of running cars on blended fuel containing up to 15 per cent methanol.

On oil, the Draft suggests that although the Great South Basin has promise of being a big commercial oil field, the basin lies in the Roaring Forties and is subject to some of the roughest wind and sea conditions in the world. To explore in such conditions at a water depth exceeding 500 metres with prospective structures 150 km from land would require major technological advances—but then technology in the world petroleum industry can change rapidly.

The New Zealand Minister of Energy, George Gair, has expressed the hope that a consensus on a national energy strategy can be reached by the time of the fourth New Zealand Energy Conference in 1979. The following guidelines have been proposed:

- (i) To ensure that a long-term view is taken in evaluating projects

¹² New Zealand Planning Council, *Planning Perspectives, 1978–83*, March 1978.

involving the consumption of energy resources, giving preference to the use of renewable resources.

- (ii) To join with other nations to work towards an improved international energy situation.
- (iii) To promote public understanding and acceptance of the need for conservation and efficient production, distribution and consumption of energy.
- (iv) To achieve an organisation of the energy sector capable of the most efficient production and distribution of the various forms of energy.
- (v) To establish arrangements for developing energy plans which ensure that they are consistent with broader economic and social objectives.
- (vi) To ensure that effective procedures are used to evaluate the environmental impacts associated with energy developments.
- (vii) To encourage exploration to determine the nature and extent of the nation's energy resources.
- (viii) To promote research and development into new techniques for producing and conserving energy.
- (ix) To achieve a pricing structure for energy that encourages conservation and the use of the most economic energy form.
- (x) To facilitate and encourage the use of coal and natural gas where they can replace oil and electricity.
- (xi) To reduce the nation's, and particularly the transport sector's, dependence on oil.

The range of energy choices open to New Zealand was the subject of scenario studies by an energy research group funded by the New Zealand Energy Research and Development Committee. The group included two engineers, a mathematician/scientist, an economist and a geographer/sociologist. It was joined on an occasional basis by two Treasury economists and other experts.¹³

In Chapter 6, the technique of discounted cash flow analysis used in company planning was outlined, but it was mentioned that scenario planning was also used in the current uncertain situation. This New Zealand study illustrates the scenario approach.

In this research, three scenarios were considered from the given data base. The first emphasised economic growth, led to a high rate of energy consumption, and was labelled the *Continuation* scenario. The second emphasised the control of environmental pollution, and was called *Low N.Z. Pollution*. It led to significantly lower energy consumption. Energy consumption between these two extremes was given by the third scenario, where the dominant concern was with the depletion of non-

¹³ R. F. Meyer, 'Energy and New Zealand', *New Zealand Engineering*, 15 May 1977.

renewable resources. This was called the *Limited Growth* scenario. The energy growth rate is thus linked with the economy, environmental quality, and lifestyle.

In the particular model generated, in the year 2025 the electricity consumption in *Limited Growth* and in *Low N.Z. Pollution* is 15 and 33 per cent respectively of that in *Continuation*. Hydro-electricity dominates in *Low N.Z. Pollution* and *Low Growth* throughout the 50-year study period. Nuclear dominates *Continuation* by the year 2025.

Under *Continuation*, standards of home heating and the use of labour saving devices by all sections of the community will rise considerably. Similar standards of comfort and convenience are expected to prevail under *Low N.Z. Pollution*, which emphasises more efficient use of energy. Under *Limited Growth*, energy use is not expected to rise significantly, and any increase goes to groups currently living in poor conditions.

Continuation sees a rise in air travel and in car ownership and use; under *Low N.Z. Pollution* increases are less than in *Continuation*, while under *Limited Growth* the use of cars falls below the 1975 level, with public transport maintaining personal mobility but saving energy.

Nuclear power is required only by the *Continuation* scenario. Under *Low N.Z. Pollution*, for example, the gross national product per head is projected to increase threefold between 1975 and 2025 without the use of nuclear power.

The study suggests that several policies might reduce future primary energy needs per unit of national income while still maintaining economic growth. The suggestions made are similar to ones that have been recommended—and in some cases tried—in Canada. They are:

- (i) To employ conservation measures and new technologies to reduce energy requirements in industry, transport, offices and homes.
- (ii) To increase the efficiency of conversion of primary energy into consumer energy.
- (iii) To find substitutes for energy-intensive imports.
- (iv) To export some primary products before energy-intensive processing, and process other primary products to a higher stage, beyond the energy-intensive stage, in order to raise the ratio value added to energy used.
- (v) To restructure industrial development towards manufacturing industries that do not have a heavy direct and indirect requirement for energy and which collectively earn sufficient foreign exchange to finance their own import requirements.

The first of these suggestions, concerning conservation, was the subject of one of the *Reports* of Australia's National Energy Advisory Committee (N.E.A.C.).

In the preface to the report the committee gives five reasons for its conviction that a major program should be undertaken to conserve

energy, especially oil. These were:

- (i) That Australia will become increasingly dependent on supplies of imported crude oil.
- (ii) Crude oil is a finite resource.
- (iii) The price of crude oil is expected to continue to rise.
- (iv) The cost of the imported crude will represent an increasingly large item in the Australian balance of payments.
- (v) Conservation, in a comparatively short time, can be effective in reducing our consumption of crude oil.

After the time and money N.E.A.C. had consumed in its deliberations, this was a somewhat pedestrian beginning, and the rest of the document did not add very much more to what was already widely known.

The Report, *An Australian Conservation of Energy Program*, has made what the Committee calls 'first stage proposals', which amount to increasing community awareness of the energy problem through education and good example.

The main proposal that a national energy conservation program be instituted in collaboration with state governments has been accepted by the commonwealth but as yet no announcement has been made on the proposals for an energy conservation advisory service for industry, training programs on energy conservation for the public¹⁴ and demonstration by government departments of proper energy management in their own establishments, such as would set an example and provide useful guidelines for other sections of the Australian public.

The *Report* also recommends the promotion of a national publicity campaign to inform the public of the need to conserve energy and, in particular, oil, for Australians have become accustomed to low-cost fuels. However, recently announced increases in the price of indigenous crude oil may have some conservation effect, and the *Report* suggests the federal government should begin studies to estimate this effect.

The committee said it was difficult to be quantitative about the likely reduction in demand for imported oil. It said, however, that if Australia could achieve a saving of 15 per cent in its prospective oil demand for 1985, this could save \$600 million. It pointed out that many transport management practices and legislative provisions for transport lead to waste of energy and recommended that legislative impediments to car pooling should be removed and that governments should make a detailed study of desirable future fuel economy standards for new motor vehicles and should prescribe design standards. It also suggested that energy costs in government transport systems should be reviewed.

The National Energy Advisory Committee has twenty-one members

¹⁴ Canada has been active in both domestic and industrial energy conservation programs.

from government, industry and universities. There have been some changes in its membership over its life. Its terms of reference state its function as to advise the Minister for National Development on matters relating to energy including:

1. Australia's energy reserves;
2. factors likely to influence—
 - (a) the pattern of energy supply and demand in Australia,
 - (b) the future costs of energy in Australia,
 - (c) the assessment and development of Australia's energy resources, and
 - (d) the economy of use of energy in Australia;
3. the balance of resources for research relating to the development of energy sources in Australia; and
4. developments in Australia and overseas in respect of methods and technology associated with the production and distribution of energy.

Another Committee established to advise the Minister for National Development is the National Energy Research, Development and Demonstration Council. This has twelve members, and is thus likely to be more of a working committee than N.E.A.C. (although both have sub-committees). N.E.R.D.D.C. met for the first time in mid-1978. Members are drawn from government and industry, with one academic member. The Council has a more specific role than N.E.A.C.—its terms of reference are as follows:

The Council shall advise the Minister for National Development on the development and co-ordination of a national program of energy research, development and demonstration in Australia. In particular the Council shall provide advice in the following areas:

A. Co-ordination of the Government's overall effort in energy RD&D

1. The council shall examine the nature of all energy RD&D projects undertaken with energy as a principal aim and supported by Government funding provided for that purpose and advise the Minister on—
 - (a) the extent to which such energy RD&D projects reflect the priorities established by the Minister
 - (b) the existence of any established priority areas of energy RD&D which are being neglected
 - (c) evidence of any unnecessary duplication of effort
 - (d) any variations which in consultation with NEAC it believes desirable in the existing energy RD&D priorities already established.

In performing roles (a), (b), (c) and (d) the Council will recognise the need for Commonwealth Departments and Instrumentalities to undertake work which flows from their particular responsibilities.

B. Support for Individual Projects

1. The Council shall call for proposals to undertake projects of research, development or demonstration in any field of energy.
2. The Council shall assess these proposals on the basis of their merit and in terms of priorities established from time to time by the Minister and within the limits of money made available by the Commonwealth.
3. The Council following such assessment shall recommend to the Minister an appropriate level of funding for each project.
4. The Council shall recommend that the funding of any project should have attached to it such conditions as the Council deems appropriate.
5. In the case of major demonstration projects which would entail expenditure beyond the normal range of funding, the Council may advise the Minister of the desirability of making a submission to the Government for special additional funding.
6. In areas established as being of high priority the Council may advise that in the absence of suitable project proposals, the Minister should commission research projects on a contract basis.

C. Support for International Projects

1. The Council shall when requested, advise the Minister of its assessment of energy RD&D projects involving other countries for which it is proposed that the Australian Government should provide support pursuant to its participation in international agreements or its membership of international bodies or otherwise.
2. The Council shall take note of the terms of Australian Agreements with other countries and international organisations which involve cooperation in any field of energy RD&D. (The Department of Foreign Affairs will be co-opted when projects involving other countries are considered.)

D. Annual Report

1. The Council shall report annually to the Minister on its activities.

What funds does the Commonwealth make available for energy research? The Minister for National Development, the Hon. Kevin Newman, said in a press statement of 15 August 1978:

About \$15 million will be available in 1978/79 to encourage a major expansion of energy research and development in Australia. The Budget makes a cash provision of \$4 million for research grants expenditure in 1978/79 and to cater for longer term projects, the Government is prepared to commit a further \$5 million against expenditure in future years. Additionally about \$6 million, representing accruals and reserves in the Coal Research Trust Account, will be available for coal research. Grants from these funds, which will be allocated on advice from the recently

established National Energy Research, Development and Demonstration Council, will enable the Commonwealth Government to greatly expand its support of energy research, development and demonstration projects. These funds are in addition to those available to CSIRO, the Australian Atomic Energy Commission and other Commonwealth authorities, which in 1976/77 expended a total of about \$14.5 million on energy research and development. The additional funds not only represent a very significant increase in Commonwealth support generally but also provide for a substantial broadening of opportunity to encourage more research by a wide range of interested groups, including State bodies and private enterprise.

The Minister also reported that agreements on coal research had been concluded with the U.K. and the U.S.A., that a solar energy agreement was currently being negotiated with the U.S.A., and that an agreement had been concluded with Japan to co-operate in the fields of coal utilisation, solar energy, and energy conservation. He said that 'Australia must maintain a significant energy research and development effort of its own in order to participate in joint projects and appreciate information we gain from other countries'.

In Chapter 11, which deals with the Role of Government, the problems of federalism will be considered. Chapter 9, which deals with Mining and the Environment, illustrates the duplication of responsibilities between two levels of government. In the energy field, there are state advisory committees as well as national committees, which is not surprising in the light of the states' historical and continuing responsibility for supply of some forms of energy. The state committees have diverse functions although some—such as public education or energy conservation, and liaison with N.E.A.C.—are common to two or more.

Victoria has a Brown Coal Research and Development Committee. Large areas of Victoria's brown coal deposits are in the hands of the State Electricity Commission, which generates electricity in the La Trobe Valley. However private enterprise has some areas—Alcoa generates power at Anglesea for its Point Henry smelter. Western Mining Corporation, B.H.P. and C.R.A. have all been interested in leases, presumably because of possibilities of alternative uses for brown coal—for metallurgical coke, for liquefaction and for gasification.

Victoria also has a Solar Energy Research Committee, with eight members, predominantly from government, although there is one member from the academic world and one from private enterprise. Both of these members have had some experience in solar energy research. This Committee's terms of reference are to:

1. review all solar energy research being carried out in Australia with particular reference to research being done in Victoria

2. advise the Government how best to support the most promising lines of research
3. maintain constant liaison with any Australian Committee whose terms of reference include solar energy e.g. the National Energy Advisory Committee
4. act as the official Victorian Government body for publicising ways in which solar energy can be used now by the public and industry and to inform the public on a continuing basis of the realistic contribution that solar energy can make to Victoria and Australia's energy resources
5. submit an annual report to the Minister for fuel and power.

Western Australia has a Solar Energy Research Institute which is subject to the Minister for Fuel and Energy. The Institute is controlled and managed by a 3-member Board of Directors assisted by a 9-member Solar Energy Advisory Committee drawn primarily from industry and tertiary education. The functions of the Institute are to:

1. encourage solar energy development
2. undertake research projects in its own right
3. carry out investigations referred to it by the Minister
4. coordinate solar energy research where appropriate in Western Australia
5. receive funds from the Government, industry and other sponsors and to allocate such funds to approved research projects undertaken by outside organisations
6. monitor and evaluate solar developments nationally and overseas
7. maintain a collection of relevant data on solar energy and to promote public awareness of solar energy
8. confer and collaborate with the State Energy Commission and other appropriate bodies within the State and elsewhere.

New South Wales has a Solar Energy Advisory Committee, formed within the State's Energy Authority. The Committee has four members—three state public servants and one academic.

Tasmania's Energy and Resources Committee is chaired by the state Minister for Resources and Energy, and its three other members are state public servants—the Director of Mines, and the Chairman of the Rivers and Water Supply Commission, and a Commissioner from the Hydro-Electric Commission. The terms of reference of the Committee are to:

1. collate known information about Tasmania's minerals and energy requirements and to fill in any gaps in that information. It would seek advice from industry leaders and academics, involved in energy issues, where necessary;
2. liaise with the National Energy Advisory Committee;
3. stimulate awareness of energy issues, including energy conservation.

Queensland has an Energy Resources Advisory Council under the chairmanship of the Under Secretary of the Department of Mines. It has no industry representatives. This Council's terms of reference are:

1. To inquire into and advise on specific energy resources aspects as may be directed by the Minister;
2. Of its own initiative to inquire into and advise the Minister on relevant energy resources matters;
3. To collect and disseminate data on Queensland's energy resources both primary and secondary, and their economic importance to the State;
4. To compile and distribute estimates of future production and consumption of Queensland's energy resources (both primary and secondary);
5. To obtain and submit information on the relative costs of all sources of energy in Queensland;
6. To advise on the progressive exploration of Queensland's primary sources of energy in order that information on such resources is available well in advance of possible requirements;
7. to recommend in advance, plans for the optimum use of all sources of energy in order that they may be utilised to the greatest benefit of the State. This will involve the reconciliation of forward estimates of production and consumption of energy;
8. To liaise and exchange statistics and reports with similar organisations within the Commonwealth, also overseas and international organisations. (Close liaison is maintained with the Australian Minerals and Energy Council Advisory Committee and the National Energy Advisory Committee);
9. To prepare reports to the Government providing a review of sources of energy, and containing up-to-date statistical information on Queensland's energy resources, their production, consumption and price.

South Australia has a State Energy Research Advisory Committee, S.E.N.R.A.C., whose functions are similar to those envisaged for the federal N.E.R.D.D.C. It is to assess research projects undertaken in South Australia and to advise the government on those projects which could usefully be assisted. The chairman is the Director General of the South Australian Department of Mines. There are eleven other members, of whom most are state public servants, although there are representatives of universities and industry. This Committee is unique among those mentioned in that it has amongst its members a representative from the Department for the Environment. S.E.N.R.A.C. expects that the underlying scientific/technical concept of the research project under consideration will be already proven. It expects the research project to have the potential of making a useful contribution to South Australia's future energy problems. Such problems include the high peak summer demand for electric power, the growth in the rate of increase of electricity consumption, alternative fuels for transport and agricultural machinery, and ways of overcoming

the technical problems associated with the use of South Australian coals for electricity generation. S.E.N.R.A.C. considers the length of time expected to elapse before the technology or process can be applied on a commercial scale. Applicability of the technology in South Australian projects which have a potential of leading to manufacturing within South Australia have been given preference over those which showed no such potential. To achieve maximum cost effectiveness, S.E.N.R.A.C. has decided not to recommend the allocation of South Australian government funds for meeting wages or salaries of researchers who are permanent employees of an organisation or company under whose auspices a research project is to take place.

As can be seen from Victorian, N.S.W. and Western Australian interest, state governments are interested in solar energy research, including research within their own state, elsewhere in Australia, or overseas.

The federal Department of National Development in June 1978 produced *A Directory of Australian Solar Energy Research and Development*, with assistance from the federal Department of Science, the Australian and New Zealand Section of the International Solar Energy Society, and CSIRO. The Directory lists a total of 143 active solar energy research projects in Australia. Of this total, 30 are being carried out in the CSIRO, 80 in universities and other tertiary education bodies, 19 in industry and 14 in government organisations (other than the CSIRO). Most activity is in the area of collector technology (41 projects) but considerable effort is being devoted to research into heating and cooling of buildings (24 projects). Other areas distinguished included photovoltaic conversion (17), water heating (13), photochemical processes (12), solar radiation (11), biomass production of electricity by thermal methods (7), biochemical conversion (4) and effects on other energy systems (3).

In the long run, Australia may find that the most efficient means of acquiring economic solar energy technology is to import it—although this view ignores any non-economic benefits that may flow from national research. In the short run, Australia hopes her expenditure on energy research will result in *her* owning the patents that will be in great demand internationally.

The argument for importing solar energy technology is analogous to the novel view of D. J. Nicklin that when 'the option of building coal conversion plants is compared with a policy of "converting" coal or gas to oil by international trade, the latter is likely to be the best alternative'.¹⁵

¹⁵ D. J. Nicklin, 'Energy Conversion—A Chemical Factory or the International Market Place', *Chemeca 78—The Resources Challenge*, Report of the 6th Australian Conference on Chemical Engineering, Royal Australian Chemical Institute, Surfers Paradise, November 1978.

In addressing the question of whether the international market place was the preferred route for coal conversion, Nicklin assumed (i) that production costs for Australian coal are \$15 per tonne, at the wharf; (ii) that half of any excess of export price above \$15 would be transferred overseas, i.e. tax rate of 50 per cent and 100 per cent foreign ownership; and (iii) that 3 tonnes of coal are required as raw material to produce one tonne of synthetic crude. He then considered four processing costs for coal conversion plants, ranging from \$0 to \$250 per tonne of crude produced, but regarded \$120 as the best current estimate. He converted this to 'equivalent tonnes of coal' by dividing by \$15.

Nicklin used these figures to show 'how unlikely it is that coal conversion will be competitive in Australia if *crude oil continues to be a product of world trade*'. He regarded stockpiles as 'the cheapest, most flexible, and most convenient way of providing security of supplies in the event of a war or embargo'.

If coal cost was \$15 per tonne at the wharf, but could be sold at \$25 per tonne internationally, then Nicklin regarded synthesis of crude oil in Australia as competitive only with a doubling of the world price of crude oil and a halving of the cost of synthesis. Even if there were no synthesising costs, with current oil prices, and coal costs of \$15 per tonne, and export prices of \$35 per tonne, a conversion plant would be neither thermodynamically nor economically efficient compared with trade. Synthesising 1 tonne of crude would require 3 tonnes of coal, importing 1 tonne of crude would require only 2.8 tonnes of coal.

The above model is a simple one. It assumes Australia as a coal producer is too small to affect the world price. It assumes there are no problems in marketing coal. It extrapolates a steady state situation.

Although making different numerical assumptions alters the break-even point, it does not alter the basic point that Nicklin is making—that in considering the technical efficiency and relative economics of various processes for converting coal to liquid fuels, we might consider what he calls 'trading plus stockpiling' along with other options such as gasification followed by synthesis (the route used by South Africa's Sasol plant); direct hydrogenation, dissolution followed by hydrogenation and pyrolysis followed by hydrogenation.

A few years ago, commentators were suggesting that environmental concern overseas should mean Australia had more opportunities to process her minerals and should avail herself of them. Now it appears that energy shortages overseas may mean location of processing facilities in Australia to take advantage of our coal and gas supplies. In the aluminium industry there appears some truth in this. However, in a period when many countries of the world are concerned about employing their work force, the most Australia might notice is increased demand for energy exports—but even there, she has plenty of competition.

9 Mining and the Environment

Australia has not been shy in joining other industrialised nations in their increasing awareness of environmental problems. Like other countries, she has seen some public demand to subordinate the goal of economic growth to a goal of improving the quality of life, a somewhat nebulous concept which, however, certainly envisages more concern with environment and conservation than was evident till the last decade.

The first Australian moves in environment protection were made at a state level; then on 17 December 1974, the federal Environmental Protection (Impact of Proposals) Act became law; an amending Act was assented to on 19 May 1975. The purpose of the Act was to introduce the environment as a formal factor in Australian government decisions, through requiring environmental impact statements for certain projects, and where necessary, public enquiries. The range of projects within the Act's jurisdiction is limited by the Constitution but includes any projects by, for or with the Australian government; any projects directly involving Australian government funds; and any projects which require the approval of the Australian government.

Since the federal government has the power to control exports, including mineral exports, it can require environmental impact statements and institute public enquiries for new mining projects producing for export. The states, which control the issuing of production leases, and the conditions of development, including restoration, also have the power to seek environmental studies and hold public enquiries. Not surprisingly, there can be disagreements between federal and state governments on specific issues, and even where only one government is involved decisions may be difficult. In May 1975, for instance, the federal Minister for Environment, Dr M. Cass, clashed with the federal Minister for Minerals and Energy, Connor, over export of mineral sands from Fraser Island. The Prime Minister, his Cabinet, and eventually Caucus supported Connor. This clash was clouded by a matter of the relative timing of the issue of export permits and of environmental legislation,¹ but the technicalities could not hide the fact

¹ Export permits were granted only days before the Environment Protection Act became law, so the project concerned was legally exempt. Nevertheless, it was widely considered by environmentally-aware members of the community that the federal government had a moral responsibility to delay decision, despite commitments on long-standing leases.

that the federal government did not regard 'environmental considerations an overriding factor in Australian Government decisions' and that 'in some circumstances environmental considerations will be overridden by other factors which the Australian Government considers more important'.²

The attitude that environment is but one factor and must be considered with others is a rational one, particularly in a period when unemployment levels are high, but it can be abused. Where a government wishes to veto a project for political ends it can use the environmental factors as an excuse; where it wants to encourage a proposal for political or economic reasons it can claim these outweigh environmental degradation. In an area where judgment is at best subjective, political factors can be powerful.

The Alwest alumina project in Western Australia (which appeared to give state environment authorities no special concern) did not satisfy federal environment authorities (during the period of Labor government to 1975) that its side effects were tolerable. In particular, concern was expressed about its effects on the salinity of Perth's water supply. The Redcliff petrochemical project in South Australia was, however, after public enquiry considered acceptable on certain conditions. The two projects were of course in different states, and with different possible effects on major population centres; they were also differently regarded by the federal government on other than environmental grounds. The Alwest proposals were considered unsatisfactory because of the foreign equity content, while the Redcliff proposals received the personal approbation of the Minister, Connor. Neither project proceeded. After some years of delay, the world market situation is now such that the Alwest partners are anxious to proceed; the state government is anxious to encourage the development, for economic reasons, even though the salinity concern—and concern over dieback in Western Australia's jarrah forests—still exist.³ The Redcliff proposal has not proceeded.

The federal department reviewed both the Alwest and Redcliff cases before the Environment Protection (Impact of Proposals) Act was passed by Parliament. The department had also been involved more informally in the New South Wales government's public enquiry into sand-mining proposals for the Myall Lakes area, an allegedly unique area of high dunes and blackwood forest just north of the Newcastle-Sydney-Wollongong population concentration, and in demand for a

² Pamphlet on the Environment Protection (Impact of Proposals) Act, issued by the Department of Environment, June 1975.

³ The bauxite industry does not accept responsibility for initiating either the salinity or jarrah dieback fungus; see 'Trees as Important as the Minerals', *Mining Review*, May 1978.

national park. The lakes themselves were considered to be important as fish-breeding waters. Federal opinion was not important to either the hearing or the final judgment. The Bunning Report recommended that mining should be permitted in some of the lease area under consideration, but not in the remainder.

What requirements did the 1974 federal Act place on mining companies?

Any new proposals had to be referred to the Minister for Environment, who—presumably on departmental advice and perhaps on his political judgment on electoral repercussions—decided whether an environmental impact statement was required. The Notice of Intention could be brief, but was expected to contain maps, plans and photographs relevant to the project. Information was expected to cover both the actual site and its region and to canvass environmental effects. Notices of Intention were not normally offered for public review, which I considered unfortunate. If public discussion were allowed and encouraged at an early stage we could well save some of the considerable resources expended when the public receives information after both mining interests and government are well entrenched in their views. (Some companies well advised by public relations experts do not spring proposals on an unsuspecting public at too late a date—they present a persuasive case at the planning stage.)

If the public suspects a proposal is under consideration, it may enquire as to the Minister's intended action. Section 10 of the Act provides that the public is entitled to prompt response from the Minister to its written enquiry on 'what action, if any, has been taken or is proposed, to ensure that environmental aspects of any proposal coming within the scope of the Act are given adequate consideration.'⁴

Where an impact statement is required it is prepared by the proponent, not by the department. While this provision is laudable in that it saves public funds, it has its faults unless the department uses sufficient professional advice not only to review the statement, but also the basic data, as objectively as possible. The alternative is an enormous bureaucracy preparing statements (this could be at company expense) and the result need not be any more in the public interest. Such statements may not come any closer to perfect impartiality (impossible to define in this case) than those prepared by private companies or their consultants for government and public review.⁵

Impact statements are issued first as a draft, available for written

⁴ Ibid.

⁵ One effect of federal and state environmental requirements has been a 'backward linkage' effect—where consulting firms have employed biologists, engineers, psychologists, chemists and economists to service the new demand.

comment unless there is a need for confidentiality. Confidentiality can certainly be desirable for national security reasons, but government departments should not use this provision to preclude review of their favoured projects. Interdepartmental rivalry is not unknown, and each department regards its interests as paramount. Most departments and Ministers were not enthusiastic about having their proposals reviewed by the Minister for Environment and his department, a very junior department indeed in the traditional hierarchy, although in mid-1975 it enjoyed a brief claim to fame when it had the Deputy Prime Minister, Dr J. Cairns, and even the Prime Minister, E. G. Whitlam, as successive ministers for short periods because of political turmoil within the government itself.

From the viewpoint of the mining industry, the lack of cordiality between departments is an advantage, since the Minister for Trade and Resources may be prepared to approve export contracts even where the Minister for Environment recommends against it. Such differences between departments have continued through various name changes with changes in the government, e.g. the Liberal-N.C.P. government submerged its environmental bureaucracy in a large Department of the Environment, Housing and Community Development, while minerals and energy interests are now dealt with by the Department of Trade and Resources and the Department of National Development.

What happens when a draft impact statement is released to the public? Its release must be announced in the *Australian Government Gazette* and in appropriate newspapers. Advertisements summarise proposals, state where the draft is available, and give an address for the forwarding of written comments. A minimum of four weeks is allowed for comments. Copies of all comments are given to the proponent, who can amend the proposal. Unless a public hearing is required, the final impact statement is then prepared, assessed by the department and released to the public.

Whether a public hearing is required is decided by the Minister, who considers the relative significance of the proposal for the environment, whether all matters relevant to the proposal have already received sufficient consideration, and presumably also electoral pressures for an enquiry. Enquiries are to be advertised six weeks in advance, and the public invited to submit written views. These are for the most part available for public perusal. People who commented on the draft impact statement may be invited to comment further. The terms of reference of the enquiry and the appointment of Hearing Commissioners are the responsibility of the Minister,⁶ who may also appoint specialist advisers.

⁶ For examples of the *Reports* of enquiries see: Commonwealth of Australia, *Final Report of the Fraser Island Environmental Inquiry*, A.G.P.S. Canberra, 1976; *Ranger Uranium Environmental Inquiry First Report*, A.G.P.S. Canberra, 1976.

The Commissioners' findings and recommendations should be available within one month. The final impact statement is produced after the Commissioners' Report and shows how recommendations and findings of the Hearing Commissioners have been taken into account.

The final impact statement is publicly released before a decision is taken; the statement is also assessed by the department with any specialist advice it considers appropriate. A recommendation to the Minister is then made and perhaps accepted, but even that is not final, since his views are subject to Cabinet (and with a Labor government, Caucus) approval.

So after a long and tortuous process, expensive to both industry and the taxpayer, we have a political decision, subject to many outside pressures. But does this ensure that it is a better-considered decision than it would otherwise have been?

To the industry, federal legislation is an added burden in terms of expense and delay; it also adds to uncertainty. From the national viewpoint, since we are concerned with our environment, we do not need to be concerned that expense and delay exist but merely that they are minimised. The uncertainty too must exist, but we can ensure its disruptive effects are minimised. Specific policies, then, should ensure that state and federal environmental investigation are complementary rather than competitive, and that investigations are performed at the right stage of planning.

On the first issue, the federal Department of Environment said in 1975 that:

every effort is made to avoid duplication between the environmental requirements of state and federal authorities. Discussions with state authorities have led to basic agreement on what should be covered in impact statements, and close liaison is undertaken in an endeavour to ensure that, where two governments are involved in examining a proposal, only one environmental impact statement will be needed.

Since that time more formal procedures for state-federal co-operation have been adopted in some cases. This will be discussed below.

On the second issue, that investigations should be performed at the optimum stage in planning, we must hope that both industry and government have learnt from their mistakes. One early experience was with Cooloola in Queensland in 1971. Two companies which had held prospecting authorities in the high-dune area of the Cooloola forest, north of Brisbane, were refused leases to mine for beach sands because of pressure from the environmental lobby. The companies threatened to sue the state government for revenue forgone. It might be argued that they were entitled to compensation, perhaps not for revenue not earned, but for their exploration expenditure undertaken in expectation of a

lease for production. That was the first case of environmental pressure preventing a lease being granted, and the companies could not have been expected to have included it in their risk calculations.

Companies now undertaking exploration can expect this added risk factor, but there may still be reason to pay compensation for exploration expenditure if a lease is refused. This way exploration is still encouraged, but governments reserve the right to change their mind on environmental priorities. The only alternative is to decide now what it wants to do where, and stay with the decision. While a praiseworthy goal, it is unrealistic.

Its desirable features may, however, be achieved by a little forethought. The Queensland government decided Cooloola was worth preserving, but how much simpler if it had decided before the exploration was undertaken. Yet environmentalists usually fight rearguard actions. Plans for development of mineral sands leases on Fraser Island were well known some years ago, but action by those opposing mining awaited concrete development plans. Environmental interests should scrutinise the issuing, not only of production leases but also of prospecting authorities. If mining is intolerable, the best thing is to prevent exploration. The present legislation does not bring particular proposals to debate soon enough. Public enquiries can be held before impact statements are produced, but in general publicity for proposals does not occur at an early stage.

The legislation does permit a public enquiry to investigate the environmental impact of particular industries as well as specific proposals.

During the period when the Labor government was establishing federal environmental legislation, were environmentalists happy with state government attitudes, legislation and practice? State governments, like the federal government, have a number of interests to balance out. Their administrative mechanism varies from state to state; in Western Australia there is a 3-member Environmental Protection Authority supported by a Conservation and Environment Council of sixteen members with a wide range of interests and experience. The Authority deals with projects on a case-by-case basis, but is also engaged in background studies such as selection of national parks, optimum distribution of population in relation to resources, and the effect of development on marine and estuarine environments. Programs have also been implemented to deal with existing or developing problems.

The states with the most pronounced mining-conservation confrontations have been N.S.W., Queensland and Western Australia.

In N.S.W., major confrontations have occurred over the Myall Lakes, as mentioned earlier, and over the Illawarra escarpment—plans for coal mining and constructing coal loading facilities on the N.S.W. south coast.

In Queensland, as in N.S.W., the mining lobby was historically strong and the importance of the industry unquestioned. The Cooloola case mentioned above was a severe blow to the whole industry. However, although conservation pressure is strong and new developments face problems, the state government has for the most part to be behind the mining industry for economic reasons. (It became firmly entrenched in its view at the time of the Fraser Island enquiry, after which the federal government used its export control power to halt mineral sand mining on the island.) Improving administrative arrangements can go a long way towards improving the tenor of dispute; we should now no longer have the ridiculous situation observed some years ago on North Stradbroke Island, where a mining company, having mined high dunes, struggled to establish any possible grass and tree cover to meet conditions set by the Mines Department; any cover would do, indigenous or otherwise, but it was an uphill battle and conservationists were upset because the previous species were not returned exclusively and in entirety. Next to the mining lease the Forestry Department had replaced the indigenous cover with a juvenile pine forest; had that section been preserved and pines planted after mining, the conservation cause would have been advanced with no one worse off. Now that the Co-ordinator General oversees such matters, greater interdepartmental co-ordination can be expected.

Western Australia's environmental administration's most notable interaction with the mining industry occurred in the very early days of state environmental legislation when the proposals advanced by Pacminex for an alumina refinery were judged to be unsatisfactory. Since that time, industry and government have appeared to establish a cordial working relationship, and though neither conservationists nor miners are always simultaneously pleased, it is possible that the Western Australian experience with environmental and pollution control has been the most satisfactory of all the Australian states. As noted above, however, the federal Department of Environment and its successor has on particular issues regarded the state attitude as unduly favourable to industry.

In the Northern Territory the most controversial issue had centred on the uranium province, and on the future of mining within the proposed Kakadu National Park. The Australian government and the mining industry provided joint finance for twelve separate studies in the Alligator River region. The uranium question includes the Aboriginal rights issue as well as the environmental questions that arise with uranium. These questions are partly decided outside government. In 1975 a trade union congress voted to ban the export of uranium. This ban was suggested not only because of local effects of uranium mining (e.g. on the health of miners) but also on the principle that the world should not be increasing its reliance on nuclear power (for en-

vironmental and/or strategic reasons). Despite the ban, the passing of the 1974 Act gave the nation the ability—modified by political and economic requirements—to protect its environment and conserve its resources. If anything, it appeared ‘over-governed’ in this area. However, one can see that the nation as a whole may have interest in protecting state features which the state itself would be happy to see desecrated for economic gain—so if national interest is paramount, federal intervention is justified.

With the advent of the Liberal-N.C.P. government in 1975, there was pressure from state governments and from private enterprise to have environmental powers returned fully to the states. This has not occurred although the federal government has been working with some states to define the relative roles of state and commonwealth governments in environment protection, e.g. the then Commonwealth Minister for Environment, Housing and Community Development (K. E. Newman) and the Western Australian Minister for Conservation and the Environment (G. C. MacKinnon) in May 1977 signed an agreement concerning the manner of achieving environmental analysis of proposals requiring approvals from both commonwealth and state.⁷

The following is an extract from their press release:

Mr MacKinnon said that the conclusion of the Agreement was a result of a long effort by the Western Australian Government to make it clear to future developers that the Western Australian Government has prime responsibility to manage the environment of the State in which the people live. He said that the Environmental Protection Authority had a proven record of reliable environmental management in this regard but it was essential that developers should know that they had to deal with the State and the Environmental Protection Authority in the first place without duplication of effort in satisfying respective responsibilities of both Governments.

Mr Newman said that the Agreement was signed in recognition of the relative roles of the State and the Commonwealth Government in environmental matters and that he has under the Federal Environment Protection (Impact of Proposals) Act 1974/75 statutory responsibilities which he must discharge.

Mr Newman said the agreement would facilitate his administration of the Federal Act in that he would be able to rely on the State processes to draw out the basic environmental issues on any proposal. The agreement would also be of advantage to mining companies and those industries in which there was a Commonwealth interest in that duplication would be avoided and

⁷ The Ministers' *Agreement on guidelines for co-operation in Environmental Analysis of Proposals* (17 May 1977); and the speech by the federal Minister to the Nature Conservation Council of N.S.W. on 16 June 1977: 'The Commonwealth Role in Environment Impact Assessment'.

uncertainties on environmental matters eliminated at the earliest practicable stage.

An essential feature of the Agreement is that an Environmental Impact Statement (EIS) required under Federal Legislation will in fact be an Environmental Review and Management Programme (ERMP) as specified by the Western Australian Environmental Protection Authority.

Mr MacKinnon said that the essential feature recognised by the Agreement was that Western Australia had the responsibility to manage its own environment for the sake of a balanced approach between development projects essential to the State and retention of the environmental values of Western Australia.

The most recent statement is given in a press release of 14 March 1978:

The Minister for Environment, Housing and Community Development, Mr Ray Groom today re-affirmed the Government's commitment to strong and effective environmental legislation.

Mr Groom said that there was no truth in claims that the Government was considering weakening the Environment Protection (Impact of Proposals) Act.

The Government had recently considered progress that was being made on the review of the Act.

It had decided to seek further discussions between Commonwealth and State Environment Ministers and that these should encompass the possibility of extending existing arrangements to offshore proposals as well as seeking to establish a statutory framework for Commonwealth/State cooperation in this area.

Once these consultations had occurred Mr Groom said he would report back to the Government.

Arrangements had already been entered into with four State Environment Ministers concerning Commonwealth/State cooperation in environment assessment. These arrangements had been operating for up to 8 months.

They had reduced uncertainty, and helped overcome problems of duplication and overlap without reducing the ability of the Commonwealth to come to its own conclusions on matters of real environmental significance.

More efficient use was now being made of the scarce resources in this field. Discussions on facilitating the administration of the Act had also taken place between Commonwealth Departments and were proving useful.

How has the environmental impact statement technique worked in practice?⁸ After two and a half years of experience of operation under

⁸ For a discussion of how it was viewed before the federal Act was passed see Australian Conservation Foundation, *The E.I.S. Technique*. Collected papers of an A.C.F. Symposium, Canberra, November 1974.

the Federal Act, R. F. Pryor said it had been 'an effective means of ensuring that the environmental aspects of a proposed action are identified, studied and considered in the decision-making processes of the Commonwealth Government'.⁹ He suggested that:

the effectiveness of EIS procedures in influencing decisions has been more through the EIS document's provision of a written set of agreed environmental protection measures to be incorporated in the design and subsequent operation of a development project, than by providing a basis for overriding or substantially modifying any development proposal. This position is most encouraging and shows that proponents are now accepting the need to consider the environmental consequences before promoting any particular proposal.

Pryor identified a number of ways that the EIS procedure could be used more effectively. These included having proponents initiate studies and action for environmental assessment of their proposals at the earliest practicable time; encouraging greater public participation during the progress of environmental studies and subsequently when draft statements are released for comment; establishing agreed and consistent environmental standards for environmental factors which can be quantified; and developing assessment techniques for the various environmental factors and the establishment of agreed methods of application of those techniques.

Between June 1975 and June 1977, when Pryor was speaking, about 6000 proposals had been considered and upon initial review 1270 of those appeared to be of some environmental significance. Pryor said that:

following more detailed review of information on the proposed actions including any environmental protective measures and the existing environment to be affected, it was ultimately decided that many of those proposals were not significant within the meaning of the Act or that the direction of an EIS was not warranted. Agreement by a proponent to implement a number of environmental protection measures has often been a condition to decisions given in this review process.

During that period, only twenty-five environmental impact statements had been formally directed. Others prepared under state administrative procedures or before the Act came into force were reviewed. The environmental impact statements released for public comment since then included statements for five mining projects.

Between June 1975 and April 1978 nineteen environmental impact statements in relation to mining projects were directed under the

⁹ 'The E.I.S. Technique—its Role, Limitations and Potential', Environmental Engineering Conference, Canberra, June 1977.

environment protection administrative procedures. There were four for uranium projects—Jabiluka (Pancontinental Mining Ltd); Koongarra (Noranda Aust. Ltd); Nabarlek (Queensland Mines Ltd); Yeelirrie (Western Mining Corporation)—all directed in November 1977. (The Ranger proposal, a joint venture between the federal government and Peko-E.Z., had been subject to a public enquiry which reported in 1976.) The Jabiluka and Nabarlek statements were subject to public review. There were two statements directed which were related to uranium mining projects—extension of the Arnhem Highway (Pancontinental Mining Ltd, directed in February 1978) and a metallurgical research plant at Kalgoorlie (Western Mining Corporation, December 1977).

Five statements for Queensland coal projects were all directed in July 1976—for Nebo (Thiess, Peabody, Mitsui Coal Pty Ltd—now Thiess, Dampier, Mitsui since B.H.P. bought the Peabody interest); Hail Creek (Hail Creek Management Pty Ltd); Norwich Park (Central Queensland Coal Associates—Utah); Blair Athol (Blair Athol Coal Pty Ltd—a member of the C.R.A. group).

A direction relating to the development of the North-West Shelf gasfield (Woodside Petroleum Development Pty Ltd) was made in February 1978, and for Peel No. 1 exploration well (Western Australian Petroleum Pty Ltd) in September 1977.

A statement for the Agnes Waters mineral sands project near Bundaberg in Queensland (Mineral Deposits Ltd) was directed in December 1977; for Western Australia's Agnew nickel project (Agnew Mining Company) in December 1976; for the Goldsworthy 'area C' iron ore development in Western Australia in April 1977; for the Marandoo iron ore development (Texas Gulf, Hanwright) in April 1977; for the Wagerup alumina project in Western Australia (Alcoa of Australia) in May 1977; and for the establishment of a lead zinc mine at Elura, near Cobar N.S.W. (Electrolytic Zinc Co. of Australasia) in December 1977.

In addition to the nineteen impact statements directed, fifty proposals were examined in relation to the requirements of the Act, but did not lead to the direction of an impact statement.

What is the commonwealth's involvement in mining, that it is constitutionally able to apply its Environment Protection Act (1974) to mining projects? It has been mentioned in relation to the Fraser Island enquiry that the operation of the Customs (Prohibited Export) Regulations requires that prescribed exports cannot be exported without the approval of the appropriate commonwealth Minister. Other relevant commonwealth powers arise from arrangements which require that certain foreign investments in Australia and takeover actions by foreign controlled companies be subject to commonwealth approval; from the Atomic Energy Act in relation to uranium mining; from the operation of the Northern Territory mining ordinances in relation to mining in that Territory; from the operation of the Petroleum

(Submerged Lands) Act in relation to offshore petroleum exploration and development; and from the provision of direct commonwealth financial assistance to a mining project.

To some spokesmen for the mining industry the operation of the Environment Protection Act is symbolised by the Fraser Island enquiry and decisions taken by the government on the report of that enquiry. The federal government has suggested that the circumstances surrounding that enquiry were unique and will not recur. This decision was taken in a period of transition, and it is to be hoped that such decisions would in future be taken at an earlier stage, i.e. export approvals would not be granted until it was clear environmental considerations did not preclude mining. Furthermore, the assessment procedure adopted for Fraser Island—a public enquiry—has not established a precedent for examination of more recent mining proposals. The Act has been applied without controversy to a wide range of proposals involving the mining industry.

R. B. Lansdown, Secretary of the Department of Environment, Housing and Community Development, told an Australian Mining Industry Council seminar in April 1978 that there had been no difficulty in establishing a good working relationship between the companies concerned and officials in his department responsible for environmental assessment; that the response of the companies to the new assessment requirements had been encouraging; and was at least as good as the general response within government agencies. He said that provided planning was competent and the allocation of resources to environment issues was timely and adequate, the impact assessment requirement did not lead to delays and frustrations; that environmental studies and assessments could go forward and had done so concurrently with other aspects of project planning. He did however say that, although in most cases the companies concerned had comprehended the physical environmental effects likely to arise from their proposals and had taken all adequate and reasonable measures to protect the environment, appreciation of the social effects was sometimes lacking, although there may very well have been doubt as to responsibilities in this area.¹⁰

At the same seminar, D. T. Buchanan, President of the Queensland Chamber of Mines, queried 'why the industry should have been selected

¹⁰ R. F. Pryor, 'The E.I.S. Technique', had referred to 'a misconception that we are mainly concerned with the physical environment or "conservation" issues. In fact we must be equally concerned with the social environment, as is required by the Act which defines "environment" as "all aspects of the surroundings of man whether affecting him as an individual or in his social groupings"'. In this respect proposals for developments . . . often have greater impact on the social environment causing changes to established community relationships, accessibility to facilities and property acquisitions, all of which are very significant environmental impacts.'

as the main environmental battleground', pointing out that it disturbed less than .0035 per cent of Australia's land surface—'far less than roads, real estate and other areas of development'. He went on to refer to the Act which established the Australian Heritage Commission, whose purpose is to identify places that should be included in the register of the 'National Estate' so that they may be preserved for environmental, social or historical reasons. He drew attention to what he saw as four problems with the Act:

Firstly, the Commission set up by the Act may nominate any area for inclusion in the register of the National Estate. Although people may object to any place being incorporated in the register, the Commission is required only to give due consideration to the objection. There is no provision for public enquiry or for any appeal.

Secondly, removal of a place from the register, other than by the Commission itself, can only be directed by the Minister for the Environment after he has considered an environmental report.

Thirdly, an even more extraordinary power enables the Commission to keep a list of places that *might* be entered in the register and such places are accorded the protection of the Act as if they were 'deemed to be in the register'. There are no requirements to alert the public to the location of such areas.

Fourthly, once a place is on the register, no activity may be conducted within it which is inconsistent with its preservation, unless there is no reasonable alternative. How is the 'reasonable alternative' to be identified? What are the ground rules? Certainly they are not spelt out in the legislation. Furthermore, the Act does not recognise the special plight of those already carrying out allegedly 'inconsistent' activities in the place concerned. Are they to be compensated in the event of finding themselves unable to continue their activities because they are suddenly part of the 'National Estate'?

What is the Australian Mining Industry Council's policy on the environment? Its *Declaration of Policy* (1978) says that the mining industry advocates the establishment and maintenance of systems for environmental protection, the adoption of adequate control measures and the rehabilitation of mined-out areas; subscribes to the need for environmental impact assessment before the authorisation of new mining activity or to proposed changes in any other category of land use; opposes the duplication of environmental impact assessment at both state and federal levels and urges governments to rationalise and co-ordinate their needs and approaches in this field; and deplors the use of federal export control powers to enforce environmental standards.

It says:

Authorisations for mining activity or existing mining operations have been sometimes frustrated by post-hoc environmental

inquiries, adding to the uncertainties surrounding any mining operation and having a deleterious effect on our international reputation.

The mining industry would expect that there should be no recurrence of such situations, if realistic environmental impact assessment procedures are completed before mining commences. In the unlikely event that the overriding national interest demands that a previous clearance be reversed, the mining industry maintains that adequate financial compensation should be forthcoming, including payments for future profit forgone.

Some members of the industry were therefore less than happy with the compensation offered by the commonwealth government to the Fraser Island miners when mining ceased, since it did not cover profit for what the companies might have regarded as the life of the mine.

The Mining Industry Council has also expressed its view that restricted exploration and mining should be permitted in national parks.¹¹ Its *Declaration of Policy* (1978) says:

The mining industry supports the concept of rational land use planning which involves a thorough study of land use potential within a whole area followed by recommendations on its usage. However, it should be recognised that mineralogical data for such studies will inevitably be less than desired. The Victorian Land Conservation Council procedures are regarded as an excellent model in this regard.

In the case of national parks and other public reserves, the mining industry supports a multiple-use concept under plans of management. It believes that blanket prohibitions on exploration and mining should be removed and be replaced by a system of restrictions and controls.

The multiple-use concept would have the advantage of making more areas readily available for national parks in that it would change the emphasis in favour of having larger national parks with fewer blanket restrictions. This would permit a greater degree of flexibility in the event of commercial mineralisation being discovered.

The mining industry opposes the concept of wilderness areas as defined in Commonwealth legislation, and particularly its application to huge areas as proposed by the Australian Conservation Foundation. While the wilderness concept may have application in parts of the African and North American continents, it is unsuited to the Australian environment because of the high volatility of this country's natural bushland. Australia's conservation areas, therefore, need careful and constant husbanding to prevent their complete devastation by bushfires. Such an approach would not preclude the temporary intrusion of certain mineral activities.

¹¹ See also 'A Grave Imbalance: National Parks impose a great cost on the economy', *Mining Review*, May 1978.

The declaration says that the industry supports the development of a code of practice for mineral exploration in national parks; supports the zoning of national parks according to their particular characteristics, the degree of restriction on exploration and mining varying with the different zones; accepts that national parks may contain specific areas in which mining would be severely restricted, in some cases to the point of prohibition due to their importance for scientific, historical or archaeological purposes or to protect outstanding scenic features; and suggests that any proposal for mineral activity within national parks, including exploration proposals, should be subject to appropriate environmental procedures. It supports the concept whereby all national park proposals and plans of management are subject to public comment and inquiry.

The declaration says:

In those specific areas of national parks in which mining activity is restricted, mineral activity on the surface should normally be limited to prospecting and then only where public access is generally allowed. The purpose of the restriction should be to protect the surface or any underground features which it is desired to preserve, but any underground mineral activity which complies with this restriction should not be precluded. In recording its attitude to national parks and other public reserves, the mining industry is cognizant of differences in definitions and procedures as between States. This general statement of policy could well need adaptation in relation to local procedures in individual States.

The idea of mineral activity of any kind in national parks is not acceptable to the environmental movement. Even within that movement, however, there is a range of opinion on permissible access to such areas. Some assume that national parks are for public enjoyment, if not for mining, whereas others see them as wilderness areas, preserved in entirety for posterity.

When a government is endeavouring to assess whether a mining operation should or should not proceed, or whether the relevant land should be devoted to national parks, it may use cost/benefit analysis. It may also use cost/benefit analysis when assessing projects for public expenditure. This technique attempts to weigh up, for a specific project, the total costs, both private (paid by industry) and social (borne by the community) against the total benefits. In some analysis, this results in a cost/benefit ratio, which may then be compared with ratios from other projects.¹²

¹² Ronald N. McKean, in 'The Nature of Cost-Benefit Analysis' in Edwin Mansfield (ed.) *Microeconomics: Selected Readings*, W. W. Norton & Co., New York, 1971 has suggested that this criterion of the ratio of benefits to cost should be carefully used.

The cost/benefit ratio, particularly for projects with severe environmental impact, is somewhat dangerous as a decision-making tool. Although there are some elements whose value is impossible to quantify with any degree of certainty, the final result is a number used without qualification. In my own experience, it is a worthwhile effort to identify the costs and benefits at least qualitatively, and then perhaps to attempt to quantify those that can be readily quantified. Where quantification is difficult, I prefer to see a qualitative comment made, rather than have a number produced which is open to doubt but is lost in other numbers. Thus I would think that an analysis of a uranium mining project (or an underground coal-mine or an asbestos mine) should attempt to forecast capital and operating costs and sales revenue; I would not like to see it attempt to cost the health hazard to miners as the medical costs incurred in treating them, or—if they died as a result of their occupation—as the income loss to their family. Such an approach ignores the value of the human being.

In the same vein, it can be said that a cost/benefit analysis on world uranium mining is a special exercise, as it requires the weighing up of easily-perceived short-term benefits to individuals, companies and governments against the longer-term risks of global devastation. In the latter case there will be some inherent discount factor operating in personal judgments, as people make allowance for the time factor. They will also, in weighing up costs and benefits, be making an implicit judgment about the probabilities of devastation.

When cost/benefit analysis includes social costs and benefits of a project it is sometimes said to be examining the 'externalities' of that project. This means that it is concerned not with 'internal' costs met by the project—e.g. on plant, equipment and wages—but with external burdens placed on the community. Similarly benefits 'internal' to a project would ultimately appear as elements in profit. 'External' benefits accrue perhaps to the neighbouring community, as in the case when the development of a mine brings telephone, electricity and reticulated water to neighbouring rural settlements. External benefits can also occur on a much wider scale, e.g. when the existence of indigenous crude oil production (selling at below import parity) helped to insulate Australia's population against the impact of the world's liquid fuel crisis. The petroleum companies could argue with some justification that the price element in this benefit was matched by their internal costs.

Although there have been benefits amongst the externalities of the petroleum industry, it is usually the costs which attract public attention and they provide a useful example of the problems of quantification in cost/benefit analysis. The question of drilling on the Barrier Reef was the subject of a Royal Commission,¹³ but the industry also has production

¹³ Australian Government and Government of the State of Queensland—

platforms,¹⁴ marine pipelines, onshore pipelines, treatment plants, harbours (with chances of oil spills), refineries and storage tanks, all of which attract public attention. Since this same public nevertheless expects to have unlimited supplies of petroleum at its disposal, the problem for government and industry becomes one of minimising the industry's adverse impact, which in some cases means locating its installations well away from the public gaze.

What social costs might be attributed to the petroleum industry? A detailed list of possible environmental impacts of offshore petroleum activities has been given by K. E. Thompson, and is shown in Table 9.1.¹⁵ From these risks he listed the data needs for environmental assessment (see Table 9.2).

These data needs are significant, but then, as Thompson had said earlier in his paper, the objective of requiring environmental impact statements (one element in a government's cost/benefit analysis of a project) is 'to educate organisations into systematically taking environmental matters into account at all phases of their development actions'. As a result,

construction can be arranged to avoid sensitive sites, processing plant can be designed to produce low levels of pollutants, measures can be developed to protect historic sites, helicopter flight paths can be planned to avoid bird nesting areas and consultation with the fishing industry can reduce risks of interference to netting.

Some aspects of cost/benefit analysis and environmental impact assessment need scientific data that can be collected only over an extended period of time, while the pressure on the government may be to permit development now.

It is however very important to realise that historical data *cannot* give us an accurate picture of future probabilities in an industry where technology moves so fast, and is under pressure to do so.

If a probability of oil spill is decided upon to permit the inclusion of a potential spill in cost/benefit analysis, how is the cost of the possible spill to be determined? The probabilities of various outcomes have also to be decided upon. If the spill can be contained or cleaned up before much damage is done, a quantitative estimate is possible; if it is not contained but damages beaches and fishing grounds, then the cost could be

Royal Commission into Exploratory and Production Drilling for Petroleum in the Area of the Great Barrier Reef: *Report*, A.G.P.S., Canberra 1975.

¹⁴ The experience of Esso/B.H.P. in Bass Strait has been that these attract seals, other marine life, and birds, and the claim has been made that this may be counted as an external benefit.

¹⁵ 'Data Needs for the Environment Assessment of Offshore Petroleum Activities'.

Table 9.1

Representative Environmental Impacts of Offshore Petroleum Activities	
<i>Activity</i>	<i>Risks of Environmental Impacts</i>
seismic surveys	fish mortality from explosives (now uncommon)
exploration drilling	service craft interference with shipping and fishing; drill cuttings smothering seabed organisms; sub-lethal impact of drilling fluid chemicals on marine life; oil or gas blowout risks
drilling platforms	coastal damage during construction and land transport; navigational hazard during marine transport and after placement; platform instability through ship collision, foundation failure, or wind and wave action; disposal of petroleum-contaminated water
production drilling	oil or gas spills through equipment or human failure
submarine pipelines	damage to marine life through dredging, blasting or spoil dumping; obstruction to fishing operations; oil spill risks
on-shore structures	damage to vegetation, animal habitat, anthropological sites, historic buildings or recreational facilities
on-shore operations	water pollution; air pollution
off-site	sociological impact on existing populations—including effects relating to urban amenities, infrastructure and social stress (crime, alcoholism)

Source: K. E. Thompson, 'Data Needs for the Environment Assessment of Offshore Petroleum Activities', Institute of Cartographers, *Symposium on Data Banks*, March 1978.

computed in terms of lost income to the tourist or fishing industry; but if it destroys or inhibits bird populations which 'are highly susceptible to lethal and adverse effects',¹⁶ how is this cost determined?

The problems of assessing oil spill risk thus revolve around whether a spill occurs, what path it follows and what lies in its path. Slack, Smith and Wyant have conducted an analysis in terms of these three phases.¹⁷ First, they considered spill probability distributions, for each of several subdivisions of a petroleum exploration permit area. Separate calculations were made for platform, pipeline and tanker spills, using two

¹⁶ J. L. Hyland and E. D. Schneider—'Petroleum Hydrocarbons and their effects on marine organisms, populations, communities and ecosystems:' Environment Protection Agency, Rhode Island, U.S.A. 1977.

¹⁷ J. R. Slack, R. A. Smith and T. Wyant—'An oilspill risk analysis for the Western Gulf of Alaska (Kodiak Island) Outer Continental Shelf lease area.' U.S. Geological Survey, Open File Report 77-212, 1977.

Table 9.2

Representative Data for Assessing Environmental Risks

<i>Environmental Risk</i>	<i>Representative Environmental Data</i>
marine explosions	fish species and concentration; fishing activity
drill cuttings	type, concentration and importance of seabed and near bottom marine life; sensitivity of important species to cuttings and drilling fluid
platform stability	foundation geology; wave height and velocity distributions; wind velocity distributions
navigational hazard	fishing and other shipping movements
seabed obstacles	types and intensity of fish netting operations
wildlife threat	sea bird nesting areas and seasons, migration paths, habitat of endangered species (marine and terrestrial)
damage to recreation areas	location and characteristics of marine parks, recreational fishing areas and coastal nature reserves
damage to historic monuments	location of historic shipwrecks, national heritage sites and buildings, anthropological sites and Aboriginal sacred sites
oil spills	records of wind, tide and ocean current velocities (for assessing potential impacts on the marine and coastal environment)
social disturbance	demographic and social data; information on urban amenities, infrastructure and recreational facilities

ranges of spill size (between 50 and 1000 barrels, and greater than 1000 barrels). Their analysis was based on geological expectations of petroleum resources and historical spill occurrence data (which as I said earlier is not necessarily an accurate projection for the future). Second, they calculated spill trajectories using a computer model to take account of ocean currents and a probability matrix of successive 3-hour wind velocity records. The analysis took account of oil slick dispersion and oil weathering rates.

This gave them a probability distribution which, for example, in simple terms would allow statements that in a specific season of the year, a given percentage of any spill from a particular area would come ashore at a certain point on the coast with a known average time lag. (Their analysis did not include the possibility of clean-up operations at sea.)

The third phase concerned the collection of data on commercial fishing areas (location and population size of various species) and on

spawning areas and hatching areas; of data on marine mammals and birds; and of data on recreational patterns, including boating and swimming. The third phase in combination with earlier phases shows the biological or topographical features at risk, and allows some judgment to be made on whether the cost (which may have some non-quantifiable elements) justifies the benefit.

It may be necessary at some stage to consider the costs and benefits of cost/benefit analysis. The last example illustrates this. That is a long and expensive process for a government to go through before it issues an exploration permit. If it requires companies to go through the process before applying for a permit, they may never do so. (This might please some environmentalists, but not necessarily the whole community.) It is a particularly expensive process to go through when exploration results may be so discouraging that the area is abandoned. Yet if the exercise is left until exploration is complete, pressures for immediate development are strong.

Thompson has suggested that 'in response to these difficulties a clearly understood and firmly supported process of environment protection administration is necessary'.¹⁸ He has suggested that this might include:

- (i) geological assessment of the relative petroleum production potential of broad sections of Australian offshore areas (with progressive updating of the assessment);
- (ii) coastal planning assessment of the relative environmental significance of broad areas of coastline and offshore islands;
- (iii) marine planning assessment of the relative environmental significance of broad areas of offshore waters;
- (iv) generalised oil spill analysis for offshore waters to establish broad patterns of movement probabilities;
- (v) categorisation of parts of the offshore area by degree of environmental sensitivity (largely based on oil spill probability relationships to sensitive coastal and marine areas);
- (vi) guidelines for the issue of permits which would enable exploration of the highest environmental risk areas to be postponed (perhaps indefinitely), exploration of areas of low environmental risk to proceed with minimum constraint, and exploration of intermediate risk areas to proceed under appropriate environment protection conditions (for example, after an E.I.S. had been prepared—which might lead to the specification of seasons or conditions in which drilling should not be carried out because the environmental risks were particularly high);
- (vii) in areas where current exploration permits or production licences are held, adoption of the principle of establishing environmental

¹⁸ 'Data Needs for the Environment Assessment . . . '.

significance and controlling subsequent activities at the earliest convenient administrative stage (with a drilling permit, a production licence, a pipeline licence or the relevant approval for platforms and onshore facilities);

- (viii) preparation of an environmental impact statement for drilling in environmentally significant areas (preferably, but not necessarily, at the exploration permit stage), for major onshore works and, in most cases, for submarine pipelines and platform erection (the latter two activities at least merit supplying environment protection authorities with information on environmental risks and protection measures).

Thompson points out that Australian practice demands that the developer of specific projects be responsible for providing both project data and site specific environmental data. Sometimes relevant government agencies have information available. He suggests that in many cases the developer could be expected to contribute at least some new environmental knowledge; and that investigations are also likely to draw the attention of researchers to some gaps in existing knowledge which, if filled, would help assessment in the future. Offshore petroleum activity should also add to the common store of environmental data. Wind records, for instance, are usually obtained.

In this chapter, the emphasis on the offshore petroleum industry has been on the problems of quantifying its costs. Chapter 6 illustrated its economic benefit, and Chapter 13 will take up the question again, showing how development of the North-West Shelf gasfield can be expected to bring economic benefits to the rest of the economy through its linkage and multiplier effects.

Having seen the problems that can arise in quantifying environmental costs, we might now usefully examine an example of cost/benefit analysis.

Chapter 8 of the Report of the Fraser Island Environmental Enquiry was entitled 'The Environmental Aspects of Sandmining on Fraser Island: The Human Environment: National Economic Aspects'. Chapter 9 discussed the economic impact of the sandmining operations on the region directly affected. One of the major difficulties in cost/benefit analysis is how to evaluate national and regional impacts comparatively. In the political decision on Fraser Island the national interest was considered paramount, and an attempt was made to compensate, through federal grants, for the regional impact of a decision made on a national basis.

Chapter 8 began with a review of the mineral sands industry as a whole—production, average export prices, the relative importance of mineral sands in total exports (1.4 per cent in 1974–5), employment, turnover and value added. It suggested that the mineral sands industry

had employed about 0.05 per cent of the Australian work force, had accounted for about 0.07 per cent of total wages and salaries paid, and had contributed between 0.12 and 0.15 per cent of the value of all goods and services produced in the nation.

These last three sets of figures illustrate two statements often made about the mining industry—that it pays higher-than-average wages, and that it is more capital-intensive than the economy in general. When this industry was examined relative to the whole mining industry, it was found that the mineral sands industry had, over the period 1969–74 had a higher proportion of the employees in the whole mining industry than it had of the wages bill; and that the value added by the mineral sands industry represented a lower proportion of the industry total than was the case for wages and salaries.

The *Report* said that no separate data were available in relation to the amount of income generated from the mineral sands industry's capital invested, or in relation to the amount of income owned abroad.

The relationship between the industry's revenue and costs was discussed for the period 1969–70–1973–4. Stores and materials represented a major expense after wages and salaries, followed by freight and other transport, repairs and maintenance, electricity, contracting and processing, and other fuels. (This gives some indication of the other industries affected by this industry—and the question of linkages will be discussed further in Chapter 13.) In the period considered, wages and salaries accounted for about 20 per cent of revenue, with the expenses listed above accounting for between 35 and 40 per cent. Rent, lease and royalty payments represented about 3 per cent of revenue.

The *Report* then considers the general principles of benefit/cost analysis, defining the net national benefit as equal to the change in net national income, which it says 'can be estimated by finding the excess of the value of output from the project over all the costs incurred, due allowance being made for differences which may occur between the benefits and costs experienced by the owners of the project and benefits and costs accruing to the nation as a whole'.

Net national benefit is thus seen as the gross value of the change in output directly resulting from the project; less the opportunity cost of all resources directly used in the project; plus indirect ('external') effects (both benefits and costs) arising from the project. This figure can be positive or negative.

The *Report* considered it customary to attempt to quantify all elements in the analysis. Annual data are used, and then the present worth of the stream of benefits and costs is obtained by discounting future flows. While there is disagreement about the appropriate rate of discount to be used, the *Report* suggests that some degree of agreement exists that the rate is within the range from 5 to 10 per cent per annum, these being the rates used in Chapter 8.

The *Report* used the following equation in its national evaluation:

$$\text{NNB} = P_r Q_r + P_z Q_z - M - K + E_b - E_c$$

where NNB = net national benefit;

P_r = price of rutile per tonne;

Q_r = quantity of rutile in tonnes;

P_z = price of zircon per tonne;

Q_z = quantity of zircon in tonnes;

M = current operating costs;

K = capital costs;

E_b = indirect benefits;

E_c = indirect costs.

In discussing the terms $P_r Q_r$ and $P_z Q_z$, the *Report* drew attention to the fact that an increase in supply may lower the price; as economists know, whether revenue rises or falls as a result of the price fall depends on the elasticity of demand.¹⁹

The *Report* assumed unitary elasticity of demand to be possible, on evidence received;

It was suggested to the Commission that no net export income may be earned from the export of mineral sands from Fraser Island because marketing the expected output of rutile and zircon may cause average export prices for the minerals to fall to such an extent that Australia's total foreign exchange earnings will not be increased. In these circumstances, the net benefits directly attributable to the project will be negative, since the input of resources yields no increment in the value of national output.

The *Report* suggested that this result could occur if there were uncoordinated marketing and production, and if firms attempted to maintain their rate of production in periods when demand for the minerals diminishes. This is not a usual long-term reaction, but in the short term action may seem desirable.

In 1975, some sandmining companies reduced output and dismissed employees in the face of a downturn in sales. It does seem usual that production would be curtailed in such circumstances in an effort to prevent further downward pressure on prices, but of course this has not been happening in all countries for all minerals. (Some countries, as was mentioned in Chapter 2, have government-subsidised industries—e.g. copper mines and steel industries—more concerned with employment and foreign exchange earnings than with their profit level.)

¹⁹ W. C. J. van Rensburg and S. C. Bambrick, *The Economics of the World's Mineral Industries*, McGraw-Hill, South Africa, Chapter 14; or Susan Bambrick and Norman Miskelly, *Mineral Development Decisions and Government Policy*, Australian Mineral Foundation, Adelaide 1978.

Economic theory discusses the concept of marginal cost pricing. Once a mining operation has commenced and the initial capital expenditure has been incurred, firms will generally operate whenever prices exceed operating costs. There are minimum prices below which producers will not operate because they need to cover the current costs of mining and processing.

The *Report* suggested the

falls in the price of zircon in the latter part of 1975 illustrate the effects of both expanded supply and reduced demand on market prices. The availability of additional output from Fraser Island increased the total supply available to purchasers and made it more difficult for producers from other areas to sell their output. Although the extent to which supply and demand considerations separately affected prices cannot be readily ascertained, it seems evident that the availability of additional supplies, at times when demand is contracting, makes it necessary to reduce prices or curtail output, or to effect some combination of both, thus reducing the value of export sales. Some price falls may be prevented by co-ordinated action by the industry, with or without government support. In late 1975, the Commonwealth Government agreed to lower minimum prices for exports of zircon below those that previously prevailed. Without government intervention to fix a minimum price level, prices may have fallen to lower levels. In such circumstances it is necessary for producers to retard the rate of production to prevent stockpiling of the minerals in Australia, so that the principal effect of the downturn in demand and the setting of minimum export prices is to prolong the life of available mineral supplies.

The gloomy outlook for the mineral sands industry was one reason cited by commentators as accounting for the federal government's decision to halt mining on Fraser Island. They felt such a halt could improve the economics of Western Australian operations so that the nation as a whole was no worse off.

This *Report* differed from some earlier cost/benefit analysis on the mineral sands industry in that it allowed for the possibility that a project might provide employment for resources which would otherwise be unemployed.²⁰ Such an allowance had been suggested earlier,²¹ for in some cost/benefit analysis, this possibility is ignored on the grounds that the national economy has operated at high levels of employment in recent decades and that even if unemployment exists, the project under

²⁰ A. Fitzgibbons and H. Hendriks, 'An Economic Evaluation of the Proposed Cooloola Sand-Mining Project', *Economic Analysis and Policy*, September 1970.

²¹ Susan Bambrick, 'An Economic Evaluation of the Proposed Cooloola Sand-Mining Project: A Comment', *Economic Analysis and Policy*, March 1971.

consideration provides no particular opportunities to utilise otherwise unemployed resources. Now that higher and persistent levels of unemployment are accepted, it is more realistic to modify the traditional approach by allowing for a divergence between wage-rates and the opportunity cost of labour according to the general level of unemployment.

The *Report* also attempted to allow for the degree of foreign ownership in the Fraser Island project. For Australian-owned projects, tax and other payments to government are included in net income generated by the project, and that net income stays in Australia; for foreign-owned projects, it is necessary to estimate payments to governments in Australia, since the remainder of the returns are payable abroad, even if they are not paid abroad.

Net national benefit from a project with 100 per cent foreign ownership was defined thus (and appropriate weighting of this and the previous equation was used for projects with both local and overseas capital):

$$\text{NNB}_f = t(\text{PQ} - \text{M} - \text{D} - r\text{PQ} - \text{L}) + r\text{PQ} + \text{L} + \text{E}_b - \text{E}_c$$

where NNB_f = net national benefit from overseas-owned projects;

t = average rate of income tax payable on net profits (as assessed for income tax purposes);

PQ = value of output = $(\text{P}_r\text{Q}_r + \text{P}_z\text{Q}_z)$;

M = current operating costs (excluding royalties and other payments to state and local governments);

D = annual depreciation of capital expenditure;

r = rate of royalty payments;

L = other payments to state and local governments, for leases, rates, etc.;

E_b = indirect benefits;

E_c = indirect costs.

The *Report* assumes for simplicity that foreign capital invested in the Fraser Island operation would not have been invested elsewhere in Australia. (If it would have been so invested, the gains from the project are overstated.)

There were two operations on the Island—those of D.M. Minerals, and of Queensland Titanium Mines—and the *Report* considered the economics of these separately.

For the D.M. Minerals operation, the weighted average of net benefits was calculated on the assumption that 70 per cent of profit from the project would be overseas-owned and 30 per cent locally-owned during the first eight years, and that from then on—a 23-year mine life was assumed—50 per cent of profits would go to each partner.

It was assumed, in accordance with reports on the partnership agreement, that all capital expenditure would come from external

sources, financed by the Dillingham Constructions Pty Ltd section of the partnership.

Calculations showed estimated net national benefits greater than \$105m. over the expected period of operation of all mining leases and applications. When a rate of discount of 10 per cent per annum was applied to the estimates of future benefits, the present worth of the net national benefit was approximately \$43m.; with a 5 per cent per annum rate of discount the present worth was approximately \$63m.

Some simple sensitivity examples were used—a fall in export revenue of about 35 per cent would have reduced net national benefits almost to zero. Although it is possible that export revenues could have been less than estimated—South Africa's Jurien Bay deposits, not mentioned here, might have caused this—there is, I think, some cause for concern that the sensitivity example chosen should have been for a fall in national benefit. To avoid the appearance of bias against the industry,²² the *Report* could well have given an example of sensitivity to underestimation of revenue as well—with perhaps some suggestion that the current outlook was for diminished rate of growth in the market.

Deducting 5 per cent from all current operating costs to allow for the utilisation of otherwise unemployed resources, in the light of recent levels of general unemployment in Australia, added about 7 per cent to estimates of net national benefit.

Calculations for Queensland Titanium Mines showed an undiscounted net national benefit of about \$6.5m., equivalent to about \$4.6m. when discounted at the rate of 10 per cent per annum, and about \$5.4m. when discounted at the rate of 5 per cent per annum. In this case a reduction in the export revenue of Australian producers of mineral sands equal to about 21.5 per cent of the estimated revenue from the operations of Queensland Titanium Mines Pty Ltd, would have caused net benefits to fall almost to zero. A deduction of 5 per cent from operating costs, to allow for the utilisation of unemployed resources, would have increased net national benefits by around 10 per cent.

Considering the two operations together, and ignoring adjustments that may be required to allow for effects on prices or to allow for the utilisation of unemployed resources, these calculations suggested that the present worth of all sandmining operations on Fraser Island was approximately \$47.3m. when future returns were discounted at the rate of 10 per cent per annum and \$68.7m. when discounted at the rate of 5 per cent per annum.

Undiscounted gross revenue from the two minerals was expected to aggregate \$333m., and the deduction of total operating and capital costs

²² The overall tenor of the *Report's* captions to its photographs seemed to me to be unfortunate. The illustrations spoke for themselves, and did not need emotive titles.

of \$190m., left profits—before deducting taxes, royalties and lease payments—of approximately \$143m. Of this, approximately \$31m. represented profits owned abroad (after payment of taxes, royalties, etc.), leaving \$112m. as the estimated increase in Australian national income. The latter was made up of approximately \$36m. in the after-tax profits of an Australian-owned company, \$68m. in payments of company income tax and withholding tax to the commonwealth government and \$8m. in royalties and lease payments to the Queensland government and local authorities. These benefits would have been reduced to the extent that sandmining operations on Fraser Island affected the revenue received by other Australian producers of the minerals.

If these economic benefits were the only ones that could be expected, and if Fraser Island was considered unique, and its value considered infinite, then environmentalists saw a case for arguing against mining on Fraser Island. They considered the 'externalities'—effects on the whole community, not showing in the financial transactions of the two operations—to be primarily losses, and to outweigh the directly measurable economic benefit.

This was not to suggest that externalities consisted only of environmental losses. The *Report* noted that some works such as transport and recreation facilities, already constructed or to be constructed by the mining companies, might be used by various members of the public and that benefits created in this way should properly be assessed as 'external' effects. The *Report* saw the problem as one of attaching values to represent the present worth of the stream of benefits which would be provided by such facilities through time. It noted that there are considerable difficulties associated with the assessment of such benefits, including the necessity to forecast future levels of use of the facilities and the value to be placed on the services provided to different types of users through time; and that although techniques exist for the measurement of these benefits, no direct evidence had been submitted to the Commission on which quantitative estimates of the effects could be made. The Commission said that no evidence was submitted to indicate that total benefits from the use of these facilities would be large when compared with the benefits which might accrue from the mining operations themselves and that the Commission considered such total benefits would be relatively small. It suggested that measurement problems may be particularly acute in circumstances in which the facilities provided are not the same as those which would have been established if the provision of services to potential users had been used as the criteria for providing facilities, as opposed to the existing situation in which the work has been carried out as a by-product of mining operations and related activities.

The Commission noted that there were significant conceptual and

methodological problems in assessing losses incurred by those who value the areas affected by mining operations in their undeveloped state, but said that 'the overwhelming weight of evidence submitted by groups opposed to mining was that substantial losses would be incurred by people who attach value to the availability, and in some cases to the use, of the areas to be mined in their undeveloped state'.

One of the most difficult methodological problems is to compare the benefits to unknown, scattered and uncounted people, who as a result of mining would have had extra recreational facilities to enjoy, with the benefit to known, organised and vocal groups who wanted the area left untouched. Even if present preferences had been determined with accuracy—for example by referendum—the preferences of future generations would not be known. The Commission said on this question that:

there is strong evidence that the real value placed on areas of high environmental quality, such as Fraser Island, will increase substantially through time. This is apparent from long-term trends in developed economies with respect to demand and supply factors associated with manufactured goods on the one hand and the availability of high quality environmental areas on the other. . . . The availability of many manufactured goods has reached or seems likely soon to reach saturation levels, while the demand for recreation and related amenities continues to grow rapidly. Accompanying these trends, the proportion of consumer expenditure going to manufactured goods is no longer rising, and an increasing percentage is being spent on services, including travel and related costs incurred in visiting recreational areas. In turn, this increasing travel and related expenditure is reflected in the rapid growth in demand for the use of national parks and similar areas which afford people the opportunity to make closer contact with the natural environment.

The Commission outlined one methodology used to estimate the value of benefits from environmental resources expected over time. It outlined the three influences on the growth in the value of services provided by high quality environmental areas as:

- (i) the rate of growth in the numbers using the areas, resulting from both increases in population and increases in the proportion of the population becoming aware of the value of such areas;
- (ii) the rate of increase in the average value of benefits from such areas as real income rises and an increasing percentage of income is spent on recreational and related activities; and
- (iii) the optimal economic 'carrying capacity' of the areas, which may be defined as the maximum number of people who may use the areas in any given time period so that the benefits derived are not reduced by the activities of excess numbers of people.

If parameters (i), (ii) and (iii) are estimated, an estimate may be made of the degree to which the current annual value of preservation of an area would increase through time. Recognition of the capacity constraint makes it unlikely that the total present worth of benefits will be infinite.

The Commission cited U.S. studies which show that the present worth of the sum of benefits provided by important environmental areas may be more than a hundred times their value in the base period when a 10 per cent rate of discount is used. Thus if benefit/cost analysis shows that the present worth of a proposed development, discounted at the rate of 10 per cent per annum, is approximately \$50m., and that the present worth of the sum of benefits lost through time due to the development is a hundred times the benefits in the base year, the significant question is whether the value of benefits lost in the base period is greater or less than \$50m.

100

What is the value of preservation in the base year? It is possible to use data on number of visitors per year, their entrance costs, their travel expenses and their accommodation costs to arrive at an estimate of how actual visitors evaluate the current environmental benefit of the area—but this cannot include the value of areas preserved to people who benefit from knowing that these natural areas exist and will continue to do so. Some idea of this might come from what people are willing to pay to see an area preserved, e.g. their contributions to environmentalist 'fighting funds'.

Studies such as this assume that for any area whose development is prevented there is an alternative project which can supply the minerals thus denied to the world.

In the case of Fraser Island, the Commission of Enquiry suggested that a reduction in the supply of rutile and zircon from eastern Australia would lead to:

- (i) an increase in the demand for rutile and zircon from other sources, including other east coast areas (where these were not also frozen for environmental reasons) and Western Australia, which together seemed likely to be able to meet a substantial part of future world demand for some considerable time (although the 'other' sources are not named, the companies developing the deposits at Jurien Bay, South Africa would obviously benefit—in fact it has been suggested that if Fraser Island were not mined in the seventies, it would not be mined at all);
- (ii) a possible increase in the price of rutile, an outcome which might be alleviated to the extent that production from Western Australia and other sources was increased, but which might eventually occur earlier than would be the case if all the recoverable east coast reserves were available;

- (iii) an additional incentive to proceed with plans to increase the output of upgraded ilmenite, particularly from Western Australian sources, thus increasing the likelihood that more synthetic rutile would be used in the production of titanium dioxide pigments (it should be recognised that the substitution incentive can come from both supply restriction and price rises);
- (iv) a possible acceleration in efforts to find substitutes for natural rutile in its other end-uses; and
- (v) an acceleration of research into substitutes for end-products whose price would also be rising.

The Commission concluded that:

although there may eventually be some increase in prices of end-products and some substitution of other minerals for Australian output of rutile as a result of a curtailment of sandmining on the east coast of Australia, the net effects of such changes on consumers of final products would not be sufficiently important to justify interference with environmentally fragile areas. The conclusion appears to hold whether the consumers of the final products are Australians or residents of other countries.

The *Report* said that the matters considered in Chapter 8 led

to the conclusion that a decision not to permit exports of mineral sands from Fraser Island would have, at most, a very small impact on the Australian economy as a whole. Any losses which might otherwise occur would be reduced to the extent that production from Fraser Island is replaced by production from other Australian sources of rutile and zircon. . . There would also be a reduction in taxation receipts of the Commonwealth Government as a result of the curtailment of mining, but such a reduction would be offset to the extent that mining operations are stimulated elsewhere in Australia. Reductions would also occur in royalty and lease payments to the Queensland Government, unless there were increases in such payments from other ventures established within the State. Although the receipts by the Queensland Government from these sources would not be large when related to that Government's total receipts, residents of the local economies directly and indirectly affected by the sandmining operations on Fraser Island would suffer relatively more important losses in terms of employment and income forgone.

However, the federal government's ultimate decision was that long-term national interests outweighed short-term regional needs, that it was in the national interest to offer some compensation payment to the region.

The argument that not exporting mineral sands from Fraser Island would not cause the world to suffer has also been applied to Australian exports of uranium. Some commentators suggest that since there are

alternative suppliers Australia can take a stand against nuclear technology and refuse to supply the world, without causing other countries to suffer electricity shortages. Others have suggested, however, that if Australia does enter the market and increase world supplies then incentives to 'the plutonium economy' will be reduced. This argument was publicly endorsed during 1977 by the U.S. President and the Australian Prime Minister.

In the uranium issue, some of the environmental questions are global in nature. If there had never been, and would not be, any production of uranium, and hence any use of nuclear technology, then the risk of diversion of nuclear material for non-peaceful purposes, and nuclear health risks, would not exist. However, on a global basis, they do exist. What should Australia do—mine her uranium, make financial gains, and—some of her politicians say—earn the right to influence world nuclear developments?

The Ranger Uranium Environmental Inquiry did not dwell on these effects alone—in its comment in its *First Report* that there were 'aspects of the Ranger proposal that the present state of the art of benefit-cost analysis does not allow to be adequately quantified',²³ it mentioned effects on Aborigines and on the 'natural' character of the region (specifically, it considered the possible harmful effects from mining on the proposed Kakadu National Park). The *Report* said 'these could include both benefits and losses, but the evidence suggests that the losses would predominate'. Losses mentioned included changes in species diversity and distribution, and the reduction in development choices for future generations. Advantages mentioned included the expansion in opportunities for visitors to enter the area for recreational and educational purposes—although the *Second Report* recommended not only sequential development for various uranium proposals, but also restrictions that limited outside intrusion into the area. The *First Report* had mentioned the disadvantages of visitors as damage to Aboriginal sacred sites, pollution, litter, damage to fauna and flora, and erosion. The *Second Report* was also concerned with disruption to Aboriginal communities.

The Ranger operation was a much more substantial operation for the government to consider than the Fraser Island operation. The *First Report* expected it to employ between 600 and 1000 people during the 2-year construction phase and from 250 to 400 during the production phase (which the Commission noted was small in comparison with the total Australian workforce. It must be remembered, however, that there would be linkage effects on other industries, and multiplier effects could make it much more significant). The Commission saw the project as

²³ Chapter 9, 'Benefits and Costs of Exporting and not Exporting Australian Uranium'.

generating 'an increase in net national income, which, although substantial in relation to the investment directly required, would be small in relation to total national income'. The estimated contribution of uranium production (not just the Ranger project) to net national income rose to \$578m. per annum by 1991-2, when its percentage contribution was 0.531. The estimated percentage contribution of uranium production to total export income was also at its peak in that year at 5.02 per cent. The Commission acknowledged that its assumptions about the future of the world uranium market could prove wrong. It assumed an average price of \$A15.37 per pound of U_3O_8 .

Although the Commission felt the contribution of the Ranger project to net national income and employment opportunities would be relatively small, the federal government, anxious to overcome its unemployment problem, is anxious to see uranium developments proceed along with Queensland coal developments and development of the North-West Shelf gasfield, for the economic benefits they are expected to bring.

10 Government and Private Enterprise:

Infrastructure, Processing and Exploration

I The Provision of Infrastructure

W. M. Lonie, addressing the 1977 ANZAAS congress,¹ said that:

where mines have been developed, or can be developed in remote areas, the cumulative effect of the resultant development on regional development and decentralisation and as a stimulus to the further exploration and opening up of the country to pastoral, agricultural, manufacturing or even further mining developments, needs no emphasis.

Development of water and power supply, electrical distribution and sewerage, port and cargo handling facilities, education facilities, hospitals and medical centres, shopping centres, refrigeration, entertainment and recreational facilities are the obvious signs of a stabilised mining community. . . Furthermore, the wider and continuing effects of industry sponsored facilities in the form of improved communications facilities throughout the length and breadth of the country, the construction and reconstruction of local and national roads systems, the development of port facilities, aerodromes, and air services, which logically follow the creation of new towns are of enormous benefit to the nation as a whole in matters such as defence and national security without cost to the national defence expenditure.

Whilst the ports, railways, towns and services provided are the obvious signs of capital expenditure and the drawing together of the markets, the finance and the mining organisations to develop the mineral deposits, the cost of mining in remote areas does not stop at the mere construction of these facilities. There is in fact a very expensive continuing cost involved in operating a mine in a remote area. That is the cost of staying in business or the cost of supporting and employing people in the area. The cost of wages and benefits are obvious, but what is not so obvious is the cost of operating and maintaining the infrastructure services, and the effect of such costs on the economic viability of the project.

These costs might be acceptable in the context of government expenditure in the purely government oriented town such as Darwin or Canberra. However, in the context of a development which must be based on economics within the restraints of a

¹ 'Mines in Remote Areas', paper delivered to Section 3, ANZAAS, Melbourne, 31 August 1977.

competitive and international market place, and at the same time support an urban lifestyle in a completely isolated area, support costs could well be the deciding factor as to whether the project starts and/or whether it should continue.

Administration expenses, covering the various costs of maintaining a population of mining industry personnel (and in many cases the surrounding countryside) together with support of ancillary services vital to any community, such as health, medical, local government, education, police and the like, is normally about $\frac{1}{3}$ of the total expenditure involved in the mining industry. In some areas these costs can be even higher.

The developments arising from mining over the past 15 years have resulted in the creation of 10,000 additional jobs in the mining industry alone, and the settlement of 40,000 people in the remote regions of the continent. Using the normally accepted ratios, this means that direct and indirect involvement of the order of 70,000 people in the work force has been developed with a major influence on the livelihood of over a quarter of a million people.

Since 1960, 24 new towns have been built, ranging in population from a few hundred to about 4,000. Twelve new ports including several which can accommodate vessels of more than 100,000 d.w.t. capacity have been constructed. More than 20 airports including eight to full commercial jet standard have been built and over 1,800 km of heavy duty railroads constructed.

Over \$1,500 million has been spent on infrastructure and community facilities to house people concerned with mining activities, including schools, hospitals, modern communication facilities, police stations, shopping centres and sporting complexes and 10,700 houses.

In the developments of the sixties, as a general rule it was the companies who provided most of the infrastructure—and indeed high infrastructure costs are one of the reasons cited for the high proportion of foreign capital sought for those projects. Since the inflation of capital costs in the seventies, and the general change from a seller's to a buyer's market in some minerals, industry has increasingly regarded infrastructure as a burden it cannot bear. Its view is very much influenced by the fact that its competitors in some other countries receive significant financial assistance in this aspect of development.

Governments may encourage mining and processing by providing infrastructure and—depending on the location—may at the same time encourage regional development. As we have seen, power, water, and transport links have to be provided, and for remote mines, social infrastructure such as houses, schools and hospitals. In some areas, the cost of such infrastructure may exceed the cost of the mine. In the sixties, for our iron ore, coal and nickel developments, \$1.8m. was spent on infrastructure for every \$1.0m. spent on mine development.

A survey of eleven mining projects developed during the period

1960-9 by the Australian Mining Industry Council of the cost of infrastructure showed the following proportions:

	Cost (\$m.)	Percentage
Ports	125	15.7
Railways and transport	200	25.0
Towns	93	11.6
Power and water	73	9.2
Off mine roads	13	1.6
Local authorities	9	1.1
Airstrips	2	0.3
	515	64.5
Mine development	285	35.5
	800	100.0

Should this infrastructure be funded from the public purse or from private sources? The mining industry says that if it located near existing population centres, infrastructure would be available, so it suffers a cost disadvantage in comparison with other industries, and since government is saved the expense of providing some infrastructure in other areas, industry argues that infrastructure in remote locations should be subsidised by government. Fitzgerald argued that infrastructure is already subsidised through tax concessions,² but the industry replies

- (i) that is only after income has been earned; and
- (ii) it is a legitimate deductible expense incurred in earning income.

An argument advanced by economists is that if infrastructure has no purpose other than to serve a particular mine of limited life, there should be no government subsidy. On this argument, the isolated project that cannot meet its own infrastructure should not be developed, while government expenditure on infrastructure is justified when it serves a complex of developments. Even where infrastructure for a complex is privately funded, individual ventures can contribute to shared amenities. At a late stage in development, iron ore companies in the Pilbara are co-operating with respect to railway facilities. In the case of the Northern Territory uranium industry, it appears that the federal government will act as co-ordinator.³

Australian government attitudes influenced attitudes to mining negotiations in Papua New Guinea during the period of Australian administration. Since independence, this influence has naturally waned. In the additional taxes applied to Bougainville, and in the attitude to taxation of new projects, there has been some divergence. On

² *Report.*

³ See Ranger Environmental Enquiry, *Second Report*, A.G.P.S., Canberra 1977.

infrastructure, there are also strict expectations by government. Each venture is expected to finance its own towns and transport and power facilities. Privately funded infrastructure has to be available for public use unless this adversely affects efficiency of the mine. Where the government actually provides such facilities, then the venture compensates for this. The government may either receive corresponding equity or it may require payments to provide a rate of return on its investment. Only if infrastructure now required for mining is regarded as necessary to approved development will the government finance it.

Whether government or private enterprise finances infrastructure may be the deciding factor in whether a project proceeds. There are new iron ore projects waiting development in Australia. Chinese requirements will probably justify at least one new iron ore mine in Western Australia in the foreseeable future. However, in the present depressed state of the steel industry Japanese customers for iron ore have favoured the expansion of operating Australian mines, in preference to paying the higher prices necessary to finance the heavy capital expenditure required for new developments.

Although economists may argue that projects should fund their own infrastructure, governments may see a need to encourage projects. The proportion of expenditure on infrastructure made by state governments is likely to change as a result of meetings between the Prime Minister and state premiers, and permission from the Loan Council to states to raise loans overseas for developmental projects. Queensland and Western Australia announced their intention to seek loans to provide infrastructure for mining and mineral processing projects. On 17 May 1978 the Western Australian Premier, Sir Charles Court, said his government would be seeking \$100m. in the next year, \$200m. in the second year, and up to \$500m. by the fifth year.

Sir Charles expected that massive increases in resource development would follow. The funds he sought he then said would be used for the Dampier-Perth natural gas pipeline, for a new electricity scheme for the Pilbara, for duplication of the Kalgoorlie-Kwinana rail link and for infrastructure for the Alwest bauxite project. In cases such as Alwest, where private developers are involved, it is expected that they will pay at least the interest on funds used. The government expects the state to benefit because more projects will proceed. Companies are expected to benefit because funding of developments becomes easier.

New South Wales has also been considering large projects such as the upgrading of rail facilities and a new coal loader on the south coast. Limitations of existing coal loading facilities at Port Kembla, Balmain and Newcastle restrict the possible expansion of the state's coal exports at a time when the Premier, Neville Wran, has emphasised growing markets, particularly for steaming coal, some of which at least is expected to meet a predicted increase in demand from the United States.



Weipa export wharf at Lorim Point. By courtesy of Comalco.



Above: Myall Lakes National Park. The right-hand side of the road was mined in 1970.

Below: Myal Lakes National Park, frontal dune stabilisation.
By courtesy of Mineral Deposits.



At the beginning of the seventies, there was a furore when Clutha Development Pty Ltd sought to build an offshore coal loader at Coalcliff at the northern end of the Illawarra coastal plain. That development did not proceed. Now there are plans for a new coal loader at Port Kembla, very possibly of the offshore variety. Environmentally, this has some difference from the Clutha proposal. The Illawarra escarpment is further inland at Port Kembla than at Coalcliff. The Clutha project would have needed a bucket conveyor running down the escarpment and a stockpile on top of the escarpment. An environmental impact statement on the Port Kembla proposal is to be issued.

Site work is expected to begin before the end of 1978, and it is hoped the loader will be ready to ship coal before the end of 1981.

In 1977, when it was announced that a large new loader at Port Kembla would be built instead of including a coal loader in the new port of Botany Bay, the N.S.W. Premier gave estimates of two-and-a-half years for the construction of an onshore loader and three-and-a-half years for an offshore loader. At that time plans for an offshore loader had been drawn up by a group of collieries over a period of five years. Both government and coal industry opinion then favoured an offshore loader, because an onshore loader would be restricted to handling ships up to 100,000 dwt, whereas the offshore version could go up to 150,000–160,000 dwt and thus be more economical in the long run. At present southern and western collieries are having to pay a \$1.10 a tonne transport levy on export coal diverted to Newcastle because the existing onshore loader in Port Kembla's Inner Harbour and the Balmain loader in Sydney Harbour cannot cope with the volume and the extensions are not due to be completed till May 1979. Colliery proprietors are objecting to the surcharge, because they feel they are not responsible for the diversion and should not have to meet its cost. They also claim it places steaming coal exporters in particular at great disadvantage in competing with Queensland and South Africa for new orders on an expanding market. Producers have met opposition from buyers in trying to pass on the surcharge. Some buyers have refused to pay the extra charge, forcing the producers to carry the additional costs, so that some of the western steaming coal companies are finding it hard to break even.

The cost of building a larger loader at Port Kembla has been variously estimated at \$100 million to \$250 million, including the cost of building a railway from Douglas Park, near Camden, to the coast. An offshore loader would cost \$20 million more than an onshore version. The N.S.W. government is planning to borrow \$100 million overseas towards financing the loader.⁴ Port Waratah Coal Services Ltd's new

⁴ In its 1978 Report, the Australian Industry Development Corporation announced that it was assisting in developing financing proposals for additional export coal-loading capacity for N.S.W.'s southern coalfields. In

loader at Newcastle, which can ship 20 million tonnes of coal a year and stockpile one million tonnes, cost \$93 million to build onshore, while in 1977, Clutha estimated the cost of an onshore loader at Botany Bay as \$77 million.

Another general target for state expenditure is the provision of electricity. In an earlier boom favourable electricity arrangements were necessary to encourage the construction of Queensland Alumina Ltd's refinery at Gladstone in Queensland and of Alcoa's aluminium smelter at Port Henry in Victoria. Further 'special' arrangements have been seen as vital to an aluminium smelter at Gladstone, and processing facilities at the Weipa bauxite mines. C.R.A., in contemplating electric steelmaking in Victoria, is expected to seek from the state government electricity supply on favourable terms. In a world which has become conscious of what it calls the 'real resource cost' of energy, there is public pressure for heavy energy use to be subject to penalty tariffs rather than discounts. State governments in particular, however, are often persuaded by arguments for economic growth and employment creation.

How did the states' applications for borrowing fare? At the Loan Council in Melbourne on 6 November 1978, the states put forward a total of twelve development proposals. All were approved. The reasons for the approval have been seen as both long term and short term. Long term, because since the late 1920s the commonwealth has conducted overseas borrowing on behalf of all Australian governments—but the present Prime Minister is committed to 'federalism'. The short-term reasons may have been for political and economic expediency—politically, the government had seen electoral unpopularity in two recent state elections, and economically, the unemployment situation is sufficiently serious for any development prospect to seem worth while.

The states are now responsible for some of their own borrowings. The November approval was for \$158m. in the 1978-9 financial year additional to their existing semi-government borrowing program of \$2087m. Over eight years, the approved additional borrowing will be \$1767m. The federal government has insisted that no new approvals for this type of borrowing will be given over the next three years.

The additional borrowing for 1978-9 will probably be overseas, as the funds would not be forthcoming from the domestic market at the maximum permissible interest rates. However, the interest rates paid overseas will necessarily be higher than current Australian rates, partly because overseas interest rates are rising in response to U.S. measures to defend the dollar, and partly because this is the price of independence.

1976-7 the corporation provided finance for Australian companies expanding Newcastle's export coal-loading capacity for the state's northern coalfields.

The commonwealth government enjoys A.A.A. status in its foreign borrowings; state instrumentalities do not.

The states pay two other prices for their independence—the first is that they will have to carry exchange risks. The second is that they bear the risks of the projects.

Of the proposed borrowings, most are for energy-related projects such as the production of electricity or the development of primary energy resources such as natural gas or coal. Western Australia was interested in the Dampier-Perth gas pipeline (\$416m.), Pilbara electricity projects (\$111m.) and infrastructure for the Worsley Alumina project (\$41m.); Queensland in the Hay Point coal-loading project (\$75m.) and new power stations (\$130m.); N.S.W. in the Port Kembla-Balmain coal-loading project (\$89m.) and new power projects (\$200m.), Victoria in the Loy Yang Power Station (\$343m.)—with \$56m. for a controversial world trade centre in Melbourne; and South Australia in the Redcliff petrochemical scheme (\$186m.); Tasmania sought \$75m. for hydro-electric power projects and \$15m. for new water supply programs.

The emphasis on power supply in these approvals underlines the increasing capital costs of expanding generating capacity. Hugh Hudson, South Australian Minister of Mines and Energy,⁵ quoted the case in his state, where

the capital cost of the Torrens Island Power Station, when completed, will approximate \$150 per kilowatt, while the new Northern Power Station with its associated redevelopment at Leigh Creek, could end up being completed for a capital cost per kilowatt exceeding \$500 and perhaps even as high as \$800.

He said that the problem of rising capital costs for power stations is a generalised one through Australia and not peculiar to any one state. South Australia has recently introduced a special 6 per cent levy into the electricity tariff structure (not applying to all consumers), as a means of providing additional finance for the building of the new Northern power station. At the same time it introduced, for domestic users, an 'inverted tariff' structure aimed at slowing down the increasing use of energy, and highlighting the need for conservation.

J. C. Trethowan, Chairman of the State Electricity Commission of Victoria, has underlined the fact that increasing capital costs have come not only from inflation but also from delays.⁶ For the S.E.C., he said, the

⁵ 'Australia and the Emerging Energy Crisis', *The Resources Challenge*, Chemeca 78, 6th Australian Conference on Chemical Engineering, Surfers Paradise, Queensland, November 1978.

⁶ 'The Size of the Problem in the Public Sector: How and Where Funds will be Found and How They Can Be Secured and Repaid', *Dollars for Minerals and Energy*, Committee for Economic Development of Australia, Policy Forum, Melbourne, 8 November 1978.

most important sources of delay have been industrial disruption and the public-environmental enquiry process.

Since the electricity supply industry must begin its plans for major additions to generating capacity a decade before the capacity is required, he pointed out that one of the most important costs to the community from construction delays would be the resulting energy shortages, which would not only inconvenience the domestic consumer but would disrupt industrial production and employment.

Trethowan identified a number of other delay costs:

In addition, project delays can result in increased costs to the public energy industries themselves with a resultant strain on project financing requirements. Firstly, there would be the problem of servicing idle capital for the period of the delay. Secondly, there would be a loss of construction efficiency, e.g. contractors and others may have to be paid whilst work had ceased. In addition, the continuation of cost inflation during the delay period would lift the total system cost by the time the project was eventually finished. If the project happens to involve imported goods, there may also be additional currency exchange costs to be borne depending upon the wording of the contracts and movements in the relative value of exchange rates.

If the delays are significant, the continuing nature of technological advances may mean that the project under construction will be partially obsolete by the time it is ready for use. During the period of the delay, the growth of energy demand may also require less efficient and higher cost plant to be kept in service when it would otherwise have been scrapped. If the existing capital stock, is, however, inadequate to meet the growing demand for energy, the community may be forced towards more expensive substitute fuels. Or the energy authority may have to resort to constructing high cost and relatively inefficient plants with a low gestation period to enable its energy capacity to meet such a growth in demand. For example the recent need by the SECV to have a second 200 MW block of gas turbines to overcome the energy shortages resulting from construction delays and the reduced size of the Newport power station. If the delay occurs before the project has been started, or at another early stage of construction, it may be possible to redraft the investment plan to take account of any technological improvements which have been discovered and successfully tested during the delay period. In this way, cost increases of the kind mentioned above may be reduced by a substitution of more efficient cost-saving techniques. However, once the plans and resources have been fully committed, and the construction has commenced in a significant way, there may be very little, if any, scope to institute any construction cost savings.

Although the states' concern with electricity generation does not flow only from a desire to facilitate resources development, some of the

borrowing approvals sought at the Loan Council do relate directly to infrastructure provision for specific projects.

If government does assist a project by providing infrastructure, what effect does this have on project viability? As was pointed out in Chapter 5, it is not possible to generalise from one case, but where a case study is available, it is interesting to examine it. One such study, prepared for Industries Assistance Commission discussions by a company mining iron ore, assessed the economics, in 1976 terms, of a new iron ore development in the Pilbara. The venture established a new mine, railway (200 km), port, and associated towns. The project contained sufficient elements in common with existing or other new ventures to be called 'typical'. The study showed that neither changes in tax legislation nor government assistance significantly improved the project economics to a level likely to be adequate. However, if real iron ore prices were to increase by, say 10 per cent, project economics were enhanced and then taxation or government assistance had a marked effect.

II The Encouragement of Further Processing

Both federal and state governments wish to maximise the economic welfare derived from exploitation of natural resources. In March 1978 the Prime Minister wrote to state Premiers seeking assistance in establishing a suitable policy framework to encourage and guide processing proposals.

Such interest in processing, with its employment, income and balance of payment effects, is not new.⁷ The federal government has from time to time supported the idea of a uranium enrichment plant in Australia. Rex Connor saw this as an Australian-owned operation, financed with Japanese loan funds. That plan is no longer seen as viable, and joint equity with European interests seems more likely at present. The Western Australian government would like to see steel produced and exported from the state, as well as iron ore. Prospects for processing, however, depend on both the demand and the supply sides. We can do little on the demand side, and on the supply side we are sometimes unrealistically optimistic, assuming that our comparative advantage in minerals production extends downstream into minerals processing. It may not—other countries may offer a cheaper product, and may also want to process because of value added to *their* exports.

⁷ The Australian case is discussed in detail in: Susan Bambrick (ed.), *Mineral Processing in Australia*, Conference Papers and Report, Centre for Continuing Education, Australian National University, August 1973; Susan Bambrick, 'Mineral Processing in Australia: What Price Resources Diplomacy?', *Australian Quarterly*, Vol. 47, No. 1, March 1975; Susan Bambrick, *The Changing Relationship: The Australian Government and the Mining Industry*, Committee for Economic Development of Australia, M. Series, No. 42, May 1975, Chapter 2, Section VII and Chapter 4.

This is not to deny, however, that there are opportunities in processing. At the present time, Australia feels she may have an advantage in processing because of her energy supplies, in which industries such as the aluminium industry are particularly interested. Sir John Crawford, the Chairman of the commonwealth governments' study group on structural change,⁸ said in his October 1978 address to the Canberra Branch of the Australian Institute of Management that much of the future new investment in Australia would go into minerals processing.

Such new investment would have a more significant effect on employment during the construction phase than during the operational phase, and it is preferable that construction should occur at a relatively even rate rather than in booms and slumps which produce multiplied cyclical effects on aggregate income and employment in the economy. The commonwealth's Department of Employment and Industrial Relations, in its submission to the Crawford study, took the attitude that the mining sector would not create significant numbers of additional jobs in the near future, at least in part because of its high capital intensity, and that it would be the service sector that would have to create most of the new jobs needed to reduce present unemployment levels. Of this view it should be said that the creation of jobs in the service sector depends upon demand for services—and that employment and income creation in other sectors is an important determinant of demand for services.

What are the specific limitations on processing ambitions? On the demand side, these may arise from the existence of a global cartel in either the semi-processed or processed commodity, or from tariff policies in consuming nations. In general, it can be said that the greater the degree to which a commodity is processed, the more market difficulties it faces. Raw materials, e.g. concentrates, usually go to relatively few buyers, often on long-term contracts with established price conditions prices may sometimes be lower than spot prices, sometimes higher. Bulk transport of concentrates—often in the customer's own shipping—is cheaper and less complex than the transport of refined and semi-fabricated products. The latter are also usually sold in a more diverse market than concentrates with more buyers and contracts of lesser duration. Selling expenses may therefore be greater. Processed materials are much more likely to be subject to tariff increases or other forms of protection in times of recession. The U.S., for example, because of a flood of steel imports from Japan and

⁸ Other members of the group are the head of the federal Department of Industry and Commerce, the president of the Australian Council of Trade Unions, and the managing director of Ford Australia. The group, which was established in September 1977, is due to report late in 1978 or early in 1979.

Western Europe during its own steel industry recession, introduced a 'trigger price mechanism'.

On the supply side, limitations to processing may arise from capital shortages, high wage costs, technical problems, an unfavourable exchange rate or a set of tax provisions which acts as a disincentive.

To illustrate the difference that can arise between the supply and demand side, we might consider the case of the Australian steel industry, which has been subject to an enquiry by the Industries Assistance Commission. Early in its enquiry, the Commission was looking at the idea that Australia, because of its raw material endowment, could enjoy comparative advantage in steel production, if she took advantage of possible economies of scale. This theoretical emphasis on the supply side appeared unrealistic at least in the short term because the demand side was not favourable. However, since that time, there has been some slight improvement in demand, largely from appreciation of the yen, and Japan has been importing some semi-finished steel.

Economics is the fundamental question to be considered when we look at long-term questions such as the possibility that Australia may have a future as a producer and supplier of raw steel to the Japanese, Chinese and Korean steel industries.

A 'jumbo' plant has been considered for Australia. A jumbo works, if it eventuates, would probably be located farther south than the Pilbara, according to a feasibility study undertaken by an international consortium headed by B.H.P., currently Australia's monopoly steel producer and a significant producer in the iron-ore province of the north-west. The consortium has deferred a decision on whether the jumbo works will proceed at all. The reasons for deferral underline the market problems faced by companies studying processing. A jumbo works producing semi-finished steel for export was perhaps viable if steel producers from Japan, the U.S. and Europe were prepared to provide both capital and guaranteed sales. With the world downturn in steel demand, with Japan deciding she could find room for expansion of domestic steelmaking capacity after all, and with the U.S. steel industry increasing its competitiveness, the jumbo works in Western Australia no longer appeared economic.

The Japanese are not at present seeking significant permanent supplies of imported semi-finished steel within the next five years. Whether they may wish to do so later is a matter for speculation—and depends on parities, transport costs, construction costs and logistical constraints on customers.

Australia's jumbo is not of course the only jumbo proposal to be postponed. Even where a jumbo proposal is going ahead regardless of the depressed world market, this is seen by many as arising simply because it was too far committed for postponement. There has not been enthusiasm in Brazil, let alone Japan.

At present China is not an area showing very much interest in Australian steel, although this could change. She has both coal and iron ore supplies, but is at present importing raw materials. Korea is interested only in raw materials. She wants steelmaking capacity of 14.6m. tonnes by 1982, which will be almost double that of 1977.

Korea's position reflects Australia's fundamental demand problem. Just as *she* would like the value added, employment and balance of payments effects that come from further processing, so would other countries. They may prefer importing raw materials to semi-finished steel—and if we do not sell our raw materials, there are alternative sources—Brazil, India, South Africa for iron ore, for instance.

Can governments encourage processing? It was suggested in a 1974 Canadian document that 'appropriate policies could achieve greater mineral processing, fabricating, mineral-based manufacturing and intersectoral linkages over the long-term through a mixture of private and public investment'.⁹ Governments investing such funds in either the processing operation or its associated infrastructure will presumably see some prospect of a return. Sometimes benefits will not be the simple monetary profits that would attract private investors. In the developing countries in particular, but not there alone, there may be balance of payments needs (export earnings or import saving) that outweigh any considerations of a simple accounting rate of return. There may be a need to raise either national or regional employment, or, as in the case of the Pilbara region, government funds could be spent and justified politically on the grounds of building up the population and social infrastructure round the northern coastline to assist in coastal patrol. We will return to the question of the Pilbara below.

How can governments encourage processing? There are several possibilities:

- (i) State coercion: This is perhaps the most obvious and successful method which has been used in the past. In Australia it is the federal government that controls exports but the state governments that control mineral leases. The states can, and do, write processing conditions into lease agreements for they are all very concerned with economic development within their own boundaries. (Activity is particularly noticeable around the time of state elections. A Labor government in Western Australia produced its plan for the Pilbara industrial complex just before an election, and in a market-oriented rather than material-oriented move, the N.S.W. State Premier, Wran, before the October 1978 election announced company interest in an aluminium project.) The Western Australian government has required its iron ore mines to conduct

⁹ 'Towards a Mineral Policy for Canada, Opportunities for Choice', Department of Energy, Mines and Resources, December 1974.

feasibility studies of processing possibilities, and specified a timetable for the various stages. Hamersley, for instance, has operated a pellet plant at Dampier for some years and is building a concentrator at Mt Price. The company is still studying the possibility of steel production, for its 1963-4 agreement Act required it to be producing 1 m.t.p.a. of steel from an integrated works by the early eighties. Hamersley's parent, C.R.A., is studying the feasibility of producing steel from scrap in Victoria. Its partner in the project is a West German firm which markets the Midrex direct reduction technology, so that eventually any Victorian steelworks constructed might use as feed the product of direct reduction. Hamersley has for some years been examining the possibility of producing metallised pellets in Western Australia, presumably for export, for the jumbo steelworks which was the subject of a feasibility study by an international consortium for various sites in Western Australia was based on traditional blast furnace technology with coal as the reductant. For the production of metallised pellets in the Pilbara, it is possible that natural gas from the offshore field nearby would prove economic.

Another form of state coercion is a two-tier royalty system. In an agreement concerning bauxite mining at Weipa, the Queensland government set a royalty per tonne of 50 cents when processed within the state, and \$1 when not treated in the state. At Gove, in the Northern Territory, royalties are 20 cents per tonne for locally treated ore and 30 cents per tonne for untreated ore.

- (ii) Federal coercion: The Australian government some years ago employed an embargo to ensure primary separation of mineral sands before export. In that case the embargo was successful because there was no market constraint. Australia was to all intents and purposes the only producer of rutile for which there was not then a competitive substitute. However, the form of processing which was achieved was only the elementary stage. In the sixties and early seventies there was public pressure to apply the same technique to bauxite but the possible success of such a move would have been limited by the availability of bauxite supplies from other countries and the wide distribution of other aluminous clays which it could become economic to process. Some processing has been undertaken, and this is being extended.
- (iii) Infrastructure incentives: As mentioned earlier, the Western Australian government suggested an industrial complex in the Pilbara region. This featured the direct reduction of iron ore using natural gas from the North-West Shelf, and other industries such as aluminium based on bauxite from the nearby Kimberley region; petrochemicals using natural gas as feedstock; and a desulphurising plant for Middle East crude oil en route to Japan. The

commonwealth government was asked to help in providing infrastructure, and in 1973 it established a federal-state government study to appraise the suggested complex. The Study Group claimed to be restricted in its talks with overseas interests by the federal government's views on foreign investment, and by Connor's equivocation on natural gas pricing. The Group also complained that under its terms of reference it could not examine other possible sites for the proposed industrial complex. Outside commentators, however, saw the main shortcoming of its 1974 Report to be its lack of emphasis on demand, a fault often found also among federal and state politicians who tend to concentrate on the supply side, with market constraints forgotten. The demand side in this case subsequently asserted itself, and the plans have not been implemented.

- (iv) Other public expenditure, e.g. on research. Technical, political or economic factors may determine the direction of processing research. Australia at the moment is concerned with research on coal liquefaction and gasification, and indeed the federal government in its August 1977 Budget introduced a coal research levy, and in May 1978 announced the membership of the committee that would advise on the disbursement of these funds to applicant organisations. Governments may finance university research or research in other tertiary institutions. Research may be financed, in whole or in part, through funds from the long-established Australian Research Grants Committee, which is concerned only with projects in tertiary institutions, or the newer National Energy Research Development and Demonstration Council which advises on distribution of funds to industry, and to institutions both within and without the tertiary sector. The federal government also makes Industrial Research and Development Grants. As a generalisation, it may be said that research in industry is perhaps shorter term in outlook and more concerned with immediate prospects for commercial development than is research in university laboratories. There are of course exceptions to this. The development phase of particular projects may be carried out in industry although the basic research was performed in academic or government laboratories. The development and demonstration phases may be as deserving of subsidy as is the basic research. In the processing industry, for example, pilot plants may be an essential stage, but if their testing proves longer than originally estimated, company managements may not wish to continue financing them unless some government subsidy is available.
- (v) Government equity: Governments may take equity in processing projects for strategic reasons, for economic reasons (to provide employment or to earn foreign currency or even because the

industry is in financial difficulties), by reason of national pride, or because of a socialist outlook. Steel industries seem particularly prone to government involvement, often for a combination of these reasons.

Australia's Labor government of 1972-5 sought involvement in both a uranium enrichment plant and a petrochemical plant, but it lost office before these were achieved. The present government is also concerned with uranium enrichment, which was first mooted as a joint Australian/government/industry venture under the McMahon government which lost office in 1972; however, the present government sees it as a joint Australian/overseas venture. So did the Labor government, although the overseas partners envisaged were somewhat different.

Earlier interests by the Commonwealth, e.g. in aluminium as well as uranium, were for strategic reasons. The Commonwealth Oil Refineries (Altona), Dorset Tin Dredge, Rum Jungle Uranium and Glen Davis oil shale are examples of federal involvement for defence reasons, along with the Aluminium Production Commission (Bell Bay). The petroleum and aluminium interests have survived, but are now in private hands. Now the N.S.W. government is talking of building an 'oil-from-coal' plant. While their interest has been criticised as uneconomic, future generations—or even our own—may applaud their decision. Technology is available, as South Africa's S.A.S.O.L. II plant shows. Maybe more economic propositions will soon be available but there are lead times involved, and a plant built and operating may be preferred to a superior plant still on the drawing board. If the plant is uneconomic, then only a government can 'afford' to build it—and its decision to sink public funds in such a venture will be subject to political endorsement at the next election.

- (vi) Taxation incentives: As we saw in Chapter 6, the time pattern of depreciation allowances is important in determining the cash flow of the project when it begins to produce. By allowing rapid or immediate write-off of development expenditure, the commonwealth can improve repayment prospects and thus assist new ventures to obtain finance from the private sector. One complaint of the mining industry in the past has been that the tax incentives offered for exploration and development have not extended to processing, which has been treated as manufacturing despite the hardships frequently imposed by remote location. Investment allowances recently applied to manufacturing have of course been relevant to processing operations.

A series of possible cost-reduction measures are also possible, such as payroll tax rebates and special allowances (such as zone allowances) in the calculation of personal income tax, so that take-home pay to the workers can be maintained although companies

reduce gross wages paid. Cost-reduction, because it increases international competitiveness, enhances market opportunities.

Processing operations are in general less profitable than basic mining and exporting activities. They may be more labor intensive than mining activities, and may be more demanding of social infrastructure. Where some local processing is carried out by an integrated trans-national corporation or consortium, profit can be taken at any stage, and may not be taken locally. For Queensland Alumina Ltd, participating companies are charged a toll for refining, and the Taxation Commissioner can impute income tax on the basis of net profit earned on total funds employed at a selected rate of interest. Attitudes of governments in tax assessments such as these can influence the level of new developments undertaken.

- (vii) Incentives for project funding: In their attitudes to funding, Australian governments need to recognise that local capital costs may be higher than overseas costs—e.g. in the mid-seventies it seemed Australian capital costs were 30 per cent higher than Japan or the U.S. Governments wanting to facilitate processing will have minimum capital inflow restrictions. The Fraser government is at the present time seeking foreign capital inflow, but in a period when our currency was stronger, an earlier government instituted non-interest bearing deposit requirements for foreign capital inflows. This increased the amount and servicing costs of the funds required. Governments desiring to maintain Australian equity may borrow overseas using their relatively high credit rating, and re-lend the funds to developers at a lower rate than they themselves could have obtained. In Australia the Labor government (1972–5) proposed that the Australian Industry Development Corporation should borrow overseas, but that was thought to be to finance government equity.

In Australia, the local capital market is said to be small. This is one of the reasons given for the high degree of foreign investment in the mining boom of the sixties. Till 1973, however, some attempt was made by the Commonwealth government to encourage individual Australian shareholders to invest in mining. Calls paid to mining companies (and also, reflecting another Australian concern, to afforestation) were tax deductible. This provision was discontinued for alleged abuse, but the Industries Assistance Commission, in its Petroleum and Mining Enquiry, received a number of submissions to the effect that these concessions should be reintroduced, under strict regulations; although the suggestion was that shareholder concessions should be used to encourage mining, they could also be used as a processing incentive. There is at present an Australian government investigation of processing

and how to encourage it, and this may be one of the aspects under consideration.

Although governments may approve of and foster the mobilisation of Australian funds, they may not always frown on foreign investors. Substantial customers who are equity holders can provide stable markets. This appears to have been accepted by the N.S.W. government for the export of steaming coal to Japan, but turning from raw materials to processing, we may note the case of Queensland Alumina Ltd, where several international aluminium companies joined in the construction and operation of the Gladstone, Queensland plant which processes Weipa bauxite. The alumina is supplied at cost to partners in proportion to their equity, on a take or pay basis. The Weipa mine is owned and operated by Comalco, which was established with 45 per cent equity held by C.R.A. (Conzinc Riotinto of Australia), in turn 80 per cent owned by R.T.Z. of the U.K., and 45 per cent by Kaiser Aluminium and Chemical Corporation of the U.S. The other 10 per cent was issued to the public. The partners in Queensland Alumina have included Comalco and C.R.A., Kaiser Aluminium, Alcan (Canada), and P  chiney (France). The shares of the partners have changed during the life of the project.

A major incentive to project funding is an aura of political stability, not in the sense that governments do not change but in the sense that if they do change, most of the ground rules of investment will not—these include provisions relating to foreign investment, taxation, environment and even marketing. With current volatility of politics, where governments may change every two or three years, companies may follow opposition policies as well as those of the government.

Availability of project funds depends also on the government's foreign trade policies. Some of these policies will be specifically in the resources area, e.g. the tying of discussions on, say, the supply of enriched uranium to discussions on beef exports. However, any policy which affects the exchange rate will be important.

If Australia does attract energy intensive minerals processing, which industries may we expect? Aluminium, iron and steel, copper, nickel and titanium are amongst the suggestions by economic optimists. The time scale is rarely mentioned. The supply of energy at competitive cost will, however, be only one factor in the allocation of processing facilities among nations.

One project which is being actively considered is the Gladstone aluminium smelter proposed by Comalco Ltd. In April 1978, Comalco made a commitment in principle to the establishment of the smelter, subject to certain requirements being fulfilled and government approvals being obtained. Comalco intends to manage the smelter on behalf of a consortium of at least four companies.

Comalco's 1957 agreement with the Queensland government provided for the development of Weipa bauxite reserves. It was agreed an alumina refinery *would be established* in Queensland, and that the company *would investigate the possibility of establishing* an aluminium smelter within the state. The Gladstone alumina refinery, operated by a consortium in which Comalco now has a 30.3 per cent shareholding (an increase from 12.8 per cent), was established in 1967.

In 1972, a further agreement between the Queensland government and Comalco gave the company the right to opt for blocks of power for aluminium smelting in the Gladstone area. This agreement allowed the state to provide evidence to the commonwealth government that further power was required for an export-based industry, and to obtain from the commonwealth loans covering half the cost of the first stage of building the Gladstone power station. In February 1975, Comalco opted on a first block of power, preserving its entitlements to sufficient electricity to service the proposed smelter.

Extended discussions among the Queensland government, the company, and local authorities have resulted in a negotiated settlement for the provision of infrastructure. All will contribute to the initial developments, which will include the construction of the Boyne River bridge to link the Boyne Island smelter site with Tannum Sands; new roads; housing development; and water supply and sewerage.

The present program is to construct two potlines with an annual capacity of 180,000 tonnes; the first potline is expected to begin operating in 1982. Separate expansion programs in the future—if conditions are favourable—could raise production capacity to 360,000 tonnes per annum.

The smelter will be fed with alumina brought from the Gladstone refinery of Queensland alumina. Other raw materials sourced in Australia will be pitch (both coal tar and soft) from Newcastle; fuel oil, petrol and solvents; the majority of refractory bricks requirements; and soda ash. However, some raw materials will be imported—petroleum coke from the U.S.; aluminium fluoride, fluorspar and cryolite from Japan and/or Europe; cathode pre-mix from Japan and/or the U.S.; cathode blocks from France and/or Japan; and some refractory bricks from the U.S. or Europe.

During the initial construction phase, lasting about four years, the average workforce required would be around 500, with a peak of about 800 in the year before the first potline is commissioned. Subsequent construction would require an average construction workforce of 200.

The proposed operational workforce for the smelter at various capacities is set out in the table on p. 165.

Economies of scale can be seen for the workforce component at last.

Population growth in the Boyne Island/Tannum Sands region will be greater than this figure might indicate—not only because of the need to

'service' the smelter workforce, but also because people employed in Gladstone may choose to reside in the area. Housing not directly associated with the project will be provided by private contractors.

Proposed Smelter Workforce*

No. of potlines	1	2	3	4
Capacity p.a. (tonnes)	90,000	180,000	270,000	360,000
Process workers	285	540	740	940
Qualified tradesmen	165	250	320	380
Professional, technical and supervisory staff	130	170	200	220
Clerical and service staff	90	120	140	160
Total	670	1080	1400	1700

*Source: Comalco Ltd.

III The Encouragement of Exploration

Some decades ago, when Australia seemed short of supplies of strategically important minerals, 20 per cent tax exemption was introduced as a very indirect exploration incentive. Indirect it may have been, but it lasted till 1974 and many producers availed themselves of it. Concern over the level of Australia's petroleum reserves has also led to various quantitative incentives not now used. Their form varied over time. Ensuring an economic return (through world parity pricing) and not suggesting resource rent taxes can also help. Exploration for petroleum has also increased as a result of development activity on the North-West Shelf. During Labor's period of government, general uncertainty was frequently cited as the cause for a downturn in petroleum exploration activity. Governments may explore either on their own account or, as in the case of the Bureau of Mineral Resources and some State Mines Departments and Geological Surveys, make basic information available to private developers. T. M. Fitzgerald, in his 1974 *Report*, regarded this expenditure as a subsidy to industry. He also pointed out that although the government had aided petroleum search through a direct subsidy, it had no equity in profitable producing fields.

Government attitudes and expenditures both influence private exploration expenditure. C.R.A.'s submission to the Industries Assistance Commission's Petroleum and Mining Inquiry, May 1975, appendix D, suggested that

Exploration will proceed at an active level only in those countries where Government policies encourage mining, and where the industry can be confident that investment in exploration and development will not be unduly at risk through future instability

or changes in Government policy. The effects of Government policies on tax, foreign ownership, are taken up elsewhere. It is worth noting here that the relationship between both tax and royalties and exploration activity is often not appreciated. The estimated effects of the imposts are fed into the feasibility study cash flow forecasts to determine the viability of a prospective mine. An increase in either can eliminate from economic reserves very large quantities of ore, thus nullifying the benefits of much exploratory work. A feeling by explorers that a Government may increase tax or royalties in the future will tend to deter present exploratory activity.

Discussions of resource rent taxes as a live issue in Australia from August 1977 to July 1978 would have been expected to have some deterrent effect on exploration.

C.R.A. continued:

Many countries have substantial resources of, and great prospects for, certain commodities, but exploration has for long periods been at a low ebb because Government policies have been hostile towards mining investment, or because of political instability. Peru, Argentina, Chile, Zambia, India, Burma and Iran are prime examples. Activity has subsequently picked up in some of the South American countries, but recent events in Zaire would not be expected to have improved prospects. In contrast USA, Canada, Australia, South Africa and Scandinavia have had substantial mining industries and active exploration for long periods, because of stable Government and encouraging policies.

C.R.A. then cited examples where exploration has increased in response to 'improvements' in Government policies: Ireland in the 1960s, Brazil in the 1970s and the Philippines since 1972, and drew attention to recent policies less encouraging towards the mining industry which have emerged in some developed countries:

In Canada, for example, the imposition or proposed imposition of heavy additional royalties or tax or state ownership has already substantially reduced exploration in British Columbia. In Manitoba and Saskatchewan it has cut the planned expenditure on primary exploration by several major companies. They have increased their actual or planned expenditure in areas with apparently acceptable fiscal regimes such as the North West Territories, the USA and overseas.

At the same time, urgent development needs have led to modification of previously hostile attitudes of Governments in developing countries of Latin America and Africa which have favourable prospects for mineral discoveries. As a result there is a shift in exploration emphasis towards some developing countries.

One important element in encouraging exploration in the past has been the work of the Bureau of Mineral Resources, but the Fraser



Above: Mount Tom Price township, W.A. By courtesy of Hamersley Iron.

Below: Burleigh Beach about 1970; the beach was first mined in 1952.
By courtesy of Mineral Deposits.





Above: A huge electrically powered walking dragline, Saraji Mine, Bowen Basin, Queensland.

Below: Peak Downs Mine Bowen Basin, Queensland.
By courtesy of Utah.



government's policy is to reduce the activities of the Bureau to those that cannot reasonably be performed by the states, and the Bureau's staff has been significantly reduced.

The pattern of exploration funding has changed over this century. The lone prospector of early years, who sold his discoveries, is no longer a significant force. Some companies still explore on their own account, but because exploration is such a high risk, high cost industry, companies may prefer to spread risk by engaging in joint exploration ventures with other companies. Australian companies with prospecting tenements may seek 'farm-in' agreements with overseas companies, as a means of raising funds. If government attitudes to farm-ins become restrictive, as they did during the Connor era, this can reduce the overall level of exploration. Some foreign government organisations are also exploring in Australia in an attempt to secure raw material sources.

D. J. McGarry, in a recent address,¹⁰ stressed that the market incentive in the petroleum industry would take care of exploration if it were allowed to do so. In his synopsis he said that, 'if historical precedent can be relied on as an indicator of things to come, then the momentum generated by the North-West Shelf Project will spread across the entire industry and restore the confidence which has been so lacking in recent years, particularly in the exploration sector'. (Since he spoke, the momentum has been obvious—as Chapter 8 indicated, there has been considerable activity offshore in Western Australia.)

McGarry went on:

The speed of recovery will increase if industry is not hindered by unnecessary intervention and regulation. There is a greater urgency now to discover and develop our petroleum resources and every encouragement must be provided to draw the necessary capital into our industry to ensure that our energy goals are met. Precious years have been lost, essential facilities have left the country and key personnel have departed. The immediate task is to reassemble the expertise that once brought Australia near to self-sufficiency and which can do so again. The exploration industry has undertaken massive financial commitments for the next five years and these will continue to expand if the political and geological factors remain favourable.

In his paper McGarry said that the effect of the development on future exploration could be deduced from past experience, but that there is a difference in this case—some people have felt that the L.N.G. development and its associated exploration program will absorb so much money that little will be left for other search. McGarry did not share this view.

¹⁰ 'Impact on Australian Petroleum Exploration of the North-West Shelf Development', *West Coast L.N.G. Symposium*, Papers, University of Western Australia Extension Service, Perth, 16 December 1977.

An examination of the history of petroleum exploration in Australia found a cyclic pattern of expansion and retraction in the level of activity:

The initial expansion at the turn of the century was small and it was followed by almost 20 years of inactivity until the next phase from 1928–1936, which only showed a production base in Queensland. Some 20 years of negligible activity followed and then came the rapid expansion of the 1960s, when Australia's present main oil and gasfields were discovered. By the early 1970s, the industry was plunging again into serious decline, but today we are witnessing the early stages of a new revival.

History illustrates the fact that expansion, not only of development but also of exploration, has always followed on discovery (or, in the first cycle, on rumours of discovery). McGarry suggested that a second lesson of history was that:

decline has been accelerated or prolonged through government neglect or heavy-handed intervention. The latter accounted for the disastrous collapse after the recent era of significant discoveries. The obvious break of exploration activity evident after the major NW Shelf discoveries on analysis had several causes and two were basic. Firstly, the discoveries were gas and whilst gas was at that time suffering a significant increase in useage, it could not be perceived that the domestic market could be of any significance when related to the cost of development—even as 'wet' as the gas proved to be and even taking into account Australia's poor liquid petroleum reserves for which some devised expensive conversion processes of the gas were suggested. Secondly, whilst world wide natural gas useage was experiencing increased growth, demands on production were not significant until the increases of crude oil prices from 1973 onwards. Markets overseas were more convinced of the need for large stable sources of production from that time on, thus making the contemplation of production from areas of physical difficulty and supposed political stability, such as the North-West Shelf, much more feasible.

McGarry drew attention to the way the impending feasibility of the North-West Shelf venture was hampered by government. He said of direction by public servants:

If those directions had come from people with good industrial experience and know-how no doubt a different status in the project would have been achieved. Indeed, a reflection on our past history will indicate that our best years of activity came when Government incentive by way of taxation incentives and smart political decisions were the greatest and bureaucratic interference and control were virtually non-existent. One would not choose a geophysicist to run a law business, so one can hardly expect to achieve great results when the intervention of lifetime public servants becomes heavy in the petroleum industry scene.

The current symptoms of revival are attributed by McGarry largely to 'new-found government understanding of the economic realities peculiar to high-risk ventures.' He suggests that 'things would move a lot faster with full industry control', and points out that:

when successful exploration achieves discoveries, it is important that the rewards accruing from this success go to the risk-taker. Only in this way will others be encouraged to challenge the great odds that normally detract from investment in exploration. In the past, governments have eroded the incentive to explore by limiting the returns to producers through imposition of controlled pricing and production levies. Removal of favourable taxation provisions has had a similar effect. The full impact of such measures is felt when industry activity is in decline and investor confidence has been shaken.

In addition to those factors which are immediately apparent, the industry is also responsive to policies affecting the inflow of overseas capital, security of tenure of exploration permits, environmental requirements and industrial relations. Poorly conceived policies in these areas can add to the many uncertainties that already weigh against investment in the industry.

11 Decisions of Government:

Government Participation, Subsidies, Foreign Ownership and Federalism

I Government Participation in the Mining Industry

From earlier chapters it is clear that the present Liberal-N.C.P. federal government, while anxious to see mineral development occur and willing to go some way towards facilitating it, does not generally wish to become involved in the development itself. This is in contrast with the Labor government, 1972-5, which went so far as to establish its own Petroleum and Minerals Authority (P.M.A.). It was established to explore for, produce, transport and market minerals.

The Petroleum and Minerals Authority Act 1973 was passed on 8 August 1974. Three main functions were defined for the Authority:

- (i) Exploring for, mining, processing, transporting, buying and selling petroleum and mineral products in Australia and elsewhere, alone or with others. The P.M.A. could not give these others grants or subsidies.
- (ii) Surveying Australia's mineral reserves.
- (iii) Planning long-term recovery of minerals in the light of long-term needs.

The P.M.A. might perform its functions only:

- (a) in a territory;
- (b) in relation to natural resources of the submarine continental mass;
- (c) to facilitate trade between states, between territories and states and with other countries;
- (d) to ensure adequate reserves in case of war;
- (e) in matters incidental to (a)-(d).

Although (a) and (b) appeared restrictive, (c), (d) and (e) appeared to cancel out any restrictiveness.

The climate of the energy crisis precipitated by the activities of the Organisation of Petroleum Exporting Countries was reflected in a provision that the P.M.A. should ensure adequate supplies of petroleum and minerals which were normally imported if the exporting country restricted or prohibited its sales to Australia. How this was to be accomplished was not specified, which is hardly surprising. (Our best insurance against O.P.E.C.'s future activities would have been to maintain or increase local petroleum exploration and to refrain from encouraging consumption through artificially low prices and restrictions on small-car imports.)

The P.M.A.'s powers included the general power to do anything incidental to performance of its functions. Its specific powers included:

- (i) purchasing, leasing and taking easements over land and disposing of land so acquired;
- (ii) purchasing, leasing and selling equipment;
- (iii) providing transport, accommodation and amenities for employees;
- (iv) entering into agreements with others for work or services, either by or for the P.M.A.;
- (v) forming a company, alone or with others;
- (vi) acquiring and disposing of shares and debentures;
- (vii) agreeing with others on the use of patents, held by others or the P.M.A.;
- (viii) acquiring interests in mining undertakings in Australia and elsewhere, or in other undertakings consistent with its authority;
- (ix) lending money to people or organisations performing or intending to perform mining activities in Australia or any other Australian activities consistent with the P.M.A.'s functions; and underwriting share and debenture issues for companies engaged in such activities.¹ The P.M.A. was also empowered to give guarantees, but both that and its underwriting power were subject to Treasury control. (The powers set out in this paragraph were considered important in retaining Australian ownership of mineral development, since it had been capital shortages and the unwillingness of lenders which had driven Australian concerns, often very small scale, to seek overseas partners.)
- (x) Entering into partnership or risk-sharing arrangements in exploration for and recovery of petroleum and minerals, and sharing production and profits involved. (This provision meant that the P.M.A. could engage in farm-in and farm-out agreements. Its ability to take a share in an existing lease—farming-in—was expected, like the previous provision, to help keep Australian interests in Australian hands,² or, if the original lease

¹ The P.M.A. could lend money and underwrite issues only for Australian activities, whereas its other powers, including partnership agreements and buying shares, were not so restricted.

² In November 1974, the Western Australian Premier, Sir Charles Court, warned mining companies that if they accepted any type of federal assistance they would be refused access to mining tenements in Western Australia. The federal government expressed its determination to ignore this threat. The uncertainty of potential private ventures was not lessened. Endeavour Oil, N.L., had been talking to the P.M.A. about possible participation in a nickel prospect, but in December 1974 it backed down because of the Western Australian government's threat. Northern Mining had also sought P.M.A. aid to complete the proving of its Murchison iron ore deposits and feasibility studies into construction of a semi-finished steel plant at Geraldton.

was in foreign hands, to raise Australian equity. The P.M.A.'s ability to take partners into its own leases—farming-out—would presumably help to spread the risk to which taxpayers' capital would have been exposed.)

While most of the above powers would seem reasonable to most Australian electors if they paused to consider them, the P.M.A. had some powers which gave wide concern. These included its powers to enter and to occupy land.

The P.M.A. or its representative could enter land for inspection or survey if it had the occupier's written consent or if it had a warrant. It could also occupy land if either of these conditions was satisfied, and could then build or remove anything it liked.

The land concerned included state-owned land, a provision hardly likely to be popular with state governments, but the main concern with the provision was the easy conditions under which a warrant could be granted. Any Justice of the Peace—including presumably one of the P.M.A. staff—could grant such a warrant if the occupier had refused consent, or if it was impracticable to obtain his consent, and if the J.P. was satisfied that the land was necessary for the P.M.A. to carry out its functions such as exploration, mining and processing.

It was hardly surprising that state governments and private leaseholders should be concerned about such provisions. Some state governments, concerned with their sovereignty (after all, so far they had had the power to dispose of mineral rights), mounted a constitutional challenge to the P.M.A. Act in the High Court. This challenge was based on the history of the Bill's passage through parliament, and hinged on whether the Senate 'rejected' or 'failed to pass' the Bill on a particular occasion. That technicality affected whether the Bill could legally be passed by a joint sitting of both Houses after the 1974 double dissolution. The P.M.A. was declared illegal by the Court.

Even if the legality of the Act had been upheld by the High Court, there could have been legal challenges to the P.M.A.'s authority to enter and occupy land. Legal opinion seemed divided. An interesting sidelight on the whole question is that if the Bill had not become entangled in the joint sitting debacle, it would have been subjected to amendments, and this provision for the issuing of warrants was one which would certainly have been challenged by the opposition in the Senate, and one on which, by all accounts, the government would readily have given way. It has even been suggested that this provision was inserted merely to draw opposition fire, and to be amended, thus facilitating the passage of the Bill through the Senate.

The P.M.A. can be seen as the creature of Connor, the then Minister for Minerals and Energy. It was not surprising that the Authority had to comply with the Minister's directions. Such directions were to appear in the Annual Report. They might include directions to undertake overseas

operations for purposes of foreign aid. Whether the P.M.A. was likely ever to become a multinational miner for profit is a matter of speculation.

Members of the Authority were to be appointed for up to seven years, but to be eligible for reappointment. They included a full-time chairman and a full-time executive member (the latter was appointed well before the Act was passed); the Secretary to the Department of Minerals and Energy, and two part-time members. A frequent criticism of the P.M.A. was that it was a departure from Australian practice in domestic aviation, banking and broadcasting, where independent government bodies are in competition with private enterprise, and in aviation and banking at least, on commercial terms.³ The P.M.A., on the other hand, had direct links with the Department of Minerals and Energy, and powers, information, and the benefit of ministerial discretion far beyond that enjoyed by private enterprise. Needless to say, such competition was not regarded by industry as entirely fair.

To the general public, who might see its economic welfare as enhanced by the P.M.A.'s operations rather than by private industry's, such 'unfairness' might have seemed an advantage; but if it was a rational general public, it was also interested to know whether commercial criteria applied to the disbursement of public funds. The principles of cost/benefit analysis could also be applied.

The Act gave the policy of the P.M.A. as seeking to make a profit after payment of all expenses and income tax. No interest was payable on capital supplied by the Treasury from parliamentary appropriation.

The original figure mentioned for capital, \$50m., seemed highly inadequate in the light of necessary annual expenditure on petroleum exploration alone, i.e. compared with former annual private expenditure, and in the light of a careless attitude to use of existing reserves. Of course, joint venture agreements (including agreements for private exploration and joint public/private development) could have raised the total.

The P.M.A. could increase its expenditure by borrowing—from approved banks, from the Australian Industry Development Corporation and from other lenders. Such borrowing needed the approval of the Treasurer, who could guarantee repayment. As in the case of direct public funding of risky exploration, then, the government could bear the risk, the lender need not—a necessary provision if funds were to be obtained. The P.M.A. could of course give security over its assets for borrowing purposes, but in the early stages at least this provision was of doubtful value.

Were the rights of others protected by the P.M.A. Act? Before starting to explore for or recover minerals or petroleum, the P.M.A. was to

³ Although competitors are protected to some extent by the two-airline policy and the Banking Act respectively.

gazette its intentions. It could not begin exploring or mining in such a declared area unless it had the occupier's consent or a warrant—except in certain submarine areas.

Any petroleum or minerals recovered or discovered by the P.M.A. belonged to it, but the previous owner could claim compensation by coming to an agreement with the P.M.A. or through action in the Australian Industrial Court. Either of these was uncertain in its outcome. An owner could also claim compensation if land entered or occupied by the P.M.A. was damaged or disfigured.

Considering ministerial interest in, and commitment to, a national pipeline grid, whose first stage was already under construction, it was not surprising that the P.M.A. acquired 50 per cent of Delhi International Oil Corporation's interest in the oil and gas reserves of the Cooper Basin. The move was in line with government policy on foreign ownership, since Delhi had proposed to sell a 50 per cent interest to the French Aquitaine group. In addition to its 50 per cent acquisition of Delhi's gas reserves, the P.M.A. acquired 25 per cent of Delhi's interests outside the area, interests which include production, processing, storage and other related facilities. The initial cost of acquisition was \$13.4m. of which \$1.7m. was to be paid on the completion of formalities, with the remainder in twenty-eight equal quarterly instalments of \$420,000 each, plus interest. Further consideration was to be decided when the planned natural gas liquids project commenced and would be based on the value of reserves which were being acquired, with a limit of \$10.8m.

The basis for deciding cost was not publicised, but commentators regarded the payment as excessive on a number of grounds—such as the market value of an equivalent purchase of Santos (Delhi's partner), or a comparison of the present values of expected reserves and considerations for purchase. The Liberal-N.C.P. government has divested itself of the Delhi holdings, selling to a company owned jointly by the South Australian Gas Company and the Pipeline Authority of South Australia.

Prior to the Delhi acquisition, the P.M.A. was 'cutting its teeth' on Wambo Coal and Mareeba Mining N.L. The new government has not maintained its interests.

Wambo's main assets were 73m. tonnes proven reserves. It was facing a cash shortage and technical difficulties. According to Connor, Wambo was being threatened by a foreign takeover, but this was denied by some interested parties. The P.M.A. stepped in to take a 49 per cent interest. The terms were direct equity participation of \$3.7m. and an immediate loan of \$700,000 to overcome urgent financial problems.

The Mareeba case was a little different. Mareeba originally granted the P.M.A. an option to take a 50 per cent interest in the company, the option being to purchase 5 million 50 cent ordinary shares at par, each share being paid to 1 cent on allotment, i.e. the initial payment was

\$50,000. The P.M.A. was prompted by Mareeba's option over the promising Dianne copper field in North Queensland—lending \$300,000 to enable Mareeba to take up its option over Dianne.

By the time the P.M.A. came into being, its projected activities in petroleum exploration had become necessary. The government's policy towards petroleum exploration had been killing the industry, and in the absence of any control on local consumption had left our national outlook in a parlous state of inadequate reserves and rising prices as we had to import more crude oil. The removal of the petroleum exploration subsidy in 1973 was probably not of prime importance, nor was the refusal to raise the local price of crude to world standards the real issue. The real limit to local exploration was uncertainty. No company mindful of its obligations to its shareholders can commit funds without being sure it can profitably develop commercial finds. Experience on the North-West Shelf—and in other industries such as uranium—did not then give companies such confidence.

Discussions of the P.M.A. were also confused by the fact that Australian, and government, ownership had become objectives in themselves. It was by no means certain that pursuit of those objectives would maximise real income.

The P.M.A. was not the only creature of government in that period. The Pipeline Authority remains.

The Pipeline Authority Act was passed on 7 June 1973. The functions initially required of the Authority were to provide an integrated system of pipelines from gas sources to population centres and export points, for transport of petroleum and natural gas; to ensure uniform prices of natural gas throughout the grid; to buy and sell petroleum (including natural gas) in Australia and elsewhere; and to ensure that adequate reserves of petroleum remained in Australia to meet our own long-term needs.

It is difficult to see the rationale behind the requirement that natural gas prices should be uniform throughout the grid. It was originally stated that this was in the interests of decentralisation, but such can hardly be the case. What user would willingly locate in Alice Springs or in the Pilbara, with all the attendant cost penalties for other factors, when he could have the same gas prices in Sydney, or even Albury, with their lower establishment and running costs?

The powers of the Authority are wide enough to allow it to perform its functions. Specifically, it can purchase, lease and dispose of land; it can take easements over land; it can buy and sell machinery; it can provide accommodation and amenities for employees; it can make arrangements with other parties for transport of their petroleum through its pipelines; it can make agreements for construction of pipelines; and it can buy, or otherwise acquire, and dispose of shares. (Terms of acquisition other than by purchase gave concern in some quarters.)

As with the P.M.A., the Pipeline Authority's ability to enter and occupy land caused debate. With the P.M.A., the owner/occupier's permission was first sought, and if it was not obtained, a warrant was obtained from a J.P. The Pipeline Authority did not even have to seek the occupier's permission to enter land, only a J.P.'s warrant. For occupation, however, it had to give a month's notice to the occupier. In contrasting the powers of the P.M.A. and the Pipeline Authority, it should be recognised that the nature of disturbance is different in pipeline construction and exploration/mining; the length of disturbance involved is different; and the economic nature of the assets in dispute are different.

There are also differences in the financial risks and assets of pipeline construction and exploration/mining, but the financial provisions for the P.M.A. and the Pipeline Authority were similar in some respects. With the Treasurer's approval the Pipeline Authority could borrow working capital from any approved bank, the A.I.D.C. or other lender, and for the purposes of this borrowing it could give security over its assets. The Treasurer could also guarantee repayment of any amounts borrowed. He could also make advances to the Pipeline Authority out of money appropriated by Parliament for this purpose.

The main difference between financing the two authorities was in financial policy; the Pipeline Authority was expected to make enough money to cover expenses but not to make a return on capital, as the P.M.A. was. However, is the difference more imagined than real? The Pipeline Authority is required to secure revenue 'sufficient to meet all its expenditure properly chargeable to revenue'. The Treasurer determines the terms of advances of public funds made to the Pipeline Authority and is therefore in a position to require some return on capital through interest payments. No income tax is payable. Any profits made are to be applied 'in such manner as the Minister, with the concurrence of the Treasurer' decides.

The initial activities of the Pipeline Authority involved the construction of the Moomba-Sydney pipeline, originally planned by private enterprise in the form of the Sydney gas supplier, A.G.L. Its future activities were to include extensions to Newcastle and Wollongong; a northern lateral to Cowra, Orange, Bathurst and Lithgow; and a southern lateral to Cootamundra and Wagga. Attention was thus focused on supplying New South Wales. The Pipeline Authority had decided not to extend the southern lateral to Albury-Wodonga as the Victorian Government had announced its intention to supply this area with gas from Gippsland through its own pipeline.

Under Labor there were plans for a link between Gippsland and Sydney. (Sydney was originally to have been supplied from Gippsland, but negotiations some years ago—before the existence of the Pipeline Authority—were not completed.) There were also plans to link the

North-West Shelf with Western Australia's eastern goldfields. There were plans to supply a large petrochemical plant at Redcliff, South Australia, which would process liquids stripped from natural gas in the Cooper Basin. It would also require a natural gas line to supply its energy needs. This project has not proceeded. There were plans to extend a pipeline from the Cooper Basin into the Palm Valley field as back-up supply, and a long and important link between the North-West Shelf, Palm Valley and Sydney.

Some state governments have had operational experience in mining for decades, since they have assumed responsibility for the production and distribution of electricity. The N.S.W. Electricity Commission is now to join a Japanese partner in mining a steaming coal deposit and is also involved with R. W. Miller and Pioneer in coal interests. Further developments involving the Electricity Commission in exports to Japan have been said to be expected to provide finance for the electrification of the state's railways. Victoria's State Electricity Commission operates mines and power stations, and is actively investigating possibilities for liquefaction and gasification of its brown coal deposits in Gippsland, in conjunction with overseas interests.

The South Australian government, which has been reluctant to grant price rises to the companies supplying Adelaide, has now become involved in gas exploration because of an expected shortfall in the state's supply. There have been comments that if more gas is not found, South Australia may have a nuclear power station by 1990. The Gas and Fuel Corporation (which is a Victorian government authority) and Beach Petroleum N.L. have been awarded a permit to explore for hydrocarbons in Bass Strait. The press reported at the time that:

The Victorian Minister for Minerals and Energy, Mr Balfour, . . . virtually conceded that gas exploration rights in Bass Strait had not been awarded to the highest bidder . . . Mr Balfour said . . . that there was nothing in the Petroleum (Submerged Lands) Act which either stated or implied that permits were to be granted on the basis of competitive bidding.⁴

This was in response to a comment by the chairman of B.H.P., which with Esso, its partner in Bass Strait, had been the only other applicant for the exploration rights. The chairman, Sir James McNeill, had 'attacked the State Government decisions, saying that if the award went to the best bid, there could be no complaints'.⁵

Since Australia is anxious to delineate further economic reserves of oil and gas, it might be considered that both national and state planning would be helped by early exploration, and that timing as well as tender

⁴ Paul Malone, 'Battle for Bass Strait', *The Australian Financial Review*, 12 May 1978.

⁵ Ibid.

price might be important. It was reported that the Gas and Fuel Corporation/Beach Petroleum partnership would not be ready to drill for at least eighteen months, while Esso-B.H.P. planned to begin drilling within that period.

When governments decide to invest in particular operations, what criteria do they use? Private enterprise may make intuitive decisions, but they may frequently be based on discounted cash flow analysis, accompanied by sensitivity and risk analyses—although with increasing uncertainty, alternative scenario planning has become popular. Taxpayers would like to feel commercial criteria also have some place in public investment decisions, although there will always be some political factors involved. The latter may range from those with some national appeal, like 'populating the north' or 'maintaining employment levels' to those which are aimed at winning local support for an individual parliamentarian in a marginal seat just before an election.

II Subsidies

Government may subsidise the minerals and energy sector from time to time, when decisions made on a commercial basis may not be regarded as serving the national interest. Thus the federal government until 1973 subsidised petroleum exploration; it gives Industrial Research and Development Grants; and since the company operating the copper mine at Queenstown, Tasmania, has been in financial difficulties in a poor world market, the federal government has joined the state government in providing assistance to keep the community employed.

Mt Lyell Mining and Railway Co. Ltd is a partly-owned subsidiary of Consolidated Gold Fields of Australia Ltd. In 1977, Mt Lyell's pre-tax loss was \$11m. (\$6.1m. after tax benefits).

Subsidies to Mt Lyell started on 15 August 1977 when the commonwealth and Tasmanian governments agreed to fund the company on a dollar-for-dollar basis. In November 1977, following an Industries Assistance Commission report on the copper industry, the commonwealth took over total responsibility for cash contributions to Mt Lyell. In the ten months from August 1977 Mt Lyell received \$3.3 million (\$2.8 million for running costs and \$500,000 for capital expenditure) in cash payments. The Tasmanian government had over the ten months forgone payroll tax on Mt Lyell of \$400,000, making the total overall assistance given the company by governments \$3.7 million. This was significantly less than the \$6.1 million which it was estimated in August would be needed to keep the company afloat for the ten months; reasons are the cost-cutting measures initiated by the company, together with better returns which have flowed from improving copper prices as a result of the war in Zaire.

In June 1978 the Press reported that the federal government had decided to continue support for a further three months from 1 July. The

cash payments by the commonwealth will amount to between \$750,000 and \$1 million for the three months. Mt Lyell, the commonwealth and Tasmanian governments will begin three-way discussions during that period. The continued support was regarded as an interim measure while firm proposals for the future are discussed.

One day after the support was announced, the relevant Industries Assistance Commission's report was released.

The Commission recommended that the federal government should withdraw the existing assistance afforded to Mt Lyell three months after announcing its decision on the report; and suggested that a counselling team consisting of representatives from the Commonwealth Employment Service, Health, Social Security and other relevant federal or state departments be sent to Queenstown, if the mine was to be closed down because of withdrawal of the assistance. The purpose of such a counselling team would be to help people in the area affected by the mine's closure to find alternative employment and to make the necessary personal adjustments. The Commission suggested that if the counselling team found the extent of personal adjustment to be such that alternative employment assistance was unlikely to be adequate or provide sufficient inducement for people to look for other employment opportunities, the government could consider providing lump sum cash payments to persons to supplement existing commonwealth and state adjustment schemes. This recommendation was not costed. The Commission implicitly took a cheerful long-term view of Australia's/Tasmania's economic prospects. It said that the real economic cost of subsidising the operation of mines to keep them producing could be evaluated only by comparing the value added by resources in mining with the value added by the resources in uses to which they would be put if the mines were to close. The Commission acknowledged that there would be a short-term loss to national economic welfare if Mt Lyell closed and that this would continue 'as long as the resources released by closure produced less than they would have with the mine open'. In refusing to countenance the idea of subsidising the mine, they thus assumed that labour released from Mt Lyell would in the longer term be able to transfer to more productive activities. (It could well be argued that the labour could be kept employed at Mt Lyell until these more productive activities offered employment.)

The Commission considered that 'the prospects for Mt. Lyell attaining reasonable profitability in the longer term in the absence of assistance additional to that available to the rest of the copper industry . . . are relatively poor'. Furthermore, it 'found no reason to believe that the provision of assistance to specific copper producers or regions would provide greater benefits to the community as a whole, than would funds allocated for employment creation either on an economy-wide basis or to other firms, regions or industries'. It said that 'there appears to be no

reason at present to favour workers in remote, long-established mining communities relative to others in the workforce who have lost, or may lose, their jobs due to the present downturn in the Australian and international economies'.

III Foreign Ownership

Writing in 1972, I said:

if the extension of foreign ownership is seen as undesirable, this seems to be on a nationwide basis, and it is the Commonwealth Government which is expected to take any blanket action required. The State Governments can affect to some degree the extension of foreign control in mining, since they can favour Australian companies in granting new leases; but for the most part they appear to be interested in achieving maximum private capital expenditure in their State, and they may favour foreign firms. If Commonwealth action on foreign ownership is taken, this will affect the States' freedom to some extent.⁶

Since then, of course, foreign ownership in development—not necessarily exploration—has been limited to 50 per cent if possible (75 per cent for uranium developments) and this has caused the states concern.⁷ Actual levels of foreign ownership and control in joint ventures depends on specific definitions of local and foreign companies. The federal Treasurer administers the foreign investment guidelines on the advice of the Foreign Investment Review Board. This considers each proposal on its merits.

The federal government in 1978 has moved to ease the definition of foreign companies at the same time as its expenditure cuts have meant the Australian Bureau of Statistics has discontinued its monitoring of the level of foreign ownership. Companies can now be regarded as 'Australian' if they have 25 per cent Australian ownership and intentions of increasing this proportion.

Conzinc Riotinto has for some time been putting similar proposals forward, since Utah and Mitsubishi were permitted to meet the 55 per cent Australian content requirement for the new Norwich Park project by selling an interest in their total Australian operation.

The main arguments against the proposal were:

⁶ 'The Integration of Australia's Mineral Policies', paper delivered to the ANZAAS Congress, Sydney, August.

⁷ For a detailed study of foreign investment in the Australian economy as at 1972, see Commonwealth Treasury, Treasury Economic Paper No. 1, *Overseas Investment in Australia*, May 1972. This examined not only the statistical information but wider issues, such as overseas investment and domestic economic management. A Senate Committee on Foreign Ownership held extensive hearings whose proceedings were published. Another useful discussion is R. B. McKern's *Multinational Enterprise and National Resources*, McGraw-Hill, Sydney, 1976.

- (i) the threat to the capital market, for if foreign companies issued large amounts of capital Australian companies would find it harder to borrow funds locally;
- (ii) that over the next few years foreigners would own an increasing proportion of resources projects, e.g. C.R.A., B.P., Esso and similar companies by gaining Australian status could enter into joint ventures with foreign companies.

State governments would still have some right of veto, e.g. as the then N.S.W. Minister for Mines, P. Hills, originally affected C.R.A.'s joint bid with Howard Smith for C.A.I.L.—although the federal government approved the takeover, Hills had already indicated that if C.R.A.'s bid succeeded, C.A.I.L. would not have access to the Warkworth coal deposits which were the main attraction in the bid at the time of writing; the joint bid is no longer operative. Howard Smith has been active, and another partner has been suggested. Hills has enquired if C.R.A. is interested, and has held talks. In this particular case, there appeared to have been some difference of opinion between the N.S.W. Premier and his Mines Minister and if N.S.W. wishes to attract further overseas interest in its coal deposits—as the Premier seems anxious to do—some compromise seems necessary.

On indications at that time company takeovers would be specifically excluded from the proposals. Takeovers would be subject to scrutiny by the Foreign Investment Review Board as they are at present.

On 31 May 1978 the Federal Treasurer, J. W. Howard, confirmed that the federal government would soon be announcing a relaxation of its foreign investment policy, but that there would be no amendments to the Whitlam Labor government's Foreign Takeovers Act as part of that policy relaxation. Despite the very informed comment in the press, he did not inform parliament of what the changes would be, although he said the relaxation would be designed to remove some of the disabilities that might exist for companies in which there is some local shareholding. This was because of a view that some companies in which there is a majority overseas shareholding as well as a not insignificant local shareholding are disadvantaged under the existing foreign investment guidelines.

Arising from representations on these matters the government had developed some proposals on changing the policy which he and the Minister for Trade and Resources, J. D. Anthony, had discussed with 'a representative group of companies' a few days earlier.

The purpose of the Government's deliberations in this area [he said], is to relax but not to undermine in any way the essential features of the Government's foreign investment policy. We have in mind the removal of possible anomalies and possible disincentives, whilst recognising the importance of the principles on which our foreign investment policy is based.

On 1 June 1978, the *Financial Review* reported that Gordon Jackson, the chief executive of Australian company C.S.R., had said at a Canberra meeting that further considered public debate was desirable, that undue haste would be counter-productive, and that 'the new guidelines would not achieve the result intended and would possibly create new uncertainty about the acceptability of foreign capital in Australia rather than encourage such investment'. Jackson was said to have summed up the new proposals by saying that in essence they would cause the present 50/50 guideline rules to be replaced by a 75 per cent foreign ownership, a percentage which was against community wishes; and that the present '50/50 principle' and the 'net benefit to Australia principle' were both clear and flexible.

He felt proposed changes would muddy these proposals with an enormous dimension of administrative discretion to be exercised over many years.

It seemed, the *Review* reported, that the Foreign Investment Review Board would approve the terms and timetable of any Australianisation proposals.

C.R.A., until that time at least regarded as a foreign company, was said to be jubilant at the prospect of having its 'Australianisation' proposal accepted, and to be able to benefit from it. (C.R.A. had some months earlier endeavoured to acquire A.A.R.—Australian Associated Resources—but had been forestalled by C.S.R.).

C.R.A., M.I.M. and Consolidated Gold Fields of Australia have all had a significant Australian interest, but it is the more Australian companies such as C.S.R. and Western Mining who have benefited in the last few years by being offered partnerships by foreign interests forced to take Australian partners. Such a benefit to them could disappear if C.R.A.'s Australianisation proposals proceed. Furthermore, as mentioned above, under the proposals current at 1 June, companies undergoing Australianisation would be seeking equity funds in Australia, and this would increase competition for funds in the local capital markets.

The Australian Industry Development Corporation, in its *8th Annual Report*, 1978, said that:

Recent modifications to the Government's guidelines for foreign investment in Australia should create new opportunities for AIDC to assist in achieving more Australian ownership, and desirable partnerships of foreign and domestic capital, in new industry and resource developments in Australia. . . It is the policy of the Government that there be co-operation between the Corporation and the Foreign Investment Review Board towards the Government's objectives in relation to Australian ownership in industry. AIDC's services are available to assist companies to develop a 'naturalisation' programme and put it into effect.

The basic proposal put forward by the Government in mid-1978 was that companies become 'Australian' when they become 51 per cent Australian-owned. There was a provisional status for those 25 per cent Australian-owned who declared their intention of moving to 51 per cent.

For C.R.A. this meant the issue of a large amount of capital and a significant increase in the Australian content in major mining ventures; for a predominantly overseas company its situation was much enhanced.

One columnist,⁸ writing the day after the meeting at which Jackson spoke, suggested that under the new proposal if, say, Shell, B.P. or Esso wanted to develop a project they would first form a company that was 51 per cent Australian to take half of the particular project. This would not involve the issuing of 51 per cent of what might be the huge operations of the overseas company in Australia. This minor company, having been declared Australian by its ownership structure, then could do a joint venture with an overseas company. Such a joint venture partner could be the parent of the 49-51 per cent owned company so that if, for example Esso, under existing requirements, wanted to develop an oilfield it would need to have 50 per cent Australian participation (assuming capital was available). Under the new proposals it could set up a 51 per cent owned company with half the venture and own the other half itself—a total of almost 75 per cent overseas ownership (which was the figure quoted by Jackson). It seemed that it might even be possible for such a development company to be 75 per cent owned overseas and be declared Australian provided there was a program to bring the offshoot company down to 51 per cent Australian ownership. If this was the case, the initial stage of the development could be 87 per cent Australian owned. The columnist pointed out that the buy-back program could be very expensive if terms were not set in advance, assuming the venture proved very profitable.

A major project of C.R.A.'s which could have been affected by the proposed new guidelines was the Ashton diamonds area where C.R.A. has 52.5 per cent and the only other Australian equity is Northern Mining's 5 per cent.

One of the reasons for changing the guidelines from 50/50 to 75/25 might be that they were in their present form preventing new projects from proceeding. Jackson suggested that substantial new funds *had* flowed into Australia, e.g. into the coal industry; and that any tardiness in foreign investment was the result of economic factors other than the guidelines. Australian life offices have been facing a surplus of capital funds.

A few days later, Jackson made a public statement covering a number of the points made—for example the possibility of a foreign company

⁸ 'Chanticleer', *Financial Review*, 1 June 1978.

establishing a 75 per cent foreign-owned subsidiary to undertake a new project, committing only that subsidiary to a program of greater Australian participation.

Jackson said that the object of retaining 50 per cent Australian equity in new mineral projects was achieved under the new guidelines only when the process of naturalisation was completed, and that the process itself represents a serious departure from that objective. He did not regard the commitment to naturalisation as enforceable. He saw the time frame to be allowed as apparently open-ended:

Articles may be changed at any time. Boards may change. One foreign company may be acquired by another foreign company with different views. Many years might pass during which minds or circumstances might change and the naturalising process break down. But then there would be no way to unscramble the eggs and restore to Australia the benefits given to the foreign company which stayed foreign. Ways should be sought of making the promise to naturalise irrevocable and enforceable.

Jackson felt that the 'naturalisation' requirement that foreign companies have a majority of Australian directors did little to safeguard the Australian interest. The directors could be full-time employees of the foreign parent. He felt the Treasurer should continue to satisfy himself that foreign persons were not in a position to determine the policy of the corporation concerned.

Jackson drew attention to the fact that the new guidelines said nothing about prices or terms of issues under which naturalising companies were to raise their equity in Australia, details fundamental to the sharing of benefit between foreigners and Australians. (The *Fitzgerald Report* had reviewed unfavourably the timing and terms of a share issue by an iron ore company to Australians.⁹)

Attention was also drawn to a major concern of Australian companies, that the new guidelines would permit a flood of foreign takeovers of smaller and weaker Australian-owned resources companies. That concern was heightened by the apparent reliance on expectation rather than requirement that naturalisation was to be accomplished by new issues rather than by takeovers.

Jackson was also understood to have suggested to the Deputy Prime Minister and Minister for Trade and Resources that Australia's new foreign investment guidelines could inject a disruptive element into Australia-Japan trade; that the guidelines could encourage the growth of U.S. and British companies in influential positions in the Australian resources industry, which could bring further dependence by Japan

⁹ 'Chanticleer' (*Financial Review*, 12 June 1978) said succinctly that 'Proceeds of C.R.A.'s sale of a small Australian Hamersley equity recovered most of the group's development costs'.

upon companies controlled by Japan's major competitors on world markets.

The report of the Ad-Hoc Working Committee on Australia-Japan relations (which was endorsed by the Prime Minister, J. M. Fraser) suggested that Japanese investment in Australia should be encouraged. The committee warned that the government should be concerned that some trans-national companies may be using the financial resources built up in Australia over decades to take dominant positions in natural resource developments which were important sources of raw materials (including energy) for Japan.

One of the major objections to the new guidelines was soon overcome. The *Financial Review* on 12 June discussed the way the Treasurer, Howard, had dealt with the problem posed by allowing an 'Australianised company' (51 per cent local ownership, or 'intention to achieve that level') to join with its parent or any other foreign company so the whole venture could be 75 per cent foreign owned, and hence very effectively foreign-controlled. Howard then inserted a clause preventing 'Australianised' companies from entering into new joint venture deals with foreign companies.

C.R.A.'s Ashton diamond project was affected by this change. Since C.R.A. owned 52.5 per cent and most of the remainder was foreign owned, and since C.R.A. was no longer to be allowed 'Australianising' status in links with foreign partners, the Ashton venture was then assumed to come under the old 50/50 guidelines. With C.R.A. owned 72 per cent by R.T.Z., this meant around 30 per cent of the venture might need to be sold by C.R.A. and its foreign partners, although if C.R.A. successfully presses a claim to be considered at the 49 per cent level it might be expected to move to, then only 19 per cent of the venture would need to be sold.

At what price would the sale take place? One columnist suggested:

CRA might well do a deal whereby its shares were sold to Australians to gain the necessary local points for Ashton (in this situation there would be a stronger case for using 30 per cent).

But it should be remembered that if this happens at a time when Ashton was believed to be a boomer CRA shares would be much higher in price than they are today.

In those circumstances the cost of Australianising CRA to 51 per cent would be much higher than the sums one might do today.

Indeed in the past RTZ has with hindsight well timed most of its share sales.¹⁰

Another member of the diamond exploration consortium, Ashton Mining N.L., controlled by the Malaysian Government, has lodged a prospectus for a share issue to the Australian public.

¹⁰ 'Chanticleer', *Financial Review*, 12 June 1978.

IV Federalism

Which states have gained and which lost through the impact of federal policies? Canadian Garth Stevenson, when a Visiting Fellow at The Australian National University in 1975, prepared a monograph on *Mineral Resources and Australian Federalism*¹¹ in which he suggested that New South Wales has had most to gain from the increased federal intervention in mineral resource policies since John Gorton became Prime Minister—intervention continued under W. (now Sir William) McMahon, accelerated sharply under Labor Prime Minister E. G. Whitlam, and ‘abating only slightly’ under J. M. Fraser.

Stevenson describes New South Wales as a resource-deficient consuming region like Western Europe or Japan. It should be noted that if overseas interest in steaming coal grows as has been suggested, Stevenson’s picture may become out of date. He considered that the national pipeline grid and the uniform price suggested by Connor for natural gas, together with export controls on coal and zircon, had all been in New South Wales’ interest; and that it had lost nothing through federal takeover of the continental shelf. The policy of requiring more Australian equity in mineral developments was consistent with state policy, and had given the state’s capital-holders increased opportunities to invest in resource-rich Queensland and Western Australia. Export controls on iron ore, through preventing foreign steelmakers from purchasing at low cost, had protected the Australian steel industry, centred largely in New South Wales. Stevenson acknowledged, however, that the export levy on coal had not favoured the economic interests of the state.

The other populous state, Victoria, Stevenson felt, was the state with most to lose from a federal takeover of offshore oil and gas, both because of royalties and the economic advantage Victorian industry had from the availability of cheap energy. A uniform price for natural gas would not have been in its interest, just as the fixed price for oil from Bass Strait—a price established in 1970 by the Gorton government—had not been in its interest. Like New South Wales, it had benefited from the requirement for Australian equity. In my own view, this should be considered the case only if this requirement substituted ‘free’ local capital (i.e. capital that did not have to be drawn from other uses such as housing), for foreign capital, for if the local equity requirement prevented developments from proceeding, the nation (i.e. all states) suffered although the state in which the development would have taken place was the most immediate and obvious sufferer.

Queensland, said Stevenson, suffered economically from export controls, the coal export levy, foreign ownership limitations, the federal

¹¹ Centre for Research on Federal Financial Relations, The Australian National University, Canberra, Research Monograph No. 17.

policy of discouraging development on Aboriginal reserves, and the prevention of oil drilling on the Barrier Reef. Since Stevenson was writing, we would also want to add the federal decision on Fraser Island's mineral sands.

Western Australia had much to lose from federal takeover of oil and gas, and had suffered from Connor's natural gas policies. Stevenson described it as 'an underdeveloped resource-exporting hinterland' which like Queensland suffered from Australian equity requirements, export controls and environmental standards.

South Australia, as a state relatively poor in mineral resources, did, said Stevenson, 'benefit to some extent from the efforts to distribute the benefits of mineral development more evenly round the country'. Tasmania was affected by federal policy less than any other state, for although it is a significant mineral producer it has no interest in natural gas as either a producer or a consumer, and it has not been considered as a site for new mineral developments, which would have made foreign investment control important. Since Stevenson wrote, however, the state has successfully requested a short-term federal subsidy for the company operating the Mt Lyell copper mine.

The types of transfers of economic welfare envisaged in Stevenson's discussion are distinguished as 'horizontal conflict', or conflict between different regions. He said perception of horizontal conflict was most pronounced in Western Australia and only slightly less so in Queensland, with the federal government 'viewed as the instrument of the industrialized south-east'. Most Australians with any experience of views in the west and north would agree with Stevenson's description.

A second type of conflict distinguished was classed as 'vertical' and suggested to be more evenly distributed among the states. Conflicts of this type arise because of 'institutional self-interest' between different levels of government and may be divided into legislative and administrative conflict, and financial conflict. Examples of the legislative and administrative conflict include attempts to make federal power paramount offshore, and the use of the federal export control power to halt production of mineral sands from Fraser Island, although the Queensland government had the power to grant production leases and control production. Such federal actions are seen by the states as an attempt to usurp their sovereign powers, and in a federation of the Australian type—where the states conveyed certain powers on the central government and retained the residual powers themselves¹²—this is viewed unfavourably by the states. Australia has seen a number of High Court challenges by the states of federal power—not least in the

¹² Sometimes called 'evolutionary' federalism, in contrast with 'devolutionary' federalism where the central government has all residual powers once the powers of second-level governments are defined.

Seas and Submerged Lands Act. The outcome there was in the commonwealth's favour, but that is not always the case. The states who challenged the Petroleum and Minerals Authority Act did so successfully, but that was on a technicality relating to its passing by federal Parliament, not on its constitutionality.

The financial type of vertical conflict comes when the federal government attempts to usurp what the states see as their prerogative to collect mineral royalties, or when the state governments attempt to collect taxes which reduce federal revenue. When the federal government reduced the coal export levy in August 1976 it made it plain that this was intended as an investment incentive, and the states should not take it as a signal to raise royalties. That example occurred after Stevenson wrote—his example concerns the threat to state mineral royalties posed by the possibility of nationalisation through the Labor government's Petroleum and Minerals Authority. He also pointed out that in vertical conflict the administrative and financial pressures may be different—for example when the federal government took over the Moomba-Sydney pipeline from the Sydney gas distributor, the Australian Gas Light Co., with whom the state government had a 'mutually supportive relationship', New South Wales showed resistance, although the state's economic interest was being well served.

Besides vertical and horizontal conflict, Stevenson defined another type of federal-state conflict, based on differences in party affiliation between different levels of government. This was illustrated by the selection of states who challenged the Petroleum and Minerals Authority Act.

The problems for the mining industry of operating in a federal system (as it does in Canada and Australia) are not present in countries such as South Africa, where the industry operates for the most part under unitary government. In a federal system, the total package of government policies at two levels is what determines the international allocation of investment funds. There may also be a third level of government—local—with which companies have to deal on matters such as rates. Problems of co-ordination between two or more levels of government may be illustrated from Canadian experience where for a brief period combined federal and provincial mining tax in one province exceeded 100 per cent.

Parliaments, politicians, trade unionists, environmentalists, academics, media and conferences now debate about our minerals and energy policy, but this represents a recent upsurge of interest. In August 1972, when I gave an ANZAAS paper entitled *The Integration of Australia's Mineral Policies*, it was an unusual conference subject. However, before 1972 was out, there was a substantial policy document presented to federal parliament by the Minister for National Development, Sir Reginald Swartz; there had been some action on foreign

ownership (including attempts to assess the actual level). Since then, minerals and energy policy has been in the limelight—partly because of Labor's term of office, partly because of concern over the Club of Rome's predictions, partly because of O.P.E.C.'s activities.

It is a sad commentary on politics that my 1972 paper remains relevant, for the problem it addressed remains. Although I canvassed national issues, and stressed national benefit, I emphasised that national benefit depends on states and commonwealth working together. State premiers, naturally enough, give more emphasis to regional issues; for example, although the nation might have wanted to preserve the uniqueness of Fraser Island, the Queensland premier was naturally concerned with regional prosperity. A nation which wants to disadvantage a regional economy for national reasons has therefore to be prepared to compensate the region adequately—and incidentally should follow its concern through. If a nation prevents mining to preserve an environment, it may not wish to see compensation spent on forestry in the same area.

What were the comments I made in 1972, and what has changed in the intervening period?

Although political factors and the macroeconomic climate affect the interaction of government with a particular industrial sector, the special characteristics of that sector are also important. The extractive nature of the mining industry and its export orientation are only two of its characteristics, but they serve to illustrate this point, for in Australia governments can control both the rate of extraction and the level of exports. This indicates the need for integration of State and Federal mineral policies, for it is the States which determine the location and conditions of extraction and the Commonwealth which has the power to control exports.

This paper considers the policy problems with which mining industry confronts local, State and Federal governments in Australia and the need for different governments and different departments of the same government to co-ordinate their policies in the national interest. It looks briefly at fuel policy, where we can benefit from co-ordinated development of our resources of coal, petroleum, natural gas and uranium. (In 1972, the former Department of National Development had a small Fuels Branch in Melbourne, and the Minister had responsibility for the Atomic Energy Commission. Energy policy was largely in the States hands. There has thus been a major change since 1972, with the federal government appearing to take a much more active role. Appearances may be deceptive of course, and despite the existence of a National Energy Advisory Committee, and now a National Energy Research, Development and Demonstration Council (to advise on the disbursement of federal funds for energy research) much of the action itself remains with the states).

The rapid growth of the Australian mining industry in the last

decade has highlighted a number of policy problems which the industry presents to Australian Governments. These include (i) the determination of a desirable level of foreign ownership and control (ii) legislative needs, balancing security to tenure with conservation demands and requirements for pollution control, (iii) deciding on desirable taxation measures (defined in the broad sense to include royalties), subsidies and incentives (iv) dealing with the intertemporal considerations posed by the possibility of export control, (v) determining regional priorities within the larger value judgments concerning decentralisation and whether infrastructure offers sufficient externalities to be provided from the public purse, and (vi) evaluating nationalistic desires for further processing in the light of economic reality.

Many of the policy decisions made have been based on explicit or implicit judgments which would not be acceptable to rigorous welfare theorists, for they have been publicly justified on economic grounds whereas the only true basis can be political.

The 1972 paper said:

In the present state of technology, and with lucky strikes largely a thing of the past, exploration expenses are considerable; so are development expenses.

If we want mining to take place—and there are some who do not—then we need to have unequivocal legislative provisions to ensure that (i) explorers who find economic ore bodies are certain to be allowed to develop them and (ii) development conditions are reasonable from both company and social viewpoints, certain in their operation, and long-term in their perspective.

Historically, in Australia, the miners' needs have been for the most part well served. Where they have relied on ministerial discretion or administrative decision rather than legislative provision, they have still been well considered. In the present intellectual climate with its leanings towards conservation and against pollution, mining interests have discovered the need for self-justification. They have found that exploration and discovery may not be followed by development, and that development arrangements between themselves and the government may be subject to public debate and pressure for revocation.

This situation is unsatisfactory from the viewpoints of both miners and the public-at-large, whether we consider the interests of the latter to be best represented by governments or by conservation spokesmen. It is a situation which will be in part resolved, for both sides agree on the ultimate goal—that the mining industry should have its limits of permissible operation clearly defined.

(From 1979, this statement appears to have been over-optimistic. Some opponents of mining seem anxious to prevent *all* development, regardless of their motivating force at any given time—environment, conservation, or Aboriginal land rights. The power currently held by

Northern Territory Aborigines over development conditions was certainly not envisaged in 1972.)

In 1972 I identified two major problems:

- (i) the definition of permissible areas of operation in the long term;
- (ii) dealing with current divergences between long-term priorities and historical preferences.

With (i) there is bound to be a major conflict of interest. While mining interests are prepared to champion a need for national parks, they would naturally prefer that these should be in areas of uneconomic mineralisation; where this is not the case they hope that in certain circumstances 'controlled' mining should be permitted in national parks. Unfortunately, geology and biology are not separately determined, and areas of economic mineralisation can be precisely those whose ecological features seem to demand conservation in the form of almost total preservation; and to some the idea of even 'controlled' mining in national parks is anathema, since such disturbance may be regarded as foreign to the whole concept.

(I did not imagine in 1972 that a few years would see a definitive statement, good for all time, on where and under what conditions mining would be permitted. Both knowledge and needs change. I did feel, however, that we might have made a little progress in compromise, but if anything, attitudes of opponents to mining have hardened, and, with Aboriginal land rights, found new ammunition.)

Problem (ii) mentioned above was that of dealing with current divergences between past public priorities, embodied in government agreements (explicit or implicit) and present or future public preferences as foreshadowed by conservation spokesmen. These should be considered in the light of long-term priorities, assessed as in (i). If it is decided that granting a production lease after exploration (or allowing the continuation of agreed production) is against these long-term interests, then the government should be prepared to refuse or revoke the relevant production authority and compensate the company accordingly. This would be an interim measure, referring only to present prospecting or development tenements, and can be regarded by the government as paying for past mistakes, or its failure to forecast adequately present public preferences. Whether compensation should cover only actual exploration and development expenditure, or whether it should include a loading for possible profit forgone will of course be subject to debate.

(This was the situation that developed some years later, when the Fraser government faced compensating the Fraser Island miners. The government was not prepared to look as far down the possible future profit stream as the miners wished. One company announced it would

make the government's attitudes well known abroad, which could have been expected to restrict the inflow of foreign funds for development. The confidence factor was already an issue in 1972, following the Cooloola case.)

Where there is no actual legal requirement for the government to issue development leases to successful explorers, even compensation for exploration expenditure may appear unnecessary. If, however, governments wish to encourage further prospecting—and they may not—they will not necessarily be guided by their strict legal obligations. If on past experience, companies could reasonably expect development leases after prospecting, then governments may wish to act accordingly.

It could however be of benefit to governments, the public (present and future) and industry if State policies and procedures were co-ordinated at least informally to ensure that representative ecological units are preserved, that present and future populations have adequate and varied recreational areas at their disposal, and that economic ventures considered desirable are encouraged. This last one of course presents its own problems, since ventures considered economically desirable from a national viewpoint may impose most of their social costs on one State or region and further political judgements are necessary.

To resolve conflicts, either long or short term, we have many options and various combinations of legislative, judicial and administrative procedures have been suggested. The questions of multiple land use and land use planning are under review, but the approach has not been the same in all States, and it is they who carry the main responsibility for environmental control. Although this is a result of the constitutional position, it may be the most efficient means, at present, for organising land use planning. States have different problems arising from their different land use policies in the past as well as from different geographical and economic factors. Planning on a State basis could have administrative benefits where a multiplicity of claims by many industries are under consideration.

... [The Commonwealth] through its relationship with the mining industry through export control, taxation etc. ... is in a position to affect and be affected by land-use considerations; it is also likely to be regarded as the ultimate source of finance for any compensation which has to be paid; and for these reasons as well as the fact that it is a national government facing a national problem, it is to be hoped that its role will be a significant one.¹³

(What happened, of course, was that the commonwealth established its own environmental legislation, in 1974. As we have seen in Chapter 9,

¹³ What the Commonwealth had done so far was outlined in a Ministerial Statement (see e.g. Hansard (Proceedings of the Senate), 24 May 1972, pp. 1986–93).

the commonwealth minister has now sought agreement with the state ministers, to minimise duplication of environmental assessment procedures through co-operation. However, this does not remove areas of possible conflict. In most cases, the commonwealth and states agree on the content of the Environmental Impact Statement. That is a federal term; states have their own names—e.g. Western Australia refers to an Environmental Review and Management Programme, Victoria has an Environmental Effects Statement, while Queensland refers to an Environmental Impact Study. There is not yet agreement with Queensland on content, but discussions are continuing.)

Environmental issues were not the only legislative issue in 1972:

The conflict between mining and conservation interests is not alone in causing rethinking of mining legislation—other changes since State mining laws were first formulated include the almost total replacement of small-scale surface prospecting by large-scale exploration using modern techniques. This time of rethinking could have been a time for achieving uniformity, despite interstate differences in land area and preponderance of minerals, two factors which some people feel justifies the retention of differences e.g. in the size of permits for initial prospecting. My own feeling is that where a number of States are dealing with one corporation, perhaps an overseas corporation, the presentation of a united front and common, well stated legislation is likely to be in the national interest; sometimes—but not always—it may also be in the corporation's interest. The present system, with its reliance on traditions and personalities, is confusing. Prospecting areas do not carry the same names; definitions vary; frequency of company reports may differ—with some required quarterly, some annually.

The Commonwealth and States have passed mirror legislation covering offshore petroleum reserves. This is still not without its difficulties, and the position with offshore mining of other minerals is even more uncertain.

(The international question of deep sea mining for manganese nodules is one which will become increasingly topical. The Law of the Sea Conference has not resolved all the problems. Three consortia, representing groups from the more technologically-advanced nations, could become involved rapidly on a commercial scale; however the technologically disadvantaged countries are not anxious to see them exploit what they regard as a common resource. Such exploitation would widen the gap between rich and poor nations. It is especially relevant that the nodules contain copper, and some present copper-producing countries such as Chile, Zaire and Zambia are not anxious to see the development of significant alternative sources of copper, since this would have depressing effects on their market. Their alternative sources of income are severely restricted.

Economic exploitation of the resources of the Antarctic is further off,

but can be expected to generate international differences of opinion.)

Much of my 1972 discussion of taxation, royalties, subsidies and incentives related to a specific set of provisions then in force. Only the general comments remain topical.

This field of financial policies is crucial in the development of a well-considered and co-ordinated attitude of government to the mining industry. It is the area through which governments, representing the population as a whole, make their financial gain, and one area through which they can encourage or discourage various types of operations.

(It is not really to be expected that state and federal governments will confer with each other over tax matters. The commonwealth's interest in resource rent taxes could lead to unseemly haste on the part of the states to introduce a similar tax first, or to change the basis of their royalty assessment to raise their share.)

Comparisons of royalty rates:

may not be especially meaningful since each mine is different—e.g. grade of ore, infrastructure costs, transport costs, different sales links and contracts etc.; but there does seem to be a strong case for increasing royalties in Queensland and establishing them more firmly in Tasmania. These two governments, like all State governments regionally minded, would presumably be loath to do this in case it discouraged production, either absolutely or by causing a transfer to other States. In its political favour however, is the fact that it would increase State revenue. The Commonwealth would also be affected on the revenue front since State royalties are deducted before the calculation of company tax (and incidentally, Queensland allows income tax as a deduction in the determination of profit on which royalties are assessed!)

It is in the basis for levying royalties that we probably see the greatest interstate differences. Since minerals are in nearly all areas reserved to the Crown¹⁴—in the form of various state governments, or the Commonwealth in the case of Territories—there are seven different systems of royalties in operation; not only do the basis and rate of royalty levied vary among States, they vary within States according to particular minerals. The impact of royalty rates on mineral production is therefore difficult to assess even from published schedules, and since most States retain the option to negotiate separate rates for major developments or when existing leases come up for renewal, the picture is even more uncertain. There is also the possibility that where the mining industry is captive to a State Government transport system, the States will levy 'excess' freight charges and regard the 'excess' as a form of royalty.

¹⁴ We would now have to note that since 1972 Northern Territory land classified as Aboriginal land is a special case.

(Since that time both Queensland and Tasmania have acted on their royalty rates. During the Whitlam government's term, the Queensland government increased its royalties on bauxite and coal, perhaps to improve its credibility when seeking federal funds. As mentioned in Chapter 5, Queensland has also changed the basis of calculating its royalties for Mt Isa production—from the profit basis—which most economists at least agree is the basis to be preferred, unless the commodity is being transferred between two arms of the same organisation.)

In summary, there appear to be two points with respect to royalties where there is room for more co-ordination.

- (i) the basis of assessment. This could be the same for all minerals, although even uniformity of the basis of assessment for individual minerals would be an advantage;
- (ii) the relative level of royalties between States. Uniform rates at least for particular minerals could be highly desirable. If uniform rates were to be applied among States these should be on the basis of profits since this allows for differing grades, production costs, transport costs, etc.

If we had this uniform basis of assessment, and on this basis uniform rates, we would be in a much better position to assess from a national viewpoint whether our royalty rates are achieving their object—although we may have first to define an object.

The Industries Assistance Commission in its enquiry into petroleum and mining taxation recognised that it is the combined impact of taxation and royalties that is important for resource allocation decisions. It also recognised that its power to affect royalties was non-existent.

As mentioned earlier, the preferable basis for levying royalties is profit. They then become like an income tax. Early Australian discussion of the resource rent tax in fact assumed that it would be levied by the commonwealth on behalf of itself and the states, on profit in place of income taxes and royalties but most mining companies regarded this as unlikely, and saw it as a 'super' tax imposed by the commonwealth after income tax and after state royalties. They did not see the states relinquishing the privilege of charging royalties. Consideration of rent taxes by the federal government in 1978 was clearly consideration of an *additional* tax. In mid-1978, the federal government announced it no longer contemplated resource rent taxes, but the federal opposition, if elected, may do so.

The 1972 paper looked at the commonwealth's export control power, which it has used to scrutinise prices, and to prevent exports when domestic prices have been subsidised or controlled at below import parity, e.g. in the cases of island phosphate and of crude oil. The power has been used to conserve local supplies, to control the destination of

strategically important exports, to impose trade sanctions, on e.g. Rhodesia, and to enforce international commodity agreements such as the International Tin Agreement.

As we have seen, the States issue prospecting and mining leases and set down conditions of development and production. The Commonwealth's main constitutional power apart from cases where it can act as territorial administrator, is its power of export control . . . there can be some difficulties in adjustment e.g. if the Commonwealth disapproves of a contract price and State development is impeded; if the tin export quota is exceeded by uncoordinated production.

(In the years since 1972, the Commonwealth's power as a territorial administrator could not be so briefly dismissed. Uranium questions in the Northern Territory (including Aboriginal lands rights issues, national parks, etc.) show the commonwealth as an important force. However, as the Northern Territory moves towards statehood, the federal government's influence may wane slightly in relation to the power vested in the local legislature. While the two examples given of possible state-federal conflict remain valid, the Fraser Island minerals sands experience is by far the most salutary.)

The 1972 paper examined the decentralisation, regional priorities and infrastructure issues:

The mining industry points proudly to the fact that in a country where the concept of decentralisation is often applauded, it is a positive agent of decentralisation and should be encouraged in its moves to isolate locations rather than being required to finance its own infrastructure. However, in evaluating the merits of a particular project from a national viewpoint, we cannot automatically assume its decentralising influence is a net national benefit; and when we consider the Australian case the situation is more complicated. If State governments wish to maximise private capital expenditure in their own state, a project in State A will confer a benefit on that State even if it would have been preferable from a national viewpoint to have it located in State B; and the State A benefit cannot be compared unequivocally with the net national loss from failure to locate at the alternative site in State B.

We have seen interstate competition for mineral projects, and . . . the Commonwealth is not necessarily free from this parochial attitude, for as a territorial administrator dealing with the mining industry it can be interested in seeing that minerals produced in the Northern Territory are processed not only in Australia, but in the Territory itself; this could be in the national interest, but this is not clearly demonstrated.

(In the immediate future we may see rivalry between Queensland and Western Australia for alumina projects, and perhaps between the Northern Territory and Western Australia for uranium.)

As a spearhead for regional development, mining suffers from severe drawbacks: economic deposits may be located in areas which do not recommend themselves as points for long-term urban and industrial development, and if the externalities of infrastructure expenditure are small then such expenditure is best financed from company sources. Since a particular mineral may face short-term fluctuations in fortune, and since the economic life of the mine is limited, sustained regional development in areas considered worth developing may require the rise of more permanent industries and governments may wish to assist with infrastructure in this case.

Whether we want to encourage development of particular areas through [commonwealth or state] government assistance, direct or indirect, will be a political judgment rather than an economic one. Remote though industrial diversification of the Pilbara or self-generating growth of Mount Isa may seem, we need only look at Newcastle and Wollongong-Port Kembla to see what *may* be achieved in the future. That the possibility of imminent collapse of mining towns can be overstated may be seen from the long existence of these and other Australian cities relying heavily on their mineral deposits and/or their processing of port facilities—such as Broken Hill, Port Pirie and Whyalla.

(Once a community is established both state and federal governments are likely to be called upon to support it in times of trouble. Thus Broken Hill has sought subsidy in the past. Mt Lyell, on the West Coast of Tasmania, is at present being subsidised.)

Although governments do support communities they regard as viable in some sense, Australia has had her ghost towns; not all the gold mining centres survived as pastoral towns like Ballarat and Bendigo. Some of our present inland centres, like Broken Hill and Mount Isa, depend almost entirely on one industry, although they do service surrounding pastoral areas, and Broken Hill groups in particular have suggested that the State Government should hasten diversification.

(The precarious existence of the specialised town is not of course confined to mining, as the recent rural recession has shown.)

... Since interstate rivalry, and the worship of decentralisation and regional development, can lead State Governments to offer mining companies more incentives than are strictly necessary to ensure a particular development, there is room for a wider (national) outlook and more co-ordination of State policies. We are well aware how fragmented iron ore and coal producers fare when facing a united buying front. State Governments can be similarly treated by prospective developers.

The situation outlined above, where governments wish to encourage a project not viable on its own merits, is a special case of the generalisation that the government can justifiably be expected

to bear infrastructure expenses where their net social benefit exceeds their cost, but as pointed out earlier the concept of net social benefit is not necessarily clear in an economic system which has local, State and Federal priorities. Thus if a particular project is expected to spearhead permanent, diverse development of an area there may be more argument for public provision of infrastructure than where development is seen as intense but temporary, with subsequent reversion to previous pursuits. In some cases, too, where the requirement that infrastructure be privately provided leads to uneconomic duplication of facilities—when companies fail to agree on a suitable basis for sharing—public provision, with perhaps some private contribution to cost, may be the answer.

(As we have seen, this public provision of infrastructure appears to have been forced upon us now by a combination of inflated costs and more difficult marketing conditions.)

In 1972, energy was on the brink of becoming a public issue:

The States have until recently acted for the most part as separate energy producers and consumers, but changing technology and energy options—such as the availability of natural gas and nuclear fuel—are changing that picture. We are moving into a period when we need a national energy policy. The Commonwealth's policy has been that consumers should be free to make their own choice of fuels, but even with an open policy such as that it has had a number of policy questions to deal with:

- (i) Should the export of coal be freely permitted? A B.M.R. survey of reserves indicated sufficient to allow exports; the adequacy of the price being obtained could, however, be subject to doubt.
- (ii) Should we be aiming at self-sufficiency in petroleum production? Here we need to consider quality as well as quantity. If our oil reserves are limited, should we locate them and then conserve them for the future? How do we encourage exploration without development, unless the government does all the exploration?
- (iii) What should we do with our natural gas? Allow exports of deposits remote from present consumers (there is a ready market) or should we conserve them, bearing in mind the current shortage in the United States? Again, how do we reward private exploration if we forbid development?

Our decisions about coal, oil and gas have implications for individual States; so do our decisions about nuclear energy. We are concerned not only with technical possibilities but also with economic feasibilities.

Formulating a national energy policy requires forecasting of supply and demand factors and balancing national needs against State interests. It is a difficult but necessary task if our basic needs for energy are to be met at least cost and with regular supplies.

(The balancing of national needs against state interests in formulating a national energy policy has been nowhere more apparent than in the discussions of plans to develop the North-West Shelf, with Western Australia pressing for immediate export, with development for its local needs also; and New South Wales pressing for a transcontinental pipeline to serve its needs in the more distant future, with limited exports from Sydney in the short term. These proposals have been discussed in Chapter 8.)

It is a sobering thought that six years on, after both debate and action in the area of minerals and energy policy, much of what was written in 1972 remains relevant.

12 The Alternative:

The Policies of the Federal Opposition

When the Liberal-National Country Party government took office in December 1975, the minerals and energy policies of the coalition defeated in December 1972 were not reinstated *in toto*, as was pointed out in Chapter 3. Similarly, if the Australian Labor Party were to regain federal office, the policies of 1972-5 need not be expected to apply.

The Shadow Minister for Minerals and Energy is young, intelligent and dynamic. He has been enthusiastic to learn, and ready to listen to all sides of a debate. He has been accessible to industry, and assiduous in his participation at industry functions. The industry has appreciated that while he may not always share its viewpoint, he is prepared to hear it.

Political life is uncertain, and it is quite possible that if a Labor government were elected, Paul Keating would not be allocated the portfolio he has understudied; even if he were, the party platform and the opinions of Caucus would be determinants of minerals policy. His views are nevertheless important.

It was not until the July 1977 A.L.P. Conference in Perth that a new minerals and energy policy was passed, but earlier indications of Keating's views were given at the September 1976 Symposium of the Australian Petroleum Exploration Association in Canberra. He emphasised that his speech represented his own thoughts but could be regarded as an indication of the direction the party might follow.

In following speeches by the Minister for National Resources, J. D. Anthony, and the Minister Assisting the Treasurer, E. L. Robinson, Keating agreed that the ground rules for investment should be clearly stated and that, within practical limits, they should remain unchanged, which would help planning in the private sector. The Minerals and Energy Policy passed at the 1977 A.L.P. Conference said 'Labor will establish a clear and equitable taxation regime to ensure a proper increment to the national wealth and provide the mining industry and the Australian Government with a consistent basis for long term planning in the industry'. Keating indicated that this basis would include depreciation of mine capital over ten or twelve years, or the life of the mine if shorter.

In 1976 Keating endorsed 'a degree of bipartisanship between the major political parties [so that] changes of government would then witness changes in emphasis in resource policy rather than substantive changes in direction'. That there were limits to bipartisanship had

become evident by March 1977, when Keating stated that a future Labor government would not feel bound to honour uranium contracts written under the current government. Although there has been some disagreement in the Labor Party over uranium mining, that policy was endorsed by the 1977 A.L.P. Federal Conference.

Keating agreed that the petroleum industry should be encouraged to increase its exploration, and hoped it would improve the crude oil situation. He said a future Labor government would maintain deductibility of petroleum exploration and development expenditure against income from any source. Labor had promised in September 1975 that new oil discovered would receive world parity price. The Labor Party approved of the lifting of the \$2 a barrel levy on crude oil production from new discoveries and 'would not reimpose such an excise on new discoveries'. He did however suggest that a 'future Labor Government would investigate the possible introduction of a tax similar to the type operating in the United Kingdom known as the Petroleum Revenue Tax' which somewhat took the edge off his reiteration of Labor's policy to remove the \$2 per barrel levy on production of crude oil from newly discovered fields. In subsequent discussions and in Parliament, he has made it plain that he feels that high coal profits should face additional tax, and the 1977 Conference policy says 'Labor will investigate the concept of a secondary profits-related tax on the mining and petroleum industries to deal with extraordinary profit situations. It is envisaged that such a secondary tax would, amongst other things, operate in place of the Coal Export Duty Levy'.

Keating referred to export control, seeing its purpose as enhancing the bargaining positions of companies, this being in the national interest. Not all companies see it this way, and as mentioned before, Sir Charles Court has described Anthony's 1978 proposals for companies to obtain government approval for their negotiations as 'negotiating with one hand tied behind their back'. Some companies have, however, privately given wholehearted approval for Anthony's proposal, and others have given qualified approval. There is no doubt that even the most *laissez-faire* minded company can find it an advantage in negotiation to be able to state confidently that specific prices or conditions would be unacceptable to the government. When they find the conditions a handicap is when the government sets conditions which are genuinely unattainable in the market so that sales are lost.

The degree of bipartisanship that is evident here is indicated by a comparison of Anthony's 1978 proposals and the policy adopted at the 1977 A.L.P. conference, which said:

Labor will use the Export Powers under the Foreign Trade powers of the Constitution to:

- (i) plan for the orderly development of Australia's mineral resources and prevent oversupply situations developing with

- the consequent downward pressure on export prices and misallocation of resources;
- (ii) supervise and monitor international resource negotiations between mining companies in Australia and overseas buyers to ensure that minerals exported are sold at prices commensurate with export prices ruling overseas;
- (iii) encourage mining companies to combine together at international negotiations and present a unified front;
- (iv) expand the export division of the Department of Minerals and Energy to enable the Australian Government and the mining industry to have the best information available on the state of the international resources market.

These clauses emphasise Australia's need to maximise her monetary benefit from mineral development; but Keating has also been prepared to contemplate the use of the export control power for conservation purposes. He told the 1976 Conference that in determining the volume of exports to be permitted from the North-West Shelf, Labor would balance the nation's need for energy with need of the project to ensure viability. The 1977 Conference said of offshore sovereignty:

With the High Court having upheld the validity of the Commonwealth Seas and Submerged Lands Act, a Labor Government would introduce legislation to establish a Mining Code to enable the Commonwealth to supervise offshore exploration and development. The Commonwealth Petroleum Submerged Lands Act would be repealed and the services presently provided by State Departments of Mines under the State mirror legislation would be replaced by the decentralisation of the relevant part of the present Department of National Resources.

On foreign ownership and control, there is considerable divergence of opinion between the Liberal-N.C.P. government and the Labor opposition. Both require, in general, 50 per cent local equity. Labor claims to be less flexible than the government parties in their attitude to this 50 per cent; and as we saw earlier, the government has considerably eased the definition of Australian companies.

The 1977 A.L.P. Conference said

It is the policy of Labor to maximise the Australian ownership and control of Australia's mineral and energy resources while recognising the continuing role to be played by foreign capital in the exploration and development of Australian resources.

Labor will require a minimum 50% Australian equity in new resource development projects. Notwithstanding, in the event of uranium development because of the special circumstances attached to this resource, a Labor Government will insist that any new deposits developed must have 100% Australian equity at the development stage; while 75% equity will be mandatory at the development stage on existing discoveries.

A Labor Government would use its Export Powers under the Constitution to enforce these equity requirements.

In determining the level of permissible foreign equity and control of companies, a close examination of offers would be a requirement. Matters such as premium rates on stock and terms of participation would be examined before approval for a project would be given with less than the minimum requirement of Australian equity.

The 1977 A.L.P. Conference also said Labor would encourage the growth and expansion of the Australian capital market so that Australian companies can mobilise the capital required to participate in new resource ventures.

In 1976, Keating drew attention to the fact that A.L.P. policy endorsed the formation of a National Fuel and Energy Commission, to prepare an annual energy budget. Such a national energy budget had been frequently mentioned by Keating's predecessor, R. F. X. Connor, during Labor's previous period in opposition, but such a concept did not receive substance—in the public view, anyway, during his term as Minister for Minerals and Energy. The 1977 A.L.P. Conference stated that

Labor will establish a National Fuel and Energy Commission to assist the Australian Government in developing and implementing a co-ordinated fuel and energy policy. The Commission will, together with the Department of Minerals and Energy, provide the Australian Government with expert advice on energy.

The Fuel and Energy Commission will:

- (i) be composed of representatives of Federal and State Governments and of producers and consumers of energy;
- (ii) be funded directly by the Australian Government, and in turn be responsible to the Australian Government through the Minister for Minerals and Energy;
- (iii) be responsible for the preparation of a blue-print for Australia's future energy requirements and an inventory of Australia's energy resources, and will specifically —
 - (a) monitor the exploration, development, transport, price, marketing and use of energy hydrocarbons, fissionable materials and generative water, with the object of achieving the best energy balance for Australia;
 - (b) in co-operation with A.S.T.E.C.,¹ be responsible for the national co-ordination and Federal funding of energy research and development in Australia, including particular research relating to coal conversion and solar energy, and determine an order of priorities for such research. The Fuel and Energy Commission will provide the Australian Government with detailed knowledge of

¹ The Australian Science and Technology Council.

- existing energy research programs and of the resources available in Australia to carry out the greatly expanded research and development effort necessary to ensure that Australia has access to the new technologies necessary for the development of alternative energy sources at the appropriate time;
- (c) evaluate and advise on the implementation of the recommendations of the Royal Commission on Petroleum, particularly those concerning a national refining policy and the use of liquefied petroleum gas in Australia;
 - (d) advise on the adoption of measures to protect the environment from energy pollutants, by legislation where necessary, and by policies designed to encourage the domestic use of non-pollutant fuels;
 - (e) evaluate the benefits arising from a vigorous program for the conservation of energy, aimed at extending the life of Australia's dwindling oil reserves through the more efficient usage and substitution of alternative energy where possible, while maintaining Australia's current high standard of living. The Commission would assist the Australian Government in implementing such a program, together with one for increasing the recovery rate from our known energy deposits while having due regard to the environmental considerations mentioned above.

The National Fuel and Energy Commission was also seen as administering an Energy Research and Development Fund which 'may be substantially financed from monies collected under the proposed secondary profits tax flowing from energy production to enable the vital research and development of alternative energy technology to be carried out'.

On energy policy in general, the 1977 A.L.P. Conference drew attention to the fact that, in contrast with many industrialised countries, Australia was favourably endowed with coal, natural gas and uranium. It suggested that Australia was specially suited for research on coal conversion and solar power. It suggested that the 'diversity of Australia's energy resources and the country's dwindling reserves of petroleum make it imperative for Australia to formulate a national energy policy, so that a long-term energy plan may be implemented to provide Australia with an energy mix consistent with its long-term requirements and available supplies'.

The Conference saw the policy as recognising

the gradual depletion of non-renewable energy sources; the social consequences of energy decisions; the environmental impact of growing energy demands; and the implications for Australian decision-making of the global maldistribution of energy use.

The conference said 'the aim of the policy is a long-term sustainable energy economy, in which energy resources and technologies are appropriate to the needs and goals of the Australian community'.

It thought a national energy policy should include:

- (a) the careful use of fossil fuel reserves as a bridge to the longer term future, with the fossil fuel policy having four elements;
 - (i) promotion of further exploration;
 - (ii) close investigation of present and future fossil fuel requirements, efficiencies of use and alternative uses, conservation of reserves, regulation of marketing and export and overall planning to cater for the depletion of reserves;
 - (iii) increased attention to alleviating the environmental effects of fossil fuel use;
 - (iv) continued investigation into the gasification and liquefaction of coal.
- (b) promotion of energy awareness in the public and private sectors and amongst individuals; with the energy awareness policy having two elements:
 - (i) fostering energy analysis in the private sector, and energy impact statements for new developments;
 - (ii) encouraging individual consciousness of the energy costs of decisions through education, provision of information, and labelling of consumer goods for energy efficiencies.
- (c) a strong program of energy conservation.
- (d) a gradual and planned shift to renewable energy sources.

Specific issues in energy policy included gas pipelines and uranium.

The Conference agreed that Labor would retain the National Pipeline Authority and would insist that all new onshore natural gas pipelines be owned and controlled by government—state or federal—to ensure that gas distribution satisfies its national energy policy objectives, and that Labor would further investigate the economic feasibility of an interconnected transcontinental national pipeline grid to link Australia's industrial cities with gas-producing centres.

On uranium the Conference said that it recognised 'that the provision of Australian uranium to the world nuclear fuel cycle creates problems relevant to Australian sovereignty, the environment, the economic welfare of our people, and the rights and well-being of the Aboriginal people'. It believed

that having regard to the present unresolved economic, social, biological, genetic, environmental and technical problems associated with the mining of uranium and the development of nuclear power and in particular:

- (a) to the proven contribution of the nuclear power industry to the proliferation of nuclear weapons and the increased risk of nuclear war;

- (b) the absence of procedures for the storage and disposal of radio-active wastes to ensure that any danger posed by such wastes to human life and the environment is eliminated; it is imperative that no commitment of Australia's uranium deposits to the world's nuclear fuel cycle should be made until:
- (a) a reasonable time has elapsed for full public debate on and consideration of the issues;
- (b) the Australian Labor Party is satisfied that the abovementioned problems have been solved; and
- (c) the Australian Government endorses Recommendation 6 of the First Fox Report, which states:
'a decision to mine and sell uranium should not be made unless the Commonwealth Government ensures that the Commonwealth can at any time . . . immediately terminate those activities, permanently, indefinitely or for a specific period.'

The Conference therefore declared a moratorium on uranium mining and treatment in Australia; and said that 'Labor will repudiate any commitment of a non-Labor Government to the mining, processing or export of Australia's uranium', and that 'Labor will not permit the mining, processing or export of uranium pursuant to agreements entered into contrary to A.L.P. policy'.

On a number of issues considered in Chapter 9, the 1977 A.L.P. Conference said:

- (i) Labor would insist that all new mining projects satisfy the requirements of its Environment Protection (Impact of Proposals) Act 1974.
- (ii) Labor would continue to consult and confer with state governments through the Australian Minerals Council.
- (iii) Labor would upgrade the facilities and status of the Bureau of Mineral Resources so that it may better serve national policy formulation by providing basic information on the geological framework and mineral resources of the Australian continent.
- (iv) Labor would promote where desirable the secondary processing of minerals in Australia to provide employment and to upgrade the nation's basic infrastructure and improve earnings.

In summary, the 1977 A.L.P. Conference said that the Party's mineral and energy policies 'are based on the principle of Government supervision of Australia's mining and petroleum industries through a policy of clear and consistent guidelines. This policy will be administered to establish a stable climate for long life investment that will provide growth to the Australian economy and an improvement in the living standards of all Australians.'

Above all, these policies will be administered with flexibility and in consultation with industry and labour so as to guarantee that the

objectives are fully realized and that the national interest is protected.

The aim of the policy will be to maximise the returns to Australian industry and the nation through the orderly and balanced exploitation of Australia's natural mineral endowments.

This policy is in harmony with Labor's clear and long standing commitment to the Australian ownership and control of its own industries.

13 Relationships Again:

Inter-Sectoral Linkages and Multipliers

Elementary economic theory tells us that when companies invest in new projects, a given level of expenditure has a multiplied effect on national income.¹ The size of this effect depends upon the proportion of personal disposable income spent, and on tax rates; and only that part of the expenditure which is undertaken in Australia can directly affect Australia's national income.

Hamersley Holdings Ltd, in its 1978 *Annual Report*, included the results of an analysis by W. D. Scott & Co. Pty Ltd (management consultants) of the initial impact of Hamersley's expenditure on expansion. More than 700 contracts totalling \$305m. were studied—25 had values of more than \$3m., 35 had values of between \$1m. and \$3m.; over 500 had values of less than \$100,000.

In identifying the initial impact of expenditure on labour and materials, the consultants concluded that 63 per cent of total expenditure is accounted for by work being carried out in Western Australia; 26 per cent is going to other Australian states and 11 per cent overseas. A broad range of industries is affected because the concentrator project means expenditure on a multiplicity of relatively small items. Of the 89 per cent of project expenditure undertaken in Australia, the highest proportions are in construction (26 per cent of total project expenditure) and machinery (20 per cent) followed by metal (16 per cent) business and finance (12 per cent), and transport equipment (16 per cent).

Around 46 per cent of project expenditure represents labour costs—on site, or producing or assembling items elsewhere for on-site use, and those engaged in management or design. It is estimated that at the peak of construction 1300 persons will be employed at the site. (Economists are interested in what happens to them when construction finishes—e.g. will there be other new projects in the area to absorb them after the Hamersley expansion is completed?)

The Hamersley *Report* says the effect on employment is greater than the 1300 employed at the site, and that, on the basis of the overall labour

¹ A close examination of the contribution of the copper-mining industry to economic activity is made in M. L. Treadgold, *The regional economy of Bougainville*, Occasional Paper No. 10, Development Studies Centre, Australian National University, 1978.

component in cost, expenditure accruing to labour is roughly equivalent to 6000 persons employed for two years, with 75 per cent of them in Western Australia. The return to labour in Western Australia was estimated to be \$104m.; in other states it was \$33m.

The concept of the labour multiplier was discussed by the late Alex Hunter of The Australian National University in a statement prepared for the Barrier Reef Royal Commission in the early seventies:

A labour multiplier is an estimate of how many jobs will be created in the regional economy for every 100 jobs stimulated directly by new investment in a particular industry. Moore and Peterson give examples for inter-industry studies of labour multipliers ranging from 1.75 for public utilities, trade and services, to 5.40 for refining, processing and fabrication industries such as copper.² What is meant by these figures is that, for example, in copper refining for every 100 persons directly employed, another 440 people will be employed in related processing, fabricating and service industries. Most sectors have multipliers which normally fall within the 2.13 to 3.18 range.

The main reason for the large multiplier effects in some industries is that a special location-attraction factor enters the situation. For example, the establishment of a new steel industry can attract related fabricating, engineering and fuel-using industries with their associated services, thus giving a particular area a labour multiplier of between 10 and 20, given enough time for development.

One estimate suggests

a labour multiplier of 2.71 for the oil industry in Alberta, Canada. However, part of the Alberta multiplier effect derives from the processing of crude oil in refineries. Queensland, and Australia, already have a well-developed oil refining industry. Another writer . . . suggests a rather lower short term oil industry multiplier of 2.2 for Alberta. For the purposes of this study, it seems best to think of labour multipliers as having, unless there are special circumstances, a value of from 2.00 to 3.00 according to locale and circumstance. On the other hand, the possibility of especially large multipliers should not be overlooked where the oil and gas industry stimulates various industries in ports and fuel-producing centres. Consider the development of Kwinana, originally a refinery port, but now a steel-making centre (B.H.P.), the site of a new nickel smelter (Western Mining Corporation) and assorted engineering and service industries.

Only detailed inter-industry analysis, and a knowledge of mineral and chemical company intentions can predict accurately the labour multiplier. However, looking over the nature of the

² F. T. Moore and J. W. Peterson, 'Regional Analysis and Inter-industry Study of Utah', *Review of Economic Studies*, Vol. 37, November 1955.

contracts let in the development of Esso-B.H.P.'s reserves in Gippsland and the demands for service on the part of the oil industry, it would seem likely that in Australia 100 new jobs in oil exploration and development would develop approximately the following workforce (an illustrative example only):—

- 22 jobs in transport and storage
(oil search supply boats, tankers, vehicles, etc.)
- 22 jobs in construction and building
(sea platforms, separation plant, stabilization plant, pipelines and pumps, accommodation)
- 30 jobs in manufacturing (fabrication of pipelines, construction of ships and offshore rigs, engineering equipment and materials, communication)
- 50 service jobs
(community and business services, public authorities, finances and property, etc.)

125 [*sic*]

These figures suggest that for every 100 jobs in the oil and gas industry, there would be 125 created in other industry sectors, giving a labour multiplier of 2.25. Probably this 2.25 is a conservative figure, as it does not take into account any additional jobs which may be created as a result of 'downstream' developments, i.e. the development of a petrochemical industry or the normal accretion of industrial enterprise to be expected around any successful new development.

It is important to note that the labour multiplier may only apply to the labour force of a particular region. If, for example, there is full employment in the particular region, then the labour force required for an oil and gas investment would probably come through a redistribution of persons from other industries, both from within and without the State. If all new oil and gas jobs are redistributed jobs, then the net multiplier effect on the total labour situation may be only 1.03 (3% is the per annum growth of the total workforce).

The ultimate location of any multiplier effect depends not only on the proportion of expenditure which appears to be made locally, but also whether the expenditure will create manufacturing employment locally or is merely expenditure in \$A on goods imported. The latter creates employment in the service (importing) sector, but the major employment (in manufacturing) occurs in another location.

The relevant proportion of local to overseas expenditure depends on the project concerned. Referring to the petroleum industry, Hunter said of what he termed 'direct expenditures':

Not all these expenditures are made in Australia. A proportion go abroad for the purchase of foreign equipment and services—for example, for the hire of offshore rigs from foreign contractors, the use of supply vessels where not provided locally, the purchase of

well tubing, case materials, bits, muds, the hire of logging services and the designs and equipment for the erection of sea platforms and production facilities and pipelines. After discussion with a number of major oil exploration companies and with Government departments, I would estimate that around 35% of all expenditures go in this direction. It would be a most time-consuming exercise to discover anything more precise than this figure. The use of very capital-intensive equipment on the continental shelf supplied en bloc from abroad in the form of the offshore drill rigs, suggests that the proportion going abroad at the *exploration* stage must be greater—nearer 65% than 35%. On the other hand, the *development* of an offshore field, if the civil engineering, as distinct from petroleum engineering activities are significant for the provision of channels, marine terminals and on-shore pipelines, could result in a larger retention of expenditures in Australia—around 75% perhaps.

Hunter commented on the difficulties of isolating purely Australian expenditure:

The policy of Esso, the operating company, is to buy locally wherever possible. Unfortunately, it is not clear how much in value of the total contractual work went abroad in purchase of design and special equipment. The labour component in the establishment of the facilities (directly on site and in the works and offices of contractors) must of course be great and this, including the incomes and expenditures of expatriate employees, stays in Australia. On the other hand drill bits, certain types of valves, pipelaying barges, hire of Glomar III, some compressors, etc. are straightforward imports. There is, however, a large 'grey' area. The installation of foreign goods requires a local expenditure, while on the other hand, local purchase through Australian companies can also involve some importing (royalties on design, special components in ships, special steels, etc.). The purchase of earthmoving equipment locally means that the assembly, distribution and profit elements stay in Australia, but the 'Knock down' parts are imported; and similarly for some commercial vehicles, compressors and the like.

Therefore, the import content of the \$400 million investment is not clear. As has been suggested previously, considering the amount of steel and local material purchased, the construction work involved and the consequently very large local labour component built into the investment, it seems likely that only some 25% of the total value of these expenditures is import content. But one must emphasise that this is no more (and no less) than an informed guess.

Western Mining, for the Yeelirrie uranium project (to the yellow-cake stage) suggests an Australian content of around 85 per cent. Of the 15 per cent imported content, mining accounts for around half, services

and plant for around one-third, and 'miscellaneous' for the balance. Imported items in mining capital would include complete Caterpillar bulldozers (D9s), and components for other mining vehicles, e.g. engines and gear-boxes for heavy trucks. Instruments used for mining grade control are another example. In the services and plant category, imported items include special gearboxes, large electric motors and small specialised chemical plant equipment. For the total nickel operation to date—mines, concentrator, smelter and refinery—Western Mining estimates 90 per cent spending in Australia.

In discussing the economic implications of the North-West Shelf development I assumed that specialised L.N.G. carriers would be built overseas, but that other items would have Australian content: 50–60 per cent for offshore expenditure, 65–75 per cent for onshore plant and 50–85 per cent for an onshore pipeline.³ Another uncertainty at that stage was the allocation of that project's expenditure between Western Australia and the other states. It was expected, for instance, that some fabrication work would be carried out in the eastern states because large-scale heat treatment facilities were needed, but estimates awaited the completion of the planning and design phase. The bulk of the fabrication work to be done in Western Australia was expected to be done either in the Perth metropolitan area or on site by Perth-based companies. The possible spin-off for Perth from the project is best illustrated by the large number, broad range of interest and diverse size of companies represented at the West Coast L.N.G. Symposium organised by the University of Western Australia in December 1977. There were several hundred participants, predominantly local businessmen interested in direct opportunities for their companies.

In the early seventies, Hunter attempted to allocate expenditure with Australia between states:

The extent to which the proportion of expenditure retained in Australia ends up in the State which is the location of the drilling is a confused and difficult area. Most suppliers and oil drilling contractors have head offices in Sydney or Melbourne, but are well represented by working branches in such mining States as S.A., W.A., and Queensland. Since a majority of the actual operations take place in these three States, most incomes generated by an industry such as the oil industry will be in the locale of the actual operation. As a result of my discussions with people in the industry, I would estimate that perhaps 50 per cent of the total expenditures take place in the State which is the location of the exploration and development—possibly more—leaving some 15% to be distributed among other States, with most office overheads located in the two largest capital cities and public service overhead expenditures mainly in Canberra.

³ Susan Bambrick, 'National and Regional Economic Effects of North-West Shelf Development', *Economic Activity*, Vol. 21, No. 2, April 1978.

Hunter then assumed the retention of direct expenditures in Queensland to be around 20 per cent for exploration, 50-60 per cent for development and 80 per cent for operating expenses.

Hunter was referring to 'direct expenditures', which he said 'follow from the plans and activities of the oil exploration and production company'. He identified

Other *indirect* expenditures in that engineering, transport, shipping and ship-building and construction companies also find their activities expanding as contractors and oil companies, foreign or Australian, order equipment, buildings and services from firms which are, in many cases, only remotely connected with the oil industry. And, as employees spend their salaries, the effect is felt even more generally in the community.

Hunter reviewed the regional effects of the Bass Strait development, showing a considerable effect on the Victorian metropolitan economy. He identified in detail (by firm and type of item) where the money was spent during the three years 1967-9, and concluded:

The effect on the Victorian metropolitan economy was considerable. Consider the expenditure made by contractors and sub-contractors for engineering supplies (steel fabrications and components, pumps for oil vessels, valves, engine mountings, etc.); for power and machinery (engines, compressors, switchgear); for civil engineering work (construction of platforms and erection, construction of pipelines and plant); for communication and instrumentation; for transport and handling (vehicles, earth-movers, supply boats and barges, cranes); for materials (cement, steel, pipes, etc.).

Hunter also reviewed regional population and employment effects: 'While most of the extensions of job opportunities from such a development is in the metropolitan area of Melbourne, some very substantial effects were local to the oil field and treatment plants.'

He considered Sale, and suggested labour migration because of Bass Strait developments accounted for Sale's population growth rate 1966-9 being 7 per cent compared with the Gippsland average of less than 3 per cent. The number of building permits issued per annum more than trebled over the three years.

Whether the relationship between economic effects in Sale and in Melbourne can be regarded as analogous to the North-West Shelf/Perth effects remains to be seen. For a start, the distances between the regional centre and the metropolis are not comparable; the project is different; and, in the Western Australia case, there is an additional factor of distance from the east coast population centres. It seems certain though, as with Gippsland, that regional employment and regional population will rise. Since in the Pilbara area there is reported to be full employment, the construction labour force of 5000 will have to come

from a redistribution of persons from other industries both within and without the state (including a section of registered unemployed persons) and maybe overseas, particularly because of skill requirements.

Although the labour multiplier for the North-West Shelf development is hard to estimate, the degree of technological change since Hunter wrote—not to mention the fact that it is a very different project—would make a direct transfer of Hunter's figures simplistic. The iron ore industry in the Pilbara has estimated that for every direct job created, there have been approximately four indirect jobs created in the area—e.g. in servicing, education, commerce, communication, transport, power stations, etc. This type of multiplier might apply also, with modification, during the operational phase when the workforce has been estimated to be around 700–800. During the construction phase with the workforce at around 5000 there will be 'downstream' jobs created in the Perth metropolitan area and in the eastern states.

In assessing regional implications of continuing development of the North-West Shelf, U.K. experience in the North Sea may be seen as a guide. MacKay and MacKay examine the industrial opportunities that North Sea activities have brought, and whether Scottish and U.K. industry (note the distinction) has responded to them.⁴ There has been some public comment that domestic industry has failed to take advantage of new market opportunities, and it has been suggested that slower development would permit greater involvement by British industry. However, the authors conclude that 'the disappointing performance of domestic industry is attributable to other factors'.⁵ They refer to 'strains being placed on the productive capacity of the North of Scotland', and discuss these at some length, concluding that 'most of the problems encountered . . . have sprung from a lack of spare infrastructure capacity . . . and from the difficulty of providing additional infrastructure quickly'. In illustration, they mention delays in fabricating production platforms, where the 'main causes have been the great pressures put on local labour markets and infrastructure, chiefly housing'.⁶ They suggest that resources have to be provided for infrastructure, as the

bulk of employment arising from North Sea activities will continue . . . to be concentrated in the North of Scotland . . . there is little that can be done to disperse such employment creation more widely and . . . an active pursuit of such a policy might be positively harmful to the establishment of a viable and functionally competitive off-shore industry.⁷

⁴ D. I. MacKay and G. A. MacKay, *The political Economy of North Sea Oil*, Martin Robertson, London 1975, p. 68.

⁵ *Ibid.*, p. 141.

⁶ *Ibid.*, pp. 141, 149.

⁷ *Ibid.*, p. 158.

In the light of Australian attitudes to infrastructure provision, it is interesting to see MacKay and MacKay recommend that the 'central government assists in the provision of finance and other support . . . particularly with regard to the provision of infrastructure'.⁸

MacKay and MacKay emphasise that although favourable effects on the balance of payments and on government revenue accrue to all regions equally, employment and income effects will be concentrated mainly in Scotland. In Australia regional/national (or rather state/federal) tensions can arise over development conditions, e.g. when Western Australia was anxious to see exports permitted so the project would proceed, while the federal government felt it necessary to consider wider issues such as the problem of long-term supply.

MacKay and MacKay classify employment creation in four phases—exploration, manufacturing, production and temporary construction—each of which of course creates secondary income and employment in the multiplier process—the initial incomes created from investment spending are spent, so that further rounds of spending on consumption occur.⁹

The temporary construction activity phase includes the construction of refineries and terminals and pipe-laying. This is labour-intensive and presumably short term (in the present state of industrial relations in Australia, short-term projects can become extended).

The exploration phase includes geological, seismic and magnetic survey work and drilling, with associated sea and air transport and back-up facilities. Most employment is on the rigs, or on their nearby service bases. Some boats and rigs are mobile and crews foreign. A rig in the North Sea uses a crew of 140 (2×70) and generates 120 direct jobs on shore (in exploration companies, crews of supply boats and helicopters, and employees of service companies). Some jobs are highly skilled (such as petroleum engineers, drilling engineers, geologists and divers), but most are unskilled or semi-skilled.

The manufacturing phase covers the fabrication of exploration and production facilities. Rigs and ships are mobile, but production platforms have very specific site requirements. Where there is a choice, manufacturers may prefer to locate near centres of heavy engineering. Concrete platforms have required a workforce of 650 with skills similar to those required in civil engineering, while steel platforms have used 1500 workers—welders, fabricators and riggers. It is expected that the North-West Shelf platforms will be steel.

The production phase has a much lower level of employment than the construction phase. The level of employment depends on the platform and its equipment, and there is also employment in landfall terminals and refineries. B.P.'s Cruden Bay landfall pumping terminal is mostly

⁸ Ibid.

⁹ Ibid., p. 112.

automated, with 30 permanent employees, but there are 60 in the separation plant at Grangemouth and 150 in the Fifth of Forth tank farm and terminal. The much larger Sullom Voe crude oil terminal in the Shetlands has an employment base of 400.

In the gas-producing phase, employment is expected to be more important as the gas will be liquefied and transported by tanker. Gas from the Frigg field will be piped to St Fergus, where the terminal and separation complex will employ about 150. Ancillary developments such as an ammonia plant would employ more.

At the end of 1974, 19,000 jobs had been created in Scotland as a direct result of North Sea oil—6000 in exploration, 8700 in manufacturing, 800 in production and 3500 in construction. It is not expected that Australian activity will reach that level because of the differing size and nature of the reserves.

MacKay and MacKay point out that it is possible that as a region grows from the direct effects of exploration, it will reach a stage where growth is self-sustained and independent of the original impetus.¹⁰ This is partly the idea behind Western Australia's original proposal for the Pilbara industrial complex—that once it was established with government assistance in the form of infrastructure and perhaps other subsidies, it would enjoy self-sustained growth.

MacKay and MacKay also point to the social disruption and economic disruption that arose from large construction forces, e.g. Peterhead had a 'large and volatile' workforce, some 2000 at the peak, mostly foreigners, for pipe-laying for the Frigg and Forties fields. (Moray Firth had a workforce of 5000 for the construction of two steel platforms, and in the pipe-coating facility.) If the workforce wishes to stay beyond the construction phase, then there is unemployment. The provision of temporary infrastructure was also a problem, partly overcome by the hire of cruise ships, but this did not overcome social problems.

The exploration, construction and production phases overlap, with exploration gradually declining after the best prospects are drilled. The manufacturing and temporary construction phase is estimated to last between three and five years (on average, five). For employment estimates, the authors suggest we make assumptions about exploration leases, calculate the number of rigs each year, and multiply by 260. Manufacturing activity can be forecast mainly on development plans. The production phase gradually supersedes all others, and since it is the most capital intensive phase, employment can be expected to tail off. For the Forties field, for instance, which becomes fully operational in the late seventies, the permanent labour force is 700, compared with a peak of 7500 during manufacturing and construction. Piper has 300

¹⁰ See H. W. Richardson, *Regional Growth Theory*, Macmillan, London, 1973.

permanent jobs associated with it, after a peak of 4000. Since indirect service jobs associated with the original direct employment can also be expected to fall, and since the manufacturing phase has limited life, governments may need to look to alternative employment readily available, e.g. in other exploration and construction activities, or in other activities that are expanding as a result of the initial boost.

It is not yet certain how long the development phase of the North-West Shelf and adjacent areas will last and whether the construction workforce can be kept continually employed on such development or whether the government will need to take compensatory action.

The fact that growth in the minerals and energy sector has implications for the whole economy has been recognised by the federal government's recently established Bureau of Industry Economics. It says effects will be felt through increased real income in Australia, through the financing of the venture, through income taxes and royalties levied, through effects on the balance of payments and exchange rates, and through the flows of goods and services between the mining and other sectors and the associated employment effects.

Discussion of such linkages in Australia has been hampered by the fact that our input-output tables relate to a period long distant. We are not alone in that, for the Canadians¹¹ in June 1978 published a linkage study based on the 1966 *Statistics Canada Input-Output Tables* which became available in 1972. Of this study, entitled *Mining to Manufacturing: Links in a Chain*,¹² the Department of Energy, Mines and Resources suggested that although the absolute values of the inputs and outputs of each activity would have changed significantly since the base year, there are both empirical and theoretical reasons for believing that there would have been little change in most relative relationships.

The study was designed to fill the gap in statistical information on the total contribution of the minerals industry to employment, income and national product. The study presented the mineral industry as a series of connected links in a chain of fabrication, and analysed the effect of passing a unit of mine output through the various stages of the fabrication chain. A similar exercise was conducted for a fixed value of output at each stage of fabrication. The effect of the various stages of the mineral industry—mining, smelting and refining, and semi-fabricating—on energy utilisation was also studied. Results were presented for the ferrous, non-ferrous (copper, nickel and zinc) and asbestos chains of fabrication.

It was not the objective of the work to pass judgment on the desirability of further fabrication as a policy option, although the report

¹¹ Department of Energy, Mines and Resources, Statistics Canada and Department of Supply and Services.

¹² Formerly titled *Mineral Commodity Production in Canada at Various Levels of Fabrication: An Input-Output Analysis of Economic Factors*.

does suggest that opportunities for increasing economic benefits for Canadians may be identified amongst the data presented—for it answers quantitatively the question 'How much economic activity in Canada, both directly and indirectly, is associated with those particular mineral industries which would be prime candidates for such a further fabrication option?' In this study, however, the factors of greatest interest are labour and energy requirements; requirements for capital stock, and the further stimulation of the economy that these requirements might generate, are not considered. Other factors which are not taken into account, but which would have some bearing on the further fabrication option, are the marketability of the fabricated products,¹³ the availability of all inputs—including natural resources, labour and capital—and the balance of payments implications and/or constraints.

In the study, the requirements for factors of production are estimated for each of direct and indirect effects, and induced effects, associated with various levels of fabrication. These effects are defined as follows:

- (i) the direct effect is the effect involved with the industry being considered;
- (ii) the indirect effect is the economic activity arising in those industries supplying the industry being considered, together with the ensuing effect on the industries supplying the suppliers, and so on. In defining the indirect effect, the study limits this to the business sector of the economy;
- (iii) the induced effect is the economic activity generated when household incomes created in the business sector are spent on consumer goods and services.

Such measures are partial because they do not include—

- (i) economic activity generated by government spending facilitated by the revenues available from activity in the business and household sectors;
- (ii) economic activity that might occur because the capital stock has to be expanded to produce additional goods;
- (iii) the interaction between all sectors of the economy in arriving at general equilibrium.

Amongst the conclusions of the report is one that the higher the level of processing, and hence the higher the impact on economic factors, the lower is the proportion of Canada's domestic mine output which is processed locally. Canada at the same time is facing a rise in the level of imports at the higher stages of processing. The report mentions the apparent opportunity for Canada to increase her economic benefit if mine output were metallurgically processed and fabricated either for

¹³ As was mentioned earlier, this all-important demand side was underemphasised by the Pilbara Study Group, which examined proposals for an industrial complex in Australia's north-west.

export or for import replacement. It points out that whether the opportunities are real as well as apparent depends on other types of analysis—that one input-output analysis, while an excellent source of facts on specific alternatives, is not a sufficiently wide basis for policy recommendation.

Australia's new Bureau of Industry Economics has initiated a research project on the linkages between the mining sector and manufacturing and service industries. It notes the lack of both quantitative and qualitative research into linkages and the rest of the economy. It hopes ultimately to be able to assess the implications of future growth in mining on the manufacturing and service industries.

The Bureau identifies a number of ways developments in mineral based activities affect the economy:

Direct impacts

- Additional employment directly associated with the development and operation of mineral-based activities.
- Flows of goods and services between mining developments and other sectors of the economy and the possible subsequent effects:
 - increased employment in non-mineral-based industries
 - increased exports of mining and associated manufacturing equipment.

Income effects

- Increased real incomes in Australia generated by new mineral-based industries.

Trade effects

- Extent to which increased mineral exports lead to an appreciation of the exchange rate and place other sectors at a disadvantage because of relative price shifts.
- Extent to which increased mineral exports and subsequent balance of payments surplus can be transmitted into domestic inflation.
- Extent to which greater dependence on mineral exports may lead to greater instability in export receipts and the subsequent implications this may have for the optimum level of international reserves.
- Increased imports of goods and services for the development and operation of new mineral-based activities.

Regional aspects

- Development of new towns and associated infrastructure.
- New transport and port developments.

Public finance aspects

- Payment of additional income tax and royalties by the enterprises involved.
- Source of funds for provision of supporting infrastructure.

Capital market implications

- Financing the large amounts of initial capital expenditure required to develop mines and processing plants:
 - the impact on domestic capital markets
 - the capital inflow from abroad.
- Foreign ownership.

Most of these effects have also been identified in individual industry studies.¹⁴ However, the trade effects via the exchange rate and balance of payments are now receiving more emphasis since the work of R. G. Gregory mentioned in Chapter 1; and capital market implications have to be tied in with trade effects to gain a complete picture of the balance of payments/exchange rate situation. Public finance aspects have taken on special significance since the *Fitzgerald Report*, mentioned in Chapters 3 and 4.

How does the Bureau of Industry Economics define the mining industry? Does it confine itself to the Australian Bureau of Statistics definition which includes only establishments engaged in mineral extraction and beneficiation (either by crushing or chemical methods), and excludes establishments engaged mainly in the manufacture of metallised iron agglomerates, or in smelting or refining? The Bureau of Industry Economics, looking at total effects of mineral developments, is interested in mining and smelting, but hopes to report with sufficient disaggregation to allow the impact of mineral-based activities to be identified.

The objective is to obtain data on the expected strength of the economic effects that may flow from mineral based developments. The foremost need is for data on the direct impacts of mining developments, including details of the flows of goods and services and the employment effects created by new developments.

The Bureau's data requirements for capital spending on different facilities include:

- (a) A description of each major item of goods/services involved in construction of the facility.
- (b) The value of each of the major items of goods and services supplied and the total value of all purchases of capital equipment.
- (c) The source of supply of the various goods or services:
 - purchased from firms located within the same state as the facility
 - purchases from firms located elsewhere in Australia
 - purchases from overseas.
- (d) Number of employees actually engaged in constructing the facility.
- (e) Available information on salaries paid, man hours and types of skills involved in constructing the various parts of the facility.

¹⁴ See e.g. Susan Bambrick, 'Australia's Mineral Sands Industry', paper delivered to the ANZAAS Congress, Brisbane, May 1971.

Such information can be most readily obtained for projects currently being undertaken, rather than for projects completed some time ago. It can also be most readily obtained where there is only one contractor, and only a few subcontractors engaged.

Data for the operational phase are also sought. As with the construction phase, the information required on current purchases includes a description of each major item of goods or services, its value and the source of supply, along with details of the employees required to operate the facilities and the various skills involved.

Information is also sought on the factors determining whether a company orders imported or Australian-made equipment. Are differences in price, quality, or associated services including credit availability, delivery dates, availability of spares and servicing contracts significant?

The third part to the project is an attempt to forecast future developments within the mining sector, and hence future effects on manufacturing and service industries. Forecasts needed are the level and price of mineral exports, the scale and location of new projects, and the timing of expected changes in the level of production from existing projects. It does not propose to make detailed projections of all aspects, but expects information from the second part outlined above to provide sufficient disaggregation for the effects of several alternative scenarios to be examined.

The latest available information on intermediate inputs to mining from manufacturing may be found in the 1968-9 input-output tables released in 1977 by the Australian Bureau of Statistics. These are of limited predictive value. The Bureau of Statistics has begun updating the input-output tables to 1974-5, but data is not yet available.

In any case, input-output tables would be of limited value to the Bureau of Industry Economics study even if up-to-date figures were available. They concentrate on intermediate inputs provided by other sectors to the mineral sector, showing that in 1968-9 the most important categories of supply to mining were wholesale trade, business expenses, electricity, petroleum and coal products, other machinery and equipment, chemical products and basic iron and steel. Obviously for policy purposes more meaningful subclassifications must be used.

Input-output tables do not provide information about the linkages between mineral development and manufacturing production associated with investment expenditure in that development. For useful prediction, it is necessary to look at regional aspects, multiplier effects, demand for domestic versus imported products and the possibility that certain domestic manufacturing establishments, through demand from the domestic mineral sector, may reach such a level of production that economies of scale render their product competitive on international markets.

In its study, the Bureau of Industry Economics was initially anxious to identify the effects of mining on specific manufacturing industries, and hoped the information sought from industry would allow disaggregation to the four-digit level of A.S.I.C. (This Standard Industrial Classification adds a digit at each level of disaggregation. The last digit distinguishes between commodities which are related on the basis of previous digits—thus cement is 28.03, ready-mix concrete is 28.04, and concrete products are 28.06; 29.01 describes basic iron and steel, 29.02 other basic metal products.)

The Bureau's initial approach has been to contact some of the larger mining companies seeking detailed information about the inputs to new mining and processing projects and established mining and mineral processing activities. The data sought concern the value of inputs, the industry class and location of suppliers and the value of imported content. The Bureau has considered surveying the successful tenderers for contracts for new mining projects and a draft questionnaire for such a survey has been prepared for use in a pilot study. The Bureau will also, at the next stage of the project, survey some at least of the manufacturers who are supplying the mining industry, seeking opinions on the effects on them of growth in mining and mineral processing activities. The Bureau expects to produce an overview report on the topic early in 1979. This will consider in perspective the various linkages between the mining sector and manufacturing and service industries and draw together the currently available information on these linkages. It proposes to follow this report with supplementary reports on specific areas of interest.

In recent years, Australian industry has complained that a great deal of time is spent in preparing information for government use—not only for the Australian Bureau of Statistics but also for the Bureau of Mineral Resources, the Prices Justification Tribunal, and various federal and state departments. The Bureau of Industry Economics in its initial description of its intentions was no exception, since it sought also the names of suppliers who might have been engaged in sub-contracting for the primary contractor. Where items were directly imported from overseas, the Bureau sought information on the availability or potential availability of equivalent domestically produced items. Comments were sought on comparative quality and durability. Lists of leading suppliers of material and equipment to the project were sought so that the Bureau might contact them directly.

Values of purchases of services were sought, to enable the Bureau to consider effects such as employment multipliers and regional impacts. For electricity, fuels, repairs and maintenance expenses, the Bureau suggested companies might save time by submitting the figure included in Mining Establishment Returns prepared for the Australian Bureau of Statistics. Annual wage and salary estimates (total value added) could be taken from the same returns.

Apart from these last two queries, this would be a time-consuming and hence costly exercise for both industry and government. Would government policy be better-based as a result? Some attitudes in parliament assume the mineral industry has little importance to the rest of the economy, apart from tax payments and export earnings. Some attitudes see the industry as 'the backbone of the country', the image promoted by the industry. The present study, costly and complex as it is (even though it appears to have been somewhat simplified as it progressed) could provide a background on which policy attitudes could be based, unless they are too firmly entrenched. The study should also make some comparisons with other industries.

With information at last available on the industry's relationships with the rest of the economy, policies to achieve specific objectives can be formulated. First objectives have to be defined—e.g. increased real income per head or increased levels of employment. Policies—including perhaps the encouragement of mining—will follow.

Questions for Discussion

These are arranged by chapter. Questions are of varying degrees of difficulty. Some are suited to workshop/tutorial discussion, while others may form the foundation for individual written projects. In some cases, at least one initial reference is suggested. In other cases, references will be found in the text or footnotes of the chapter.

Chapter 1

1. Does the so-called 'Gregory Thesis' have implications for Australia's economic policy?

Initial references:

R. G. Gregory, 'Some Implications of the Growth of the Mineral Sector', *The Australian Journal of Agricultural Economics*, Vol. 20, No. 2, August 1976.

John D. S. MacLeod, 'The Gregory Chant', *Australian Quarterly*, Vol. 49, No. 2, June 1977.

Geoff Miller, 'Intersectoral Competition and Rural Prosperity: Some Policy Issues', *The Australian Economic Review*, 4th quarter 1976.

Chapter 2

1. How do you see Australia's future position in the world, both as a minerals and energy producer and as a consumer?

Initial references:

Plato Malozemoff, 'Geographical Aspects of the Mineral Equation', *Proceedings of the Joint Conference*, Australasian Institute of Mining and Metallurgy and American Institute of Mining, Metallurgical and Petroleum Engineers, Canberra, May 1978.

Sir James Foots, 'Future Planning Against Mineral Shortages', *Joint Conference A.I.M.M.-A.I.M.E.*

James Scully, 'International Commodity Agreements and Arrangements', *Joint Conference Aus. I.M.M.-A.I.M.E.*

Russell T. Madigan, 'Stockpiles and their Role in International Resource Management', *Joint Conference Aus. I.M.M.-A.I.M.E.*

Charles W. Robinson, 'The Political Dimension in Resource Development', *Joint Conference Aus. I.M.M.-A.I.M.E.*

Chapter 3

1. What do you see as the main current issues for Australian minerals and energy policy?
(Note for teachers: It is interesting to discuss this question at the beginning of a course, and again at the end.)
2. How has the emphasis in Australian minerals and energy policy changed over the last decade?
(Note for teachers: This can also be considered later, after Chapters 9–12.)

Initial reference:

The Changing Relationship: The Australian Government and the Mining Industry, C.E.D.A., M Series No. 42, May 1975.

3. What do you expect to be the main issues in Australian minerals and energy policy in the next decade?
4. How does Australia's attitude to minerals and energy policy compare with attitudes in other mineral producing countries?

Initial reference:

W. C. J. van Rensburg and S. C. Bambrick: *The Economics of the World's Mineral Industries*, McGraw-Hill, Johannesburg, 1978.

Chapter 4

1. Do you think the mining industry should pay royalties and, if so, how would you assess them?
2. Would you subsidise petroleum exploration in Australia?
3. Do you believe that shareholders subscribing exploration or mineral development funds should be able to deduct them from taxable income?
4. Do you believe the mining industry should enjoy depletion allowances?
5. How do you regard competitive leasing?
6. Do you see special characteristics of the mining industry that necessitate special tax treatment?
7. What do you think of resource rent taxes? Would you impose them on companies operating in Australia and, if so, in all areas of interest or only for certain minerals? If not, what threshold rate of return would you select?
8. How would you argue that a government imposing an extra tax on 'super-normal' profits should also compensate companies for losses?
9. How would you argue against the suggestion that a government, while imposing a rent tax of x per cent, should also give a grant of x per cent of the initial cost?

Initial references:

- Industries Assistance Commission, *Report of the Petroleum and Mining Enquiry*, 1976.
- W. C. J. van Rensburg and S. C. Bambrick: *The Economics of the World's Mineral Industries*, McGraw-Hill, Johannesburg, 1978, Ch. 6.
- Susan Bambrick: *Resource Rent Taxes*, Committee for Economic Development Monograph, November 1978.
- P. L. Swan, 'Income Taxes, Profit Taxes and Neutrality of Optimizing Decisions', *Economic Record*, June 1976.
- P. L. Swan, 'Australian Mining Industry Taxation and the Industries Assistance Commission: An Appraisal of Two Recent Reports', paper presented to a workshop on Mining Industry Taxation, Centre for Resource and Environmental Studies, A.N.U., November 1976.
- Paul A. Samuelson, 'Tax Deductibility of Economic Depreciation to Insure Invariant Valuations', *Journal of Political Economy*, December 1964.
- R. Garnaut and A. Clunies Ross, *Taxing Natural Resource Projects*, Australia-Japan Research Project, Australian National University, 1974.
- R. Garnaut: *The Application of a Resource Rent Tax to The Australian Mining Sector*, Taxation Workshop, Centre for Resource and Environmental Studies, A.N.U., November 1976.
- B. Smith and A. M. Ulph: *Economic Principles and Taxation of the Mining Industry*, Centre for Resource and Environmental Studies, A.N.U., November 1976.
- Commonwealth Treasury Taxation Paper No. 1, *Taxation Reform—Problems and Aims*, September 1974.
- Treasury Taxation Paper No. 13, *Summary of Issues*, December 1974.
- A. G. Henderson, in 'Royalties and the Confiscation of Economic Rent', Resources Policy series, Department of Economics, A.N.U., 1972.
- A. O. Lockner, 'The Economic Effect of the Severance Tax on Decisions of the Mining Firm', *Natural Resources Journal*, Vol. 4, No. 3, pp. 468–85, January 1965; R. D. Kelsey, 'Royalty Systems and their Impact on Mining Investments', University of N.S.W. Mining Economics Symposium, September 1977.
- Industries Assistance Commission, *Report on Crude Oil Pricing*.
- Robert J. Enright, 'Soaring Costs, taxes, slow oil development in North Sea', *Oil and Gas Journal*, 30 June 1975.
- Jon R. Morgan and Colin Robinson, 'The Comparative Effects of the UK and Norwegian Oil Taxation Systems on Profitability and Government Revenue', *Accounting and Business Research*, Winter 1976.

Chapter 5

1. How do you regard the *Fitzgerald Report*?
2. What do you think of the suggestion that the Australian government should not only charge withholding tax on branch profits remitted abroad, but that it should have a higher tax rate on these than on subsidiary profits remitted abroad?

Chapter 6

1. Consider the imposition of a coal export levy of \$3.50 per tonne of coal. Develop two simple financial models of a proposed new mine—one where the new levy (where none existed before) will prevent the project from proceeding, and one where the project is not prevented (although its profitability is reduced). Devise an additional profits tax whose imposition would not have prevented either project.
2. Develop a simple financial model for a new mineral development, illustrating how viability may be affected by differing write-off provisions. Illustrate the effects of an investment allowance.
3. Develop a simple financial model to illustrate how royalties differ in impact according to whether they are based on tonnage, price or profit.

Chapter 7

1. Companies permitted to mine Aboriginal land have to negotiate compensation payments to be paid to the Aborigines. If you were advising the Aborigines, how would you determine the level of compensation sought?
2. In 1., if you were advising the company how would you determine the level of compensation to be offered?
3. If your suggestions in 1. and 2. differ and you are an independent arbitrator appointed to determine a compromise, how would you determine this?

Chapter 8

1. What do you see as the main issues for Australian energy policy?
2. Do you think there is a world energy crisis? What are the implications of your answer for Australian energy policy?
3. We hear from our politicians and their critics of a 'need to formulate a national energy policy'. What does a national energy policy look like—that is, what are its elements?
4. R. F. X. Connor in Opposition in 1972 wanted to see the government produce a national energy budget. Paul Keating has also supported this idea. What does a national energy budget look like?

5. Would you apply a resource rent tax or secondary profits tax to:
 - (a) oil
 - (b) coal
 - (c) uranium
 - (d) other mining?
6. Should Australia be concerned about the level of foreign ownership in her coal industry? How do you regard the Japanese view that if Australia does yield equity to foreigners, this should go to Japan rather than to multinational companies?
- 7a. Do you support the idea of free export of natural gas from the North-West Shelf?
OR
- 7b. What do you see as specific areas of conflict between states, and between a state or states and the commonwealth, in the field of energy policy? How do you seek a solution?
- 8a. How do you see the world uranium market developing over the next decade? What do you think of suggestions that the federal government will help uranium producers set 'a common target price' for uranium ore? What do you think of suggestions for sequential development of uranium mines in Australia?
OR
- 8b. Total Australian uranium resources in the reasonably assured and estimated additional resources categories recoverable at costs of up to \$30 per pound of U_3O_8 represent 9.2 per cent of the total non-communist world's uranium resources in those resource and cost categories. By 1985, Australia may be only 25 per cent self-sufficient in petroleum production compared to 65 per cent in 1975. Accepting these statements as being soundly based, is this sufficient economic justification for Australia to proceed to develop without delay its uranium resources?
OR
- 8c. 'Estimates of the growth of nuclear power have shown the same characteristics as all other long term plans, they are almost invariably wrong, not just a little bit wrong, but a lot wrong. The reason is not incompetence on the part of the planners, it is just an almost impossible exercise with far too many unknowns that can have a major effect on the answer.'—Sir John Hill, in an address to the International Symposium on Uranium Supply and Demand, London, June 1976.
Do you agree with this statement? What safeguards, if any, can be incorporated into an energy planning program to ensure that the best possible answers are isolated and implemented?
9. Do you think the federal and/or state governments should increase their funding of energy research? If so, how would you allocate this in terms of institutions and types of projects?

10. What do you see as the future of alternative energy sources in Australia?
11. What time scale, if any, do you envisage for commercial development of the electric car on a world scale? How do you view its possibilities in Australia?
12. How do you regard N.E.A.C.? Do you see any permanent role for a body of this kind? How do you regard N.E.R.D.D.C.?
13. How do you think the world price of oil will move over the next decade? Do you see world demand patterns changing? How do you view the long-term world supply position for petroleum?
14. What do you think of the profit-related tax, suggested by Bob Foster and referred to in this chapter, as a replacement for the existing excise levy?
15. Consider the scenarios mentioned in Chapter 8 as having been generated in discussion of New Zealand energy policy for the next fifty years.
What alternative scenarios could you generate for Australia over the next (a) 10 years; (b) 20 years; (c) 50 years?
- 16a. How do you regard energy modelling?
OR
- 16b. Discuss some of the energy modelling that has been undertaken in Australia and overseas (for an initial reference see Folie and Ulph's paper in the list below).

Initial references:

- Academy of Technological Sciences, First Invitation Symposium (Energy), Canberra, October 1977.
- Australian Atomic Energy Commission, *Annual Reports*.
- B.H.P. Energy Symposium, Melbourne, 26 September 1977, Papers:
 - The North-West Shelf Project, I. A. McGrath
 - Coal Conversion in B.H.P.'s Energy Programme, G. M. Keith
 - Gas in Eastern Australia, R. Hutchinson
 - Crude Oil Prospects—A B.H.P. View, D. A. Wittwer
 - Solar Energy—The Alternative for Low Grade Heat, R. G. Ward.
- Committee for Economic Development of Australia. Papers:
 - Energy in Australia, 1977–2000, C.E.D.A. Policy Statement P20, August 1977
 - C.E.D.A. Energy Project Position Paper No. 1, September 1975.
 - Crude Oil Pricing Policy—Australia, J. R. Wilson
 - C.E.D.A. Energy Project Position Paper No. 3, March 1976. Back to Black Coal, J. R. Wilson
 - C.E.D.A. Energy Project Position Paper No. 4, April 1976. Uranium, C.E.D.A. Research Group
 - C.E.D.A. Energy Project Position Paper No. 5, May 1976. Brown Coal, C.E.D.A. Research Group

- C.E.D.A. Energy Project Position Paper No. 6, October 1976. Oil in Australia, C.E.D.A. Research Group
- C.E.D.A. Energy Project Position Paper No. 7, December 1976. Energy Sources for the Future, C.E.D.A. Research Group and the C.E.D.A. Study, Project Series No. 17 (October 1975) on: International Economic Consequences of High Priced Energy.
- G. L. R. Dixon, B. J. Ferguson and D. McPherson, Natural Gas Exports or Transcontinental Pipeline? A Quantitative Comparison, 6th Conference of Economists, Hobart, May 1977.
- M. Folie and A. Ulph, 'The Role of Energy Modelling in Policy Formulation', in Susan Bambrick (ed.), *The Australian Minerals and Energy Sector: Planning and Problems for the Eighties and Beyond*, Centre for Continuing Education, A.N.U., February 1977.
- Institution of Engineers: Report of the Task Force on Energy, 1977. National Energy Advisory Committee Reports.
- W.A.E.S., Technical Reports, Energy Demand Studies—Major Consuming Countries; Energy Supply to the Year 2000; and Energy Supply—Demand Integrations to the Year 2000.
- Garth Stevenson, Mineral Resources and Australian Federalism, Centre for Research on Federal Financial Relations, A.N.U., Canberra, 1976.
- Workshop on Alternative Energy Strategies, M.I.T.; Energy: Global prospects 1985–2000.

Chapter 9

1. Examine critically the Cost/Benefit Analysis in the Fraser Island Enquiry Report. Do you think it a useful contribution to the debate?
 2. In December 1976, W. D. Scott & Co., in their *Review of the Economic Analysis Presented in Chapter 9 of the Ranger Uranium Environmental Inquiry* (commissioned by the Australia Uranium Producers' Forum), said 'Chapter 9 of the *First Report* of the Ranger Uranium Environment Inquiry does not present a complete economic analysis. The methodology is faulty and leads to conclusions which could mislead.'
- Do you consider cost/benefit analysis a useful guide to public policy? (This may be considered in conjunction with Chapters 10 and 11 where direct public expenditure is considered. Some of the references below refer to this subject.)

Initial references:

- E. J. Mishan, *Cost-Benefit Analysis*, George Allen and Unwin, London, 1971. Also his *Economics for Social Decisions*, Praeger, New York, 1972.
- A. R. Prest and Ralph Turvey, 'Cost-benefit analysis: a survey',

Economic Journal, December 1965; reprinted in American Economic Association/Royal Economic Society, *Surveys in Economic Theory*, Vol. 3 (Macmillan, 1966), pp. 155–207. Also their 'Applications of Cost-Benefit Analysis', *Economic Journal*, 1965. Reprinted in Edwin Mansfield (ed.), *Microeconomics: Selected Readings*, W. W. Norton & Co., New York, 1971.

L. G. Hines, 'The hazards of benefit-cost analysis as a guide to public investment policy', *Public Finance*, 1962.

Commonwealth of Australia, 'Investment Analysis', Supplement to the *Treasury Information Bulletin*, July 1966. A.G.P.S. Canberra (7854/66-2).

Russell Mathews, *Public Investment in Australia*, Cheshire, Melbourne, 1967, chs 2, 3, 7, 8 and 10.

Arnold C. Harberger, *Project Evaluation: Collected Papers*, Macmillan, 1972.

Ronald H. Coase, 'The Problem of Social Cost', *Journal of Law and Economics*, October 1960 (Vol. III).

W. J. Baumol, *Economic Theory and Operations Analysis*, 2nd ed., Prentice Hall, 1965, ch. 19.

Harley H. Henricks and Graeme M. Taylor, *Program Budgeting and Benefit/Cost Analysis*, Goodyear, Pacific Palisades California, 1969.

O. Eckstein, 'A Survey of the Theory of Public Expenditure', in J. M. Buchanan (ed.), *Public Finances: Needs, Sources and Utilisation*, Princeton University Press, Princeton, 1961.

I. M. D. Little and James A. Mirrlees, *Manual of Industrial Project Analysis in Developing Countries*, Vol. II, *Social Cost Benefit Analysis*, O.E.C.D. Publications Center, Washington, D.C., 1969.

R. N. McKean, *Efficiency in Government Through Systems Analysis*, John Wiley, New York, 1963.

George Irvin, *Modern Cost-Benefit Methods: Financial, Economic and Social Appraisal of Development Projects*, Macmillan, August 1978.

3. What factors would you take into account in deciding whether or not Australia should mine and export uranium?
4. Do you see a role for government in environment protection? If so, do you think the mining industry should be subject to state or federal control, or to both?
5. How do you regard the suggestion that the federal (Liberal-N.C.P.) government is calling for tenders to allocate mineral exploration rights in the second state of the Kakadu National Park? ('Uranium plan revealed in secret document', *Australian Financial Review*, 11 November 1977.)
6. What measures do countries other than Australia adopt with reference to the oil spill aspect of offshore petroleum proposals?

Initial references:

U.S. Department of the Interior, Geological Survey, *Policies, Practices and Responsibilities for safety and environmental protection in oil and gas operations on the outer continental shelf* (1977).

Lyddon D. *Planning for North Sea Oil Developments in Scotland: Scottish Development Department*, 1975 (see also Scottish Office, *North Sea Oil and the Environment*. Pollution: an assessment of the risks and actions to deal with incidents). Norwegian Parliamentary Report No. 44 (1975/76—Pollution control measures).

Chapter 10

1. Do you think the Australian government should provide infrastructure for the mining industry?
2. Do you think the Australian government should encourage local processing, and if so, how and for which particular minerals?
3. Are Australia's mineral research facilities adequate? What of our training facilities for the exploration, mining and processing workforce?

Chapter 11

1. What considerations would you take into account in deciding whether (i) the federal government, (ii) the state governments should be operating in the minerals and energy sector?
2. Would you advise the Papua New Guinea government to become directly involved in its mining industry?
3. Do you know of any lessons to be gained from overseas experience of government involvement in the mining or petroleum industry, e.g. in Indonesia (Pertamina), the Middle East, or Brazil?
4. Should government decisions to become directly involved in the mining industry have more emphasis on commercial (rate of return) aspects than on social considerations?
5. When a government has operated an industrial/commercial enterprise in direct competition with private enterprise (e.g. Australia's two-airline policy), has this been beneficial? To whom? Do you think the same considerations would apply to government participation in mining?
6. How do you view the plans of Queensland's State Government Insurance Office, 'to continue large-scale direct equity investments in the resources field?' (See *Australian Financial Review*, 21 November 1977.) The S.G.I.O. reportedly was to outlay \$28 million to buy a 20 per cent interest in Amoco, and gain a seat on the Board. Amoco was to expand its Queensland refinery capacity by 50 per cent. The S.G.I.O. is reported to be planning direct equity investment in Queensland's energy resources.

7. How do you regard the suggestions that (a) the Australian government and (b) Urenco Centec should finance a uranium enrichment plant in Australia? (Urenco is a consortium of Britain, Holland and West Germany. The Centec Company is from West Germany.)
- 8a. Do you think state and federal governments should be concerned about the level of foreign ownership and/or control in the Australian mining industry at present? In the light of your answer, how do you regard proposals that companies be classed as 'Australian' if they have 25 per cent Australian ownership and plan to proceed to 50 per cent?
OR
- 8b. How do you account for the present level of foreign ownership and/or control in the Australian mining industry? What do you expect to happen to this level in the future?
OR
- 8c. When the A.L.P. federal government took office from December 1972, it moved to restrict the level of foreign ownership in the minerals and energy sector. How do you see that decision in relation to the Commonwealth Treasury's Economic Paper No. 1 (May 1972) and the deliberations of the Senate Committee on Foreign Ownership?
OR
- 8d. R. B. McKern (*Multinational Enterprise and Natural Resources*, McGraw-Hill, Sydney 1976, p. 9) says 'the simple, if undeniable, argument that companies undertake investments in order to make profits is not much help in explaining the observed patterns of investment from one country to another'. Discuss.

Chapter 12

- 1a. What are the objectives of the federal opposition's policies on minerals and energy?
OR
- 1b. How do the federal opposition's policies on minerals and energy differ from those of the government?

Chapter 13

1. Outline, qualitatively at least, the multiplier effects you would expect from a specific present or future mining or petroleum project. Do you expect these effects to be sustained in the long term? If not, does this have any implications for government policy?
2. What forward linkages do you associate with the development of the Weipa bauxite deposits? With the development of the Broken Hill mines?

3. What (a) backward and (b) forward linkages do you expect to arise from:
 - (i) Extensions of coal mining in Queensland and New South Wales? (Distinguish between coking and steaming coal where necessary.)
 - (ii) Development of new uranium mines?
 - (iii) Development of the North-West Shelf gasfields?

Index

- Aboriginal Affairs, Minister for, 73, 82, 83
- Aboriginal land rights, 31, 72-84 *passim*, 187, 190, 196, 205
- Additional profits tax, *see* Resource rent tax
- Africa, 13; *see also* South Africa
- Alcoa, 15, 17, 110, 125, 152
- Alligator Rivers, 121
- Alumina, aluminium, *see* Bauxite
- Alwest, 116, 150
- Amax, 17
- American Smelting and Refining Company, 16; *see also* Mt Isa; Mt Isa Mines; M.I.M.
- Antarctica, 14, 18, 31-3, 101, 193
- Anthony, the Rt Hon. J. D., 24, 25, 35, 83, 181, 184
- Argentina, 12, 13, 166
- Asbestos, 13
- Ashton Mining, 185
- Ashton project, 183, 185
- Australian Antarctic Territory, *see* Antarctica
- Australian Associated Resources, 182
- Australian Atomic Energy Commission, 27, 110
- Australian Coal Industry Research Laboratories, 90
- Australian Labor Government, 13, 24, 34, 64, 161, 162, 170, 189; *see also* Budget; Commonwealth Government
- Australian Labor Party, 2, 3, 27, 83, 84, 200-7 *passim*
- Australian Heritage Commission, 127
- Australian Industry Development Corporation, 64-7, 162, 182
- Australian Mining Industry Council, 76-81 *passim*, 127-9, 149
- Australian ownership, *see* Foreign investment
- Australian Resources Development Bank, 66-7
- Australian Science and Technology Council, 203
- Average hours worked, 5
- Balance of payments, 1, 14, 16, 22, 107, 217, 219, 220; *see also* Exchange rate
- Balmain coal loader, 150-1
- Bass Strait, 15, 17, 28, 32, 85, 86, 93, 94, 100, 186, 213; *see also* B.H.P.; Gippsland
- Bauxite, alumina, aluminium, 9, 10, 11, 15, 17, 114, 158, 159, 163-5
- Belgium-Luxembourg, 12-13
- Bellambi Coal Co. Ltd, 8
- B.H.P., 7, 8, 15, 16, 17, 29, 85, 90, 91, 99, 100, 110, 157, 177, 178, 209; *see also* Bass Strait; Esso
- Bipartisanship, 90, 200, 201
- Bjelke-Peterson, the Hon. Joh, 26; *see also* Queensland
- Bougainville, 49, 149
- B.P., 8, 29, 99, 181, 183, 215
- Brazil, 12, 13, 18, 59, 157, 158, 166
- Britain, *see* United Kingdom
- Broken Hill, 16, 21, 197
- Budget, federal: 1973, 2; 1974, 37; 1976, 27; 1977, 35, 52, 90; 1978, 29; *see also* Taxation
- Bureau of Industry Economics, 217, 219-23 *passim*
- Bureau of Mineral Resources, 165, 166, 206, 222
- Burmah Oil, *see* Woodside Burmah

- Canada, 13, 18, 20, 26, 59, 88, 101, 166, 188, 217, 218
 Capital inflow, 2, 3, 16; *see also* Balance of payments
 Capital intensity, 4, 21
 Cash flow, 21, 46–59 *passim*; *see also* Taxation; Depreciation
 Cass, Dr M., 115
 C.G.F.A., 17, 48, 53, 54, 55, 56, 178, 182
 Chile, 166, 193
 China, 12, 13, 14, 18, 19, 157, 158
 Clutha Development, 151
 Coal, 5, 6, 9, 11, 12, 13, 14, 16, 17, 18, 25, 86, 87, 91, 150–2, 186, 201; export levy, 27, 52–3, 90, 188; gasification and liquefaction, 18, 90, 91, 114, 161, 204; research levy, 90–1, 101, 109; *see also* Prices; Exploration
 Coal and Allied Industries Ltd, 181
 Comalco, 15, 17, 48, 163–4
 Commonwealth Government, 21, 23; *see also* Anthony, the Rt Hon. J. D.; Connor, the Hon. R. F. X.; Export control; Federalism; Foreign investment; Pipeline Authority; Petroleum and Minerals Authority; Prices; Taxation
 Communist bloc, 19
 Connor, the Hon. R. F. X., 22–4, 28, 86, 93, 115, 116, 160, 167, 168, 186, 187, 203; *see also* Australian Labor Party
 Conservation, 29, 30, 91, 101, 106–7, 111, 190, 204, 205
 Continental shelf, *see* Offshore resources
 Cooloolool, 119, 120, 121
 Cooper Basin, 93, 98, 174, 177
 Copper, 9, 10, 12, 14, 178, 193
 Cost-benefit analysis, 57, 129–46
 Court, Sir Charles, 27, 150, 171, 201; *see also* Western Australia
 C.R.A., 8, 15, 17, 49, 59, 110, 149, 152, 159, 165, 180–5 *passim*
 CSIRO, 90, 91, 110, 113
 C.S.R., 182
 Defence, 101, 114, 161, 170
 Depletion allowance, 21
 Depreciation, 21, 23, 37, 38–44; *see also* Taxation; Cash flow
 Discounted cash flow, *see* Cash flow
 Economic impact of mining, 219; *see also* Balance of payments; Bureau of Industry Economics; Employment; Exchange rate; Exports; Finance; Imports; Infrastructure; Linkages, Multipliers, Processing; Royalties; Taxation
 Electrolytic Zinc, 16; *see also* E.Z.; Peko-E.Z.
 Employment, 3, 4–5, 14, 24, 156, 164–5, 208–17 *passim*; of Aborigines, 78, 79
 Energy forecasting, 15, 112
 Energy policy, 29, 30, 85–113, 198–9, 204–5
 Energy prices, 15; *see also* Coal; Petroleum
 Energy shortages, 15, 114; *see also* Coal; Energy policy; Petroleum
 Environment, 115–46, 190; Environment Protection Act, 206; environmental impact statements, 117–19, 123–5, 193; environmental standards, 187; *see also* Pollution; Resource depletion
 Esso, 17, 53, 54, 55, 56, 85, 86, 99, 100, 178, 181, 183, 210, 211; *see also* B.H.P.
 Europe, 19, 155
 European Economic Community, 9, 11, 16
 Excess profits tax, *see* Resource rent tax
 Exchange rate, 1, 2, 3, 217, 220
 Exchange risk, 71, 153
 Excise, *see* Petroleum (crude oil levy)
 Exmouth Plateau, 28, 99, 100
 Exploration, 21, 23, 28, 34, 35, 37–8, 73–4, 89, 94–101 *passim*, 165–9, 202; *see also* Petroleum; Subsidies
 Export control, 23, 24, 25–7, 86, 97, 98, 115, 125, 159, 186, 187, 195, 201, 202, 203; *see also* Prices

- Exports, 1, 2, 4, 9-12, 29, 30, 90, 219 E.Z., 125; *see also* Electrolytic Zinc; Peko-E.Z.
- Federal government, *see* Commonwealth Government
- Federalism, 4, 152, 186-99
- Finance, 64-71, 86, 101, 152-3, 162, 181, 203, 219-20; *see also* Foreign investment
- Fitzgerald, T. M. (*Fitzgerald Report*), 23, 34, 37, 46, 47, 53-7 *passim*, 149, 165, 184, 220
- Foreign investment, equity, ownership, control, 5, 7, 16-18, 20, 21, 24-5, 27, 28, 29, 64, 85, 87, 95, 96, 160, 162, 180, 185, 186, 187, 202, 207, 220
- Foreign Investment Review Board, 180-2
- Foreign Takeovers Act, 181
- Foster, Bob, 88-9, 95-8
- Fox Report, 16, 30, 77, 81, 206
- France, 12, 13, 32
- Fraser, the Rt Hon. J. M., 35, 185, 152, 186
- Fraser Island, 31, 115, 120, 121, 125, 126, 135-44, 187, 189, 191
- Germany (Federal Republic, West), 12-13, 101, 159
- Gippsland, 176, 210, 213
- Gladstone, 15, 17, 152, 163-5
- Gold, 10
- Goldsworthy, 17, 49
- Gove, 159
- Gregory, R. G. ('Gregory Thesis'), 1-4
- Hail Creek, 27, 125
- Hamersley, 17, 49, 53-6 *passim*, 159, 208
- Hayden, the Hon. W. G., 95
- Hong Kong, 12-13
- Howard, the Hon. J. W., 181, 185
- Howard Smith, 181
- Illawarra, 120, 151
- Imports, 13, 22, 89, 210, 211, 212, 218-19, 221
- Incentives, 158-63, 188; *see also* Subsidies; Taxation
- India, 12-13, 158, 166
- Indian Ocean, 18
- Indonesia, 12-13, 32
- Industries Assistance Commission: copper, 178-9; crude oil pricing, 34, 85; petroleum and mining, 24, 34, 37, 47, 49, 59, 155, 162, 165, 195; steel, 157; *see also* Taxation
- Inflation, 2, 3
- Infrastructure, 17, 147-55, 198
- Input-output analysis, 217, 219, 221
- Interest, 6, 16
- Investment allowance, 28
- Iran, 12-13, 102, 166
- Iron ore, iron and steel, 9-12, 13, 14, 16, 18, 23, 25, 155, 157, 158, 159, 186; *see also* Prices
- Italy, 12-13
- Jackson, Gordon, 182-4
- Japan, 9-17 *passim*, 19, 21, 24, 26-7, 86, 87, 157, 159, 184, 185
- Jurien Bay, 19
- Kakadu National Park, 112
- Keating, the Hon. Paul, 95, 200-3
- Korea, 12, 13, 14, 18, 19, 87
- Labor Party, *see* Australian Labor Party
- Labour intensity, 3
- Law of the Sea Conference, *see* Offshore resources
- Lead, 9, 10, 12
- Liberal-National Country Party coalition, 24, 34, 35, 122, 170, 174, 200; *see also* Commonwealth Government
- Linkages with other industries, 4, 156, 208-33 *passim*
- Loan Council, 71, 150, 152
- Loan repayments, 16
- Local ownership, *see* Foreign investment

- McNeill, Sir James, 177
 Malaysia, 185
 Manganese, 10, 11
 Manufacturing sector, 1-7 *passim*;
 see also Linkages with other
 industries
 Marketing, 17, 30, 87, 96, 198, 202;
 see also Prices
 Mary Kathleen Uranium, 27, 31
 Mineral sands, 9, 10, 12, 23; *see also*
 Fraser Island
 Minerals and Energy, Minister for,
 see Connor, the Hon. R. F. X.
 Middle East, 18-19, 101, 159
 M.I.M., 53-9 *passim*, 99, 182
 Mt Isa, 11, 16, 197; Mt Isa Mines,
 16; *see also* M.I.M.
 Mt Lyell, 16, 178-9, 187, 197
 Mt Newman, 17, 55
 Multinational corporations, *see*
 Foreign investment
 Multipliers: labour, 209-10 (*see also*
 Employment); national income,
 208, 217-18, 221
 Myall Lakes, 116, 117
- Nabarlek, 83; *see also* Queensland
 Mines
 National Development, Department
 of, 15, 22, 24, 98, 113, 118
 National Energy Advisory Com-
 mittee, 94, 98, 106-8, 110, 111
 National Energy, Research, Develop-
 ment and Demonstration Council,
 90, 108-9, 160
 National Fuel and Energy Com-
 mission, 203-4
 National income, 3, 4, 5; *see also*
 Economic impact of mining;
 Multipliers (national income)
 Natural gas, *see* Petroleum
 Nebo, 27, 49, 125
 Netherlands, 11, 12-13
 Newman, the Hon. K. E., 24, 30
 New South Wales, 14, 15, 16, 87,
 93, 111, 120, 121, 150, 153, 155,
 161, 163, 186
 New Zealand, 12-13, 15, 17, 32, 87,
 104-6
- Nickel, 9, 10, 11, 17
 North Broken Hill, 16, 48
 Northern Land Council, 75-83
 passim
 Northern Mining, 183
 Northern Territory, 27, 30, 31, 72-
 81 *passim*, 121, 149, 159, 196
 North Sea oil and gas, 4, 61, 99,
 214-16
 North West Shelf, 16, 24, 28, 29, 32,
 34, 50-1, 52, 70, 92, 93, 94, 95, 98,
 100, 125, 135, 159, 165, 167, 177,
 202, 212, 214, 215
 Norwich Park, 27, 52, 125, 180; *see*
 also Utah
- Objectives of mineral policy, 1, 20,
 21
 Offshore resources, 31-3, 186, 187,
 188, 193
 Oil, *see* Petroleum
 Opposition, federal, *see* Australian
 Labor Party
 O.P.E.C., 18, 20, 85, 170, 189
- Pacific region, 18
 Papua New Guinea, 20, 149
 Pakistan, 12, 13
 Peko-E.Z., 24, 27, 30, 48, 75, 77, 125;
 see also Electrolytic Zinc; E.Z.;
 Peko-Wallsend; Ranger Project
 Peko-Wallsend, 16, 48; *see also*
 Peko-E.Z.
 Peru, 59, 166
 Petroleum, 201, 204; coal interests of
 petroleum companies, 18; con-
 servation, 34, 107; crude oil levy,
 28, 87, 88, 100; crude oil prices,
 24, 29, 30, 34, 85, 90, 96, 98;
 imports, 3, 9, 15, 28, 107; leases,
 87, 99; natural gas, 10, 15, 16, 18,
 30, 94-5, 153, 159, 187; natural
 gas costs, 100; natural gas prices,
 28, 94, 96, 160, 175, 186; petro-
 chemical plant, 15; profitability
 of refining and marketing, 7, 9;
 supplies of indigenous crude, 24,
 85, 86, 89, 165; *see also* Bass
 Strait; Employment; Energy

Petroleum—continued

- policy; Exploration; Gippsland; Linkages; Multipliers; North Sea; Resource rent tax; Subsidies; Taxation
- Petroleum and Minerals Authority, 23, 27, 170–5, 188
- Philippines, 12–13, 166
- Phosphate, 13
- Pilbara Iron, *see* Mt Newman
- Pilbara region, 15, 28, 91, 94, 149, 158, 159, 160, 197, 213–14
- Pipeline Authority, 24, 93, 96, 97, 175–7, 205
- Pollution, 15, 31, 77, 80, 91, 93, 94, 97, 114, 204–5; *see also* Environment
- Port Kembla, 150–1
- Prices, 19, 20, 23, 96; in coal and iron ore trade with Japan, 21, 23, 24, 25–7; transfer pricing, 21; *see also* Petroleum (crude oil prices) and (natural gas prices); O.P.E.C.
- Processing, 7, 15, 20, 101, 114, 206, 218, 220, 222; *see also* Uranium enrichment
- Profits, profitability, 5–7, 8, 17
- Queensland, Queensland Government, 4, 15, 16, 17, 27, 31, 87, 93, 112, 120, 121, 153, 159, 163–5, 186, 187, 193, 194, 195, 196, 213
- Queensland Alumina Ltd, 152, 162, 163–4
- Queensland Mines, 125; *see also* Nabarlek
- Ranger project, 24, 27, 73–83 *passim*, 125, 144–6; *see also* Fox Report; Peko-E.Z.
- Ranger Uranium Environmental Enquiry, *see* Fox Report
- Redcliff project, 116, 153, 177
- Regional development, 21, 31, 164–5, 189, 196–7, 208–19 *passim*, 221
- Renison Ltd, 8
- Research, 29, 90, 91, 94, 97, 101, 108–13, 160, 204; *see also* Australian Science and Technology Council; Australian Coal Industry Research Laboratories; Coal (research levy); CSIRO; National Energy Advisory Committee; National Energy Research, Development and Demonstration Council; Technology Reserves, 21, 28, 112; *see also* Petroleum
- Resource depletion, 21, 86, 204; *see also* Petroleum
- Resource rent tax, 34, 35, 36, 52, 87–9, 95, 100, 166, 195, 201, 204
- Risk, 5, 21, 100; *see also* Exploration
- Royalties, 5, 21, 58, 87–8, 159, 166, 188, 194–5, 217, 219; *see also* Exploration; Taxation
- R.T.Z., 16, 17, 185
- Rural sector, 1–7 *passim*, 11
- Rutile, 159
- R. W. Miller, 87
- Salt, 10
- Scenario planning, 105–6
- Secondary profits tax, *see* Resource rent tax
- Sequential development, 30–1
- Shell, 29, 99, 183
- Singapore, 12–13
- Solar energy, 91, 92, 101, 110, 111, 113, 204
- South Africa, 18, 19, 20, 59, 158, 166, 188; *see also* Africa; Jurien Bay
- South Australia, 16, 94, 95, 112–13, 116, 153, 177, 187
- South Broken Hill, 16
- South Korea, *see* Korea
- Spain, 12–13
- State governments, 21, 115; *see also* Federalism; New South Wales; Queensland; South Australia; Tasmania; Victoria; Western Australia
- Steel, *see* Iron ore
- Structural adjustment, 2
- Subsidies, 22, 23, 178–80; *see also* Exploration
- Taiwan, 12–13, 14
- Tanabe, Saburo, 16

- Tariffs, 1, 2, 3, 4, 19
 Tasmania, 17, 93, 111, 153, 178, 187, 194, 195
 Taxation, 5, 6, 17, 20, 21, 23, 24, 27-8, 34-63, 87, 94, 95, 96, 97, 100-1, 161-2, 166, 217, 219; *see also* Cash flows; Depletion allowance; Depreciation; Exploration; Fitzgerald, T. M.; Industries Assistance Commission; Investment allowance; Resource rent tax; Risk; Royalties
 Technology, 14, 17, 87, 91, 96, 100, 101; *see also* Research
 Thailand, 12-13
 Thiess Peabody Mitsui Coal Pty Ltd, (now Thiess Dampier Mitsui), 8, 17, 26
 Tin, 10, 11
 Trade, 9-19 *passim*, 219, 220
 Trade and Resources, Department of, 98, 118
 Trade and Resources, Minister for, *see* Anthony, the Rt Hon. J. D.
 Trade unions, 31, 37, 121
 Tungsten, 10

 United Kingdom, 4, 11, 12, 184; *see also* North Sea oil and gas
 United States of America, 9, 11, 12, 13, 14, 17, 18, 59, 60-3, 150, 166, 184
 Uranium, 10, 16, 23, 25, 30, 31, 35, 87, 102-3, 149, 158, 201, 205-6; *see also* Aboriginal land rights; Fox Report; Northern Land Council; Northern Territory; Ranger project; Uranium enrichment
 Uranium enrichment, 15, 86, 155, 161
 Uren, Hon. Thomas, 83
 U.S.S.R., 14
 Utah, 8, 14, 17, 26, 27, 36, 54, 55, 56, 60, 62, 180; *see also* Norwich Park

 Victoria, Victorian Government, 15, 87, 93, 94, 110-11, 152, 153, 154, 159, 177, 186, 193, 213

 Wage income, 5
 Weipa, 17, 152, 159, 163-4
 Welfare, 3, 187
 Western Australia, Western Australian Government, 4, 16, 17, 91, 92, 95, 96, 99, 111, 116, 120, 153, 155, 158, 186, 187, 193, 196, 208, 212; *see also* Court, Sir Charles

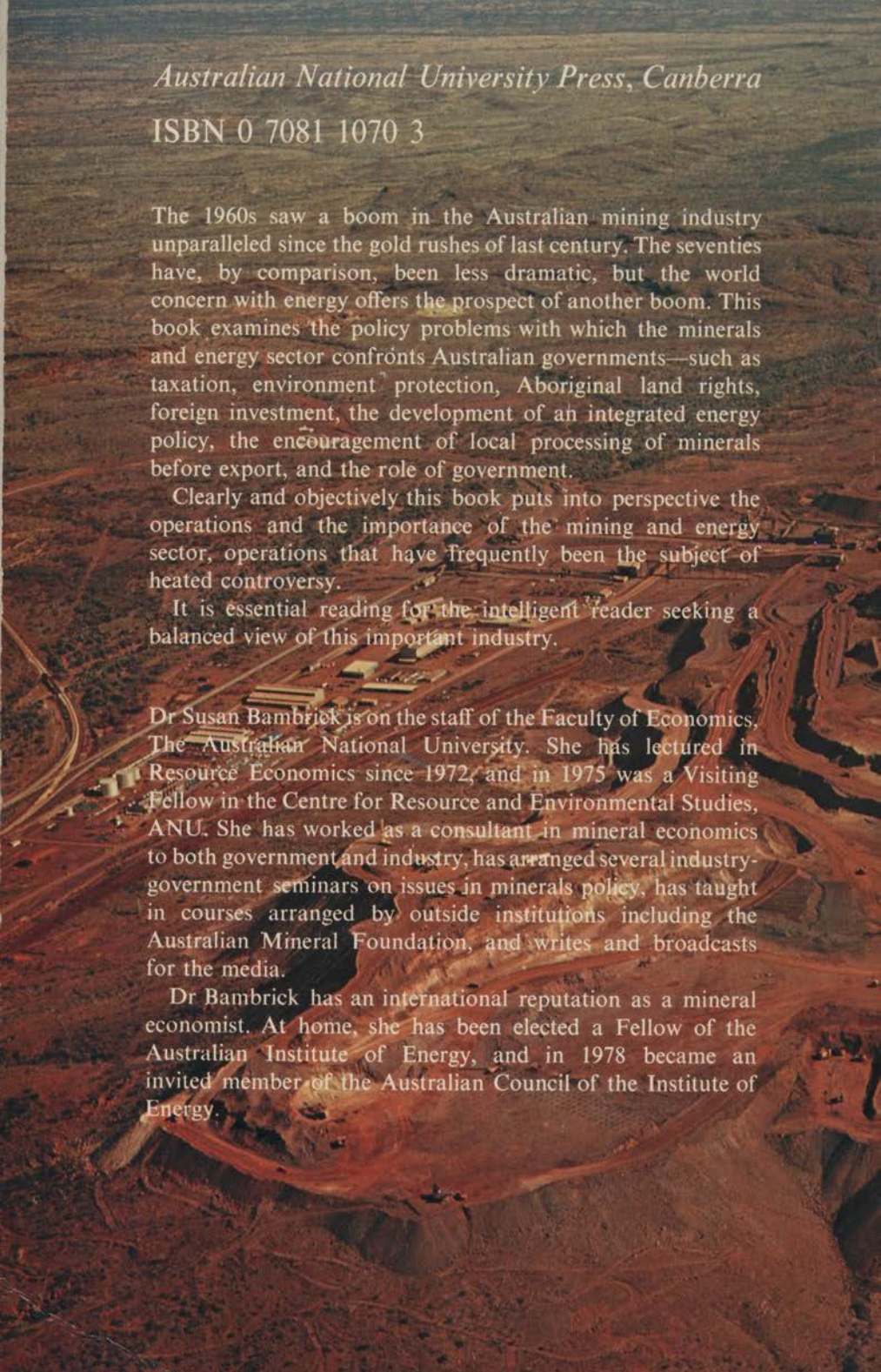
 Western Mining Corporation, 17, 48, 49, 53, 54, 55, 56, 99, 110, 125, 182, 209, 211
 Whitlam, the Rt Hon. E. G., 22, 24, 118
 Whyalla, 16, 197
 Woodside, Woodside-Burmah, 28, 29, 199
 Woodward Report, 73, 75
 Wran, the Hon. Neville, 14, 150

 Yeelirrie, 211
 Yunupingu, Galarwuy, *see* Northern Land Council

 Zaire, 166, 193
 Zambia, 166, 193
 Zinc, 9, 10, 11, 12, 13
 Zorn, Steven, 82-3



Text set in 10 point Times one point leaded.
Printed on 85 gsm Griffin M.F. Semi-Matt at
Griffin Press Limited, Netley, South Australia.

An aerial photograph of a mining operation in a desert landscape. The image shows a large, rectangular mining pit or processing area in the center, surrounded by reddish-brown earth and sparse vegetation. Several roads and tracks are visible, leading to and from the central area. The overall scene is arid and rugged.

Australian National University Press, Canberra

ISBN 0 7081 1070 3

The 1960s saw a boom in the Australian mining industry unparalleled since the gold rushes of last century. The seventies have, by comparison, been less dramatic, but the world concern with energy offers the prospect of another boom. This book examines the policy problems with which the minerals and energy sector confronts Australian governments—such as taxation, environment protection, Aboriginal land rights, foreign investment, the development of an integrated energy policy, the encouragement of local processing of minerals before export, and the role of government.

Clearly and objectively this book puts into perspective the operations and the importance of the mining and energy sector, operations that have frequently been the subject of heated controversy.

It is essential reading for the intelligent reader seeking a balanced view of this important industry.

Dr Susan Bambrick is on the staff of the Faculty of Economics, The Australian National University. She has lectured in Resource Economics since 1972, and in 1975 was a Visiting Fellow in the Centre for Resource and Environmental Studies, ANU. She has worked as a consultant in mineral economics to both government and industry, has arranged several industry-government seminars on issues in minerals policy, has taught in courses arranged by outside institutions including the Australian Mineral Foundation, and writes and broadcasts for the media.

Dr Bambrick has an international reputation as a mineral economist. At home, she has been elected a Fellow of the Australian Institute of Energy, and in 1978 became an invited member of the Australian Council of the Institute of Energy.