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Discussion Paper No. 7 July, 1981

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Part 1: Smelter Operations and Foreign Exchange Returns

The aluminium smelter at Bluff, jointly owned by Comalco and Japanese interests, has now been operating for ten years. In view of extravagant claims made during the 1960s about the anticipated benefits from the project,[1] and the public controversy since then over its impact on both the economy and the environment, it seems appropriate at this stage to take stock of the smelter's record to date.

Unfortunately for independent research, the eagerness of Comalco and the New Zealand Government to create a favourable public image for the smelter has not been matched by any willingness to provide the public with information. The secrecy which surrounds virtually every aspect of the Bluff smelter's operations is extraordinary as well as ineffective. As the appendices to this paper point out, no systematic data are published in New Zealand on the smelter's output, wage bill, sales income, operating costs, electricity purchases, tax payments, or profitability. Undocumented figures on net foreign exchange earnings appear only irregularly in company press releases. Consequently, what should have been a straightforward project to evaluate the smelter's impact on the New Zealand economy became a sustained struggle to reconstruct the record from such data as we could scavenge from public sources.

The unwillingness of the company to publish detailed information about its affairs is normal enough among multinational ventures of this kind. In most other countries where aluminium smelters have been established over the last couple of decades, a similar veil of non-disclosure has shielded the companies

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1. As has been the case with the second smelter debate during 1980-81, inflated estimates of probable employment were at the centre of the official case for the Bluff smelter. In the 1960 Parliamentary debates on the project, smelter employment estimates varied from 2,500 to 10,000. In fact employment has never been much above 1,100.

from public scrutiny, except where host country governments have insisted that the public interest required more openness with information. Where information has been made available by this means, it has often exposed multinationals to strong criticism, frequently justified. The international record would tend to suggest that where secrecy performs any recognisable function, it serves the interests of the companies against the interests of the host country.

The New Zealand Government has nevertheless acquiesced in allowing Comalco to conceal information in which the public have a legitimate interest. Nowhere has this been more apparent than in the contortions performed by the New Zealand Electricity Division in its annual statistics in a futile attempt to hide the impact of the country's largest single consumer of electricity (see Appendix IV) and to prevent the New Zealand public from knowing the size of the power price concessions granted to the consortium. Equally, no pressure has been exerted to have the smelter owners file meaningful accounts for their New Zealand operation; the annual accounts of the New Zealand subsidiaries of Comalco, Sumitomo and Showa, on file in the Companies Office, are travesties of commercial disclosure.

Our first (and major) conclusion is, therefore, that it is quite unnecessarily difficult to obtain useful information about the Bluff smelter (Useless information abounds). This has not prevented us from carrying out our study; it has merely wasted a great deal of our time, which we take to be the intention of both company and Government. The figures set out in this paper are as consistent and as accurate as possible, given the constraints imposed on us.

The basic data which we have assembled comes from scattered sources of varying reliability. We describe these sources in detail in Appendices I - X. The major results from those appendices are set out in Tables 1 - 7.

TABLE 1

Output, Exports and Local Sales for the Bluff Smelter, 1971-1980

000 metric tonnes

Calendar year	(1) Smelter Output	(2) Aluminium Exported	(3) Sales in New Zealand	(4) Residual*
1971	22	2	1	19
1972	88	65	10	13
1973	117	87	27	2
1974	110	92	34	-15
1975	109	86	19	4
1976	140	113	28	-1
1977	144	127	23	-6
1978	150	133	23	-6
1979	154	120	26	7
1980	155	127	30	-2
Totals	1,187	951	220	16

* Consists of stocks changes plus errors and omissions in our estimates.

Source: Appendix I Tables I.1, I.3 and I.4. Totals here may not add exactly, due to rounding.

Our first aim was to establish the quantities of output, local sales and exports (Table 1). By the end of 1981 the Bluff smelter had produced roughly 1.2 million tonnes of unwrought aluminium, of which about 950,000 tonnes had been exported and 220,000 tonnes had been consumed in New Zealand. Smelter output has risen in two abrupt jumps, corresponding to the opening of the first and second potlines at the smelter. Sales within New Zealand (where Comalco is the dominant supplier) rose extremely rapidly in 1971 - 1974 as Comalco displaced imported supplies from the local market, and as the cost savings for fabricators (due to lower-priced local supplies) led to forward-linkage expansion of "downstream" activities. [2] Since 1974 there has been no tendency for local sales to rise, suggesting that the New Zealand aluminium market is saturated.

Our second aim was to estimate the smelter's profitability and net foreign exchange contribution. (Tables 2, 3, 4 and 5). Table 2 provides our estimate of the smelter's sales revenue over the ten years. Table 3 summarises operating outlays including interest payments, but excluding tax and depreciation. Column (7) of that table shows operating outlays in New Zealand; it can be seen that over the decade these have risen from about one-third to about 45% of total operating outlays, due largely to the increase in electricity charges in 1978. This increase, however, may have been offset by a decrease in tax paid in New Zealand (something on which we have been unable to obtain any information).

Table 4 provides our estimates of the profitability of the smelter. After making losses during the first two years, the enterprise has been highly profitable, despite a brief slump in 1975. Over the period from 1973 to 1980,

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2. It should be noted that such forward-linkage benefits are once-for-all that is, Comalco has already triggered off any profitable aluminium-using industries likely to appear in New Zealand on the basis of locally-smelted aluminium. The proposed second smelter is not expected to undercut Comalco's prices to any great extent.

TABLE 2

Annual Revenue from Smelter Sales, 1971-1980

$ million

Calendar year	(1) FOB value of exports	(2) Local sales	(3) Total sales revenue
1971	0.8	0.7	1.5
1972	25.4	5.2	30.6
1973	33.0	14.7	47.7
1974	45.7	18.6	64.4
1975	57.0	14.2	71.2
1976	91.7	24.9	116.6
1977	133.1	25.0	158.1
1978	151.8	26.9	178.8
1979	164.1	35.0	199.2
1980	221.5	48.4	270.0

Source: Appendix II, Table II.4. Totals may not add exactly due to rounding.

TABLE 3

Operating Expenditures in New Zealand and Abroad, 1971-1980

$ million

Calendar year	(1) Wages and salaries	(2) Electricity purchases	(3) Other locally - purchased inputs	(4) Imported inputs	(5) Interest paid in New Zealand	(6) Interest paid abroad	(7) Operating Outlays in New Zealand Except Tax and Dividends	(8) Total Operating outlays Excluding Capital Charges and tax	(9) Column (7) as a % of Column (8)
1971	1.6	0.8	0.8	5.8	0.1	3.7	3.3	12.8	26
1972	3.3	3.0	3.1	11.9	0.2	7.0	9.6	28.5	34
1973	4.5	4.0	4.8	14.5	0.3	6.4	13.6	34.5	39
1974	5.1	3.8	6.4	17.8	0.3	6.6	15.6	40.0	39
1975	7.8	3.7	7.1	31.0	0.3	8.1	18.9	58.0	33
1976	10.0	4.8	11.7	47.2	0.3	11.7	26.8	85.7	31
1977	13.5	4.9	15.8	61.1	0.3	10.6	34.5	106.2	32
1978	16.5	20.4	17.9	57.1	0.3	11.0	55.2	123.2	45
1979	17.7	24.4	19.9	66.5	0.5	14.0	62.5	143.0	44
1980	20.7	26.3	27.0	74.2	0.5*	14.5*	74.5	163.2	46

Sources: Column (1) from Appendix III Table III.3
Column (2) from Appendix IV, Table IV.3.
Column (3) from Appendix VI, Table VI.1.
Column (4) from Appendix V, Table V.2.
Column (5) from Appendix VII, Table VII.1.
Column (6) from Appendix VII, Table VII.1.
Column (7) is the total of Columns (1), (2). (3), and (5).
Column (8) is the total of Columns (1) to (6).

* Estimates

TABLE 4

Pre-Tax Operating Surplus and Maximum Tax Liability, 1971-80

$ million

Calendar year	(1) Gross operating surplus	(2) Depreciation	(3) Net operating surplus	(4) Column (3) as a % of net assets	(5) Tax liability if tax is 50% of net surplus
1971	-11.3	0.9	-12.2	-17	..
1972	2.2	3.0	-0.8	-1	..
1973	13.3	3.3	10.0	12	5.0
1974	24.4	3.3	21.1	27	10.5
1975	13.2	3.4	9.8	13	4.9
1976	30.8	4.2	26.7	26	13.3
1977	51.9	4.5	47.4	47	23.7
1978	55.6	4.6	50.9	52	25.5
1979	56.2	4.7	51.5	54	25.8
1980	106.8	5.1	101.7	107	50.9

Source: Appendix IX, Tables IX.1 and IX.2. Totals here may not add exactly due to rounding.

net pre-tax operating surplus has risen from a 12% return on net assets in 1973 to over 100% in 1980.

Table 5 shows two possible estimates for the net foreign exchange contribution of the smelter to the New Zealand economy. These two series provide the bounds within which we estimate the true figures to lie. Our lower-bound series is the net foreign exchange contribution on the assumption that the smelter consortium has paid no tax whatever. The upper-bound series is based upon our "maximum tax liability" series in Table 4. The difference between the two series - $160 million over the ten years - is the same as the total maximum tax liability.

Before pursuing further the divergence between the two series, it is worth outlining what is meant here by net foreign exchange contribution, or "returned value". Our series attempts to show the actual amount of foreign exchange accruing to New Zealand after all flows associated with the smelter operation have been taken account of. To obtain our figure we have first added up all expenditures in New Zealand by the smelter consortium to pay for wages and salaries, electricity, other locally-purchased inputs, interest on loans raised locally, and tax paid to the New Zealand Government (if any). All of these outlays we treat as foreign-exchange-financed, including those financed from the proceeds of local-market sales of aluminium (which we treat as import-substituting, hence foreign-exchange-contributing). Electricity and other locally-purchased imputs are net of their import content (that is, we have adjusted our figures for second-round leakages).

We have then added on the estimated local content of investment undertaken in the smelter year by year. Our net foreign exchange series thus includes both current and capital expenditures by the consortium. It should be noted that so far as we can tell, the estimates by other writers which appear in Column (3) of Table 5 are current expenditures only; unfortunately the Institute of Economic Research, which has been responsible for most of these (perhaps all of them) has not published enough information about its calculations for us to be

TABLE 5

Net Foreign Exchange Contribution Estimates, 1971-1980

$ million

Calendar year	Net Foreign Exchange Contribution (1) If no tax paid	(2) If maximum tax paid	(3) Estimates by other writers.
1970	23.9	23.9	
1971	24.3	24.3	
1972	9.7	9.7	
1973	11.8	16.8	
1974	20.6	31.1	22
1975	28.8	33.7	
1976	26.2	39.6	35
1977	30.3	54.0	
1978	47.4	72.9	50
1979	55.0	80.7	80
1980	66.0	116.8	64
TOTALS	344.0	503.5	

a. Excluding capital inflows.

Source: Columns (1) and (2) from Appendix X, Table X.1, series RV3 except for 1980 when RV2 is used.
Column (3) from Appendix X Table X.2.

certain. However, the only year in which the capital expenditure item makes a really significant difference is 1974 (when capital spending accounts for $7 million of our $20 million net-foreign-exchange figure).

The amount and timing of tax payments by the consortium are the main problem for independent analysis of the smelter's performance. Inclusion of "maximum" tax raises the returned value figure by 50% for the period; and the tax item carries more weight throughout the period than does the smelter's payments for electricity (given the low concessional tariff paid for its power). In constructing our figures, we have assumed that tax is paid in the year when the corresponding profits accrue, which is of course quite unrealistic; in practice there will generally be a lag of at least a year before tax falls due for payment. (The Institute of Economic Research estimates use the same assumption as we do, that tax is paid within the period.)

Inspection of Table 5 makes it clear that our estimates are compatible with those of other observers if possible variations in the smelter's tax payments are taken into account. The most interesting figures are those for 1979 and 1980; whereas in 1979 the smelter was claimed by NZIER to have a foreign-exchange yield corresponding to our fully-taxed figure, in 1980 the Managing Director of the consortium claimed a foreign-exchange yield virtually identical to our no-tax figure. We provisionally conclude that NZAS paid no tax in 1980.

Table 6 shows the smelter's net foreign exchange contribution as a percentage of the value of total sales, to indicate the proportion of total earnings "returned" to the New Zealand economy. The figures are graphed in Figure 1, which shows the trend of returned value over the ten years. Figure 1A shows returned value inclusive of capital expenditures, while Figure 1B shows returned value excluding capital spending. In each case, upper-bound and lower-bound series are presented, corresponding to the maximum-tax and no-tax cases. Major features of these results are the strong impact of the consortium's

TABLE 6

Returned Value (Net Foreign Exchange Contribution) as a % of Value of Total Sales

Calendar year	Returned Value Including Capital Spending (RV3)		Returned Value Excluding Capital Spending (RV2)		NZIER/ NZAS figures
	Lower-bound	Upper-bound	Lower-bound	Upper-bound	
1971	1,624.0	1,624.0	198.0	198.0	
1972	31.7	31.7	26.8	26.8	
1973	24.7	35.1	24.2	34.6	
1974	32.0	48.4	20.3	36.7	34.2
1975	40.4	47.3	22.8	29.7	
1976	22.5	34.0	19.3	30.8	30.0
1977	19.2	34.2	18.3	33.3	
1978	26.5	40.8	25.9	40.2	28.0
1979	27.6	40.5	26.5	39.5	40.2
1980	23.1	42.0	24.4	43.3	23.7

Sources: Denominators from Appendix II, Table II.4.
Numerators from Appendix X, Tables X.1 and X.2.

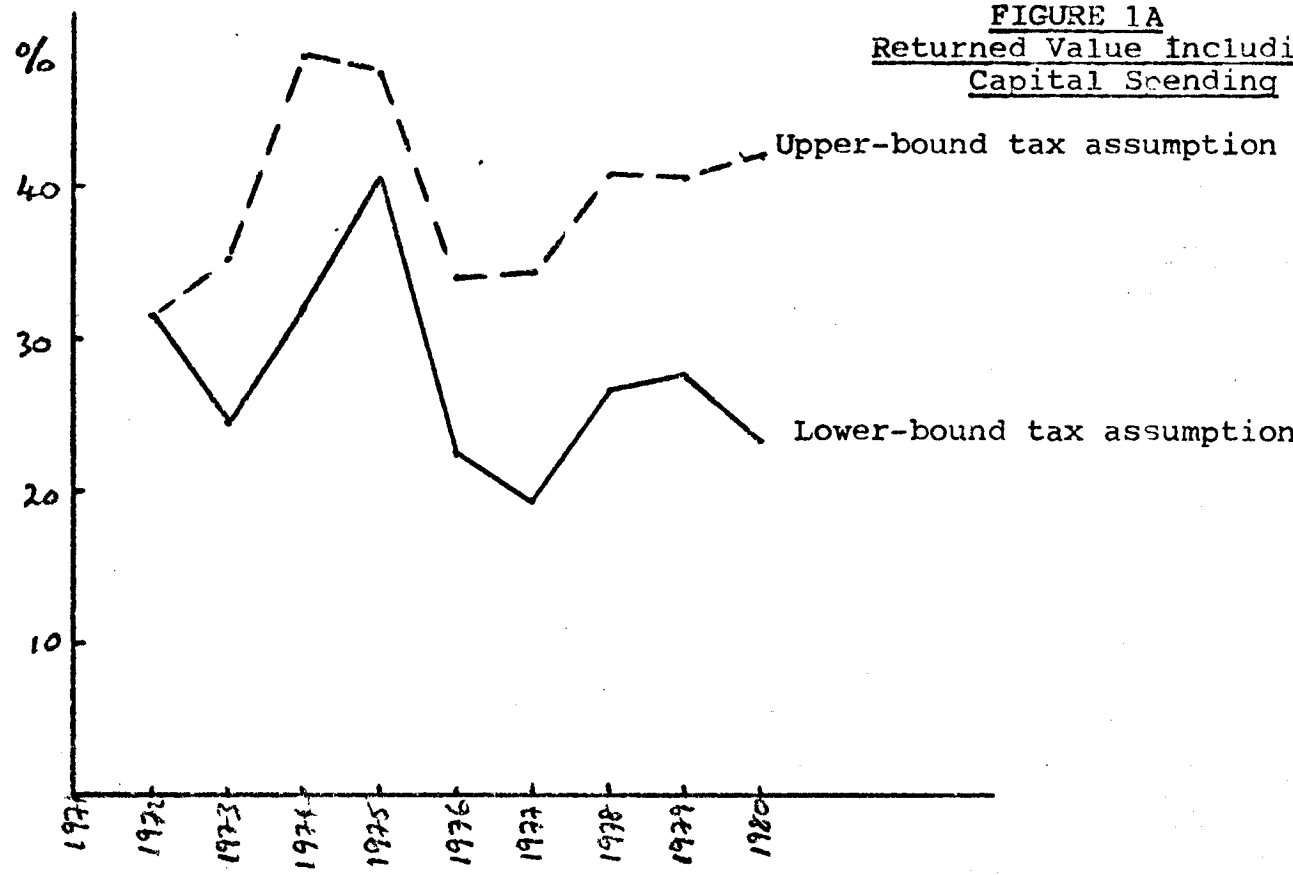

FIGURE 1A
Returned Value Including Capital Spending

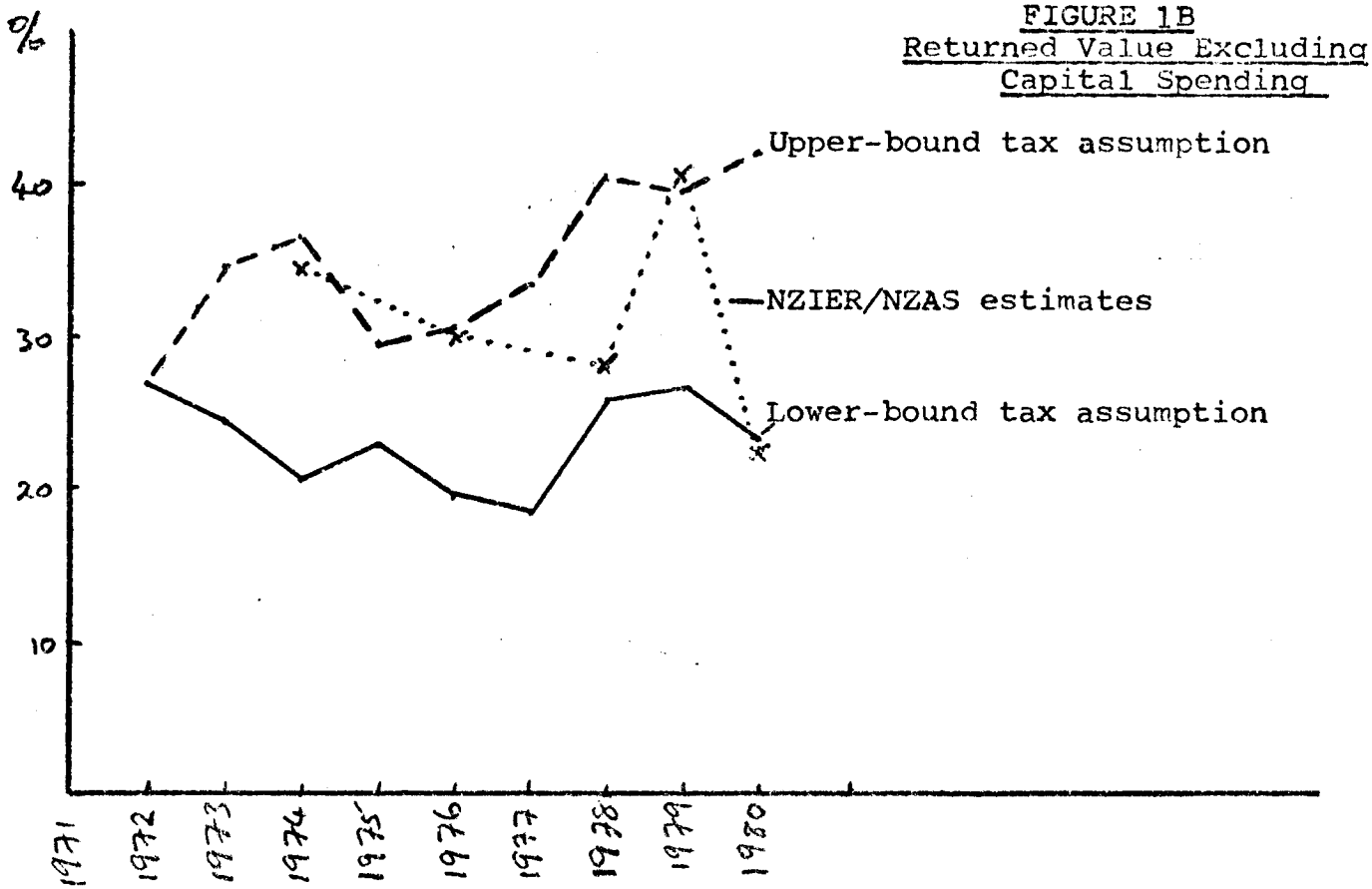

FIGURE 1B
Returned Value Excluding Capital Spending

investment programme in 1974 and 1975; and the effect on returned value of the increased electricity charge which became effective in 1978.

It is clear that if the consortium has been a tax-avoider, then the overall trend of returned value has been downward, reversed only temporarily by the 1978 adjustment of electricity price. If the consortium has paid full tax, the basic trend has been stable or slightly upward, with an upward jump associated with the 1978 electricity price hike. Given that the truth probably lies somewhere between the two series, the long-run trend of returned value must be concluded to be indeterminate.

In Table 7 we use the import price index to deflate the net foreign exchange series back to 1971 purchasing power. This permits a comparison of our results with projections made in 1971 regarding expected foreign-exchange earnings of the project. The Institute of Economic Research in its 1971 study of the smelter suggested that at a capacity of 110,000 tons (sic) annually the project would have a net foreign exchange yield of $19 million if the domestic market as well as export markets were supplied; while at an output of 220,000 tons p.a. this would rise to $44 million.[1] The smelter reached the first level of output during the years 1973-1975, when as Table 7 indicates, its returned value (excluding capital spending, in order to remain comparable with NZIER) ranged somewhere between $9 million and $14 million (respectively the average lower-bound and upper-bound estimates) per year, in 1971 purchasing-power terms. The Institute estimates thus appear over-optimistic by at least 25% (despite the claim in 1975 by McDonald that "the original forecast of net foreign exchange earnings .... now appears highly conservative"[2]).

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1. Poole, W.A. et al, The Manapouri/Bluff Aluminium Development: an Economic Appraisal (NZIER, 1971), p. 163, Table 33. In 1972 the Institute revised its original estimate for the 110,000-ton case downwards, to $14 million. The revised figures appear in McDonald (1975), p. 3.

2. McDonald (1975) p.4.

TABLE 7

Net Foreign Exchange Contribution Deflated by Import Price Index

Calendar year	Import price index, 1971 = 1000	Returned Value Including Capital Spending $ million		Returned Value Excluding Capital Spending $ million	
		Lower-bound	Upper-bound	Lower-bound	Upper-bound
1971	1000	24.3	24.3	3.0	3.0
1972	1046	9.3	9.3	7.9	7.9
1973	1137	10.4	14.8	10.1	14.5
1974	1398	14.7	22.3	9.4	16.9
1975	1844	15.6	18.3	8.8	11.4
1976	2245	11.7	17.6	10.0	16.0
1977	2463	12.3	21.9	11.8	21.4
1978	2595	18.3	28.1	17.9	27.7
1979	3015	18.2	26.8	17.5	26.1
1980	3800[a]	17.4	30.7	16.4	29.8
Total		152.2	214.1	112.8	174.7
Average		15.2	21.4	11.3	17.5

a Estimate

Sources: Import price index from Monthly Abstract of Statistics, converted from June-year to calendar-year basis by averaging.

Returned Value data from Appendix X, Table X.1.

From 1978 to 1980 the smelter output averaged around 150,000 tonnes annually and returned value per year was between $17 million and $42 million, in 1971 dollars, depending on how much tax was paid. This is too wide a range to permit meaningful comparison with the original estimate by NZIER, except to note that if tax as calculated by us was paid, then the project was performing better than anticipated by Poole et al, while if tax was avoided the project was performing substantially worse than projected.

In 1971 dollar terms, the Bluff smelter provided New Zealand with a total of between $150 million and $215 million in foreign exchange over the ten years 1971 - 1980. To earn this, the New Zealand economy committed the following resources:

8,500 man-years of labour (total of Table III.2 Column 3)

20,186 gigawatt-hours of electricity (Table IV.1 Column 2)

Locally-produced goods and services (other than electricity) worth $55 million (Table VI.1, Column 3, deflated using wholesale price index/general price index, to 1971 dollars).

If, as a provisional working assumption, we suppose that the 1971 prices of smelter labour ($5,000 per man-year) and local goods and services represent the opportunity cost of these resources for the 1970s as a whole, then labour worth $42.5 million and local production worth $55 million were used - a total of $97.5 million, or near enough to $100 million. This leaves between $50 million and $115 million as the return to New Zealand on the electricity supplied, plus any other land and capital services (e.g. infrastructure provided by the local authoirity at Bluff, and loans to the consortium by New Zealand banks).

The Manapouri power scheme cost the New Zealand Government over $140 million to build, between 1962 and 1976.[1] From 1971 to 1980 over half of the power generated by the station was used by the smelter[2]. The electricity system investment directly associated with the Bluff smelter project thus came to at least $70 million and may have been as high as $90 million.

Half of the operating and maintenance costs of Manapouri during the 1970s we provisionally guess at $20 million, which leaves between $30 million and $95 million as the gross return on that part of the investment allocated to supplying the smelter. The gross rate of return on the investment is then between 3% and 14%, depending on the amount of tax actually paid by the consortium. This approach, however, begs a number of important questions on the electricity supply side of the issue, and we shall defer fuller discussion to the second part of this study (forthcoming).

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1. New Zealand Electricity Department, Annual Statistics in Relation to Electric Power Development and Operation, annual, data for Capital Outlay for Manapouri station, Lake Manapouri Control, and Lake Te Anau Control. Cost of transmission lines and sub-stations would raise the cost well above the $140 million figure.

2. New Zealand Electricity Department Annual Reports show Manapouri generating nearly 40,000 GWh from calendar 1971 to calendar 1980. Of this, just over 20,000 GWh was taken by the Bluff smelter. Possibly another 10% would have been lost as wastage and transmission loss associated with smelter supply.

LIST OF APPENDICES

APPENDIX I

Volume data for the Smelter's Operations, 1970-1980

1. New Zealand Output and Consumption of Primary Aluminium

No systematic figures on output or consumption are published in New Zealand, so far as we have been able to discover. The only approach to such data is in the Official Yearbook section on "Manufacturing", giving the current capacity of the Bluff smelter in each year. There is however no indication of the extent to which that capacity was utilised in practice. Neither the Industrial Production Statistics up to 1973/74, nor the Manufacturing Census 1975/76 provide information on the volume of production. Only in the last three years has the smelter company released output figures in its press releases.

We have therefore drawn most of our figures for output and local consumption of primary (that is, unwrought) aluminium from the European publication Metal Statistics, supplemented where possible from local press reports.

TABLE I.1

N.Z. OUTPUT AND CONSUMPTION: METRIC TONNES

Calendar year	(1) New Zealand Output	(2) NZAS Output	(3) New Zealand Consumption
1968			6,900
1969			9,800
1970			13,300
1971	22,400		14,700
1972	87,700		15,600
1973	116,700		29,200
1974	110,300		35,400
1975	108,600		20,100
1976	139,800		27,700
1977	145,100	143,790	23,300
1978	151,100	149,831	23,100
1979	n.a.	153,557	26,500[b]
1980	n.a.	154,740	30,000
Total 1971-1980		1,187,418[a]	245,600
Total 1971-1979		1,032,678[a]	215,600

a. Totals for Column (1) 1968-1976, and Column (2) thereafter.

b. Interpolated; compares well with 26,000 tonnes in statement by M.B. Bennett, Southland Times, March 15,1980.

Sources: Column (1) Metal Statistics 1968-78 (Frankfurt) page 16.

Column (2) 1977-1979 from Evening Post (Wellington) March 17, 1979 and Christchurch Press March 15 1980.
1980 from Christchurch Press March 21, 1981.

Column (3) 1968-1978 Metal Statistics 1968-78, page 19.
1980 based on reports in Evening Post September 3, 1980 and November 4, 1980.

2. Exports and Imports of Primary Aluminium

Figures for exports and imports are given, for June years, in the Department of Statistics annual publications External Trade: Imports and External Trade: Exports. These are available for years to 1978; thereafter, we use figures from Monthly Abstract of Statistics to bring our data up to June 1980.

TABLE 1.2

Exports and Imports of Primary Aluminium, 1970-1980

metric tonnes

Year ending June	Exports of unwrought aluminium	Imports of unwrought aluminium
1970		13,258
1971	602	16,294
1972	33,578	9,807
1973	65,199	2,776
1974	109,702	1,235
1975	74,245	2,220
1976	98,009	75
1977	127,486	274
1978	114,659	181
1979	143,252	263
1980	119,006	390

Sources: 1970-1978 from New Zealand External Trade (annual, Department of Statistics, Wellington), SITC code 681.10.

1979 from Monthly Abstract of Statistics August 1979, Supplement.

1980 from Monthly Abstract of Statistics September 1980, pp.137 and 144.

In order to relate the foreign trade data to the output and consumption data in Table L1, it is necessary to convert them to a calendar-year basis. At both the beginning and end of our period this is easily done, since during 1971 and 1972 the Department of Statistics published its foreign trade data on a six-monthly rather than an annual basis, while July-December figures are available for 1977, 1978, 1979 and 1980 in the Monthly Abstract.

We can therefore construct Table 1.3, giving our series for foreign trade in unwrought aluminium on a calendar-year basis.

TABLE I.3

Calendar-Year Data on Exports and Imports, 1970-1980

metric tonnes

Calendar year	Exports of unwrought aluminium	Imports of unwrought aluminium
1970		
1971	1,795	13,428
1972	64,985	5,914
1973	87,451	2,006
1974	91,974	1,728
1975	86,127	1,148
1976	112,748	175
1977	126,669	245
1978	133,129	216
1979	119,995	348
1980	126,589	266
Totals	951,462	25,474

Sources and Notes see over.

Sources and Notes:

1971 exports are total for the June year 1970-71, plus July-December 1971.
1972 exports are January-June 1972, plus half of the total for June year 1972-73.
1973-1976 exports are obtained by adding two successive June-year figures and dividing by two - i.e. we assume that the June-year totals were spread equally between the two half-years.
1977 exports are half the June year 1976-77, plus data for July-December 1977 from Monthly Abstract of Statistics March 1978, Supplement.
1978 exports are June year 1977-78, minus July-December 1977, plus July-December 1978 from Monthly Abstract of Statistics March 1979, Supplement.
1979 exports are June year 1978-79, minus July-December 1978, plus July-December 1979 from Monthly Abstract of Statistics March 1980 p.126.
1980 exports are June year 1980, minus July-December 1979, plus July-December 1980 from Monthly Abstract of Statistics March 1981 p.120.
Imports are obtained by the same technique, but starting off with a 1971 estimate obtained as (½ x June year 1970-71) plus July-December 1971. Sources are the same as for exports.

3. Estimation of local sales and stock changes

On the basis of the figures in Tables I.1 and I.3 it is possible to construct a material balance of aluminium flows. We obtain the total New Zealand supply of primary aluminium by adding smelter output to imports. We then subtract local consumption and exports to obtain a residual figure for changes in stocks. Finally we subtract imports from New Zealand consumption to obtain an estimate of the volume of Comalco's local-market sales.

TABLE I.4

Materials balance for the New Zealand Primary Aluminium Market

metric tonnes

Calendar year	(1) Total supply of primary aluminium (= output plus imports)	(2) Changes in stocks (= Total Supply minus exports minus local consumption)	(3) Local sales by Comalco (= New Zealand consumption minus imports)
1971	35,828	19,333	1,272
1972	93,614	13,029	9,686
1973	118,706	2,055	27,194
1974	112,028	-15,346	33,672
1975	109,748	3,521	18,952
1976	139,975	- 473	27,525
1977	144,035	-5,934	23,055
1978	150,047	-6,182	22,884
1979	153,905	7,410	26,152
1980	155,006	-1,583	29,734
Totals	1,212,892	15,830	220,126

As orders of magnitude these figures appear reasonable. Brown (1980) states that "at the end of 1979 over 1 million tonnes of aluminium had been produced"[1] which compares well with our figure of 1,032,678 tonnes to the end of 1979 (Table I.1). The domestic consumption figures match the guess by the Department of Trade and Industry in 1974 that the local market was about 25,000-30,000 tonnes per annum[2].

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[1] Brown et al (1980) p.1.

[2] Department of Trade and Industry, Report No.225 to the Tariff and Development Board. Public Tariff Enquiry: Unwrought Aluminium (June 1974, p.5.)

Accumulated stocks of between 10% and 15% of annual output do not seem unreasonable. And our division of total output between exports (80% of output) and local sales (19% of output) matches the comment in McDonald (1975) that of total output sold, "roughly four-fifths was exported and one-fifth sold in New Zealand" for the year 1974[3] (our figures for 1974 are exports: 83% of output, local sales: 30%, but because of the crude means by which we placed our export data on a calendar-year basis and derived our stock change figures, too much emphasis should not be put on a single-year figure in our tables).

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[3] T.K. McDonald, "The Contribution of the Bluff Aluminium Smelter to New Zealand's Foreign Exchange Position", NZIER, Wellington, October 1975, p.4.

APPENDIX II

ESTIMATES OF CURRENT REVENUE TO THE CONSORTIUM, 1971-1980

No figures are published on Comalco's income from sales of aluminium within New Zealand, and the export values recorded in the Department of Statistics publications on external trade are fictitious constructions related to the transfer-pricing arrangements of the consortium partners (and therefore do not provide a good estimate of the true worth of the aluminium to the partners). We have therefore used separate published price series to value aluminium exported, and aluminium sold locally, and then added the results to obtain estimated total sales revenue.

1. EXPORT EARNINGS

There has recently been much debate in New Zealand over which of the various available price series should be used as the "world price" in evaluating aluminium smelters. In a perfect world, we would be able simply to take the F.O.B. value of export aluminium leaving Bluff, as recorded by the Government Statistician and reproduced in Table II.1 below. The problem is that the value of exports as reported by the consortium to the Government is merely the accounting price at which aluminium is transferred from one part of each partner's multinational operation to another; these prices bear no necessary relation to the true value of the metal on an open market.

TABLE II.1

F.O.B. Value of Unwrought Aluminium Exports as Recorded in Official Statistics

June Years	(1) Volume of exports (tonnes)	(2) Recorded value of exports ($000)	(3) Unit value (2) ÷ (1) $ per tonne
1971	602	194	322.3
1972	33,578	12,489	371.9
1973	65,199	23,325	357.8
1974	109,702	41,386	377.3
1975	74,245	36,515	491.8
1976	98,009	67,667	690.4
1977	127,486	112,976	886.2
1978	143,252	149,025	1,040.3
1979	143,252	149,025	1,040.3
1980	119,006	150,245	1,262.5

Sources: As for Table I.2.

Rather than canvassing various alternative price options in detail, we shall settle here for a series which is readily available and widely referred to in the international literature: the Canadian export price CIF U.K. This price series appears to correspond closely to the (unsourced) "world prices" cited in McDonald and Ashley Jones (1980) p.17, and Brown et al (1980) p.19. In Table II.2we set out this series in U.S. cents per lb, convert it to $N.Z. per tonne at current rates of exchange, and use it to derive an estimated CIF value for the aluminium export volumes shown in Table I.3 above.

TABLE II.2

Valuation of Bluff Aluminium Exports, 1971-1980

Calendar year	Canadian aluminium price CIF delivered in U.K.			CIF Value of NZ exports of unwrought aluminium $000	FOB Value of exports (CIF less 10%)
	U.S. cents per lb	$US per tonne	$NZ per tonne		
1971	26.14	576.29	500.06	898	808
1972	23.53	518.75	434.03	28,205	25,384
1973	26.46	583.34	419.59	36,694	33,025
1974	34.70	765.00	552.48	50,814	45,733
1975	39.40	868.62	734.86	63,291	56,962
1976	40.40	890.67	903.96	101,920	91,728
1977	51.90	1,144.20	1,167.52	147,889	133,100
1978	60.10	1,324.98	1,267.29	168,713	151,842
1979	70.30	1,549.95	1,519.88	182,378	164,140
1980	85.40	1,882.75	1,944.39	246,138	221,525

Source: IMF, International Financial Statistics July 1975, p.28; December 1978 p.40; March 1981 p.50, for the series in US cents per lb. Converted to tonnes @ 2,204.62 lb per tonne.

New Zealand-US exchange rates from Reserve Bank of New Zealand Bulletin March 1981. p.108.

The FOB value of exports is then estimated by subtracting 10% from the CIF figure. This is probably a generous allowance for freight and insurance costs.[1]

2. LOCAL SALES REVENUE

Local market sales have since 1974 been subject to price control by the Department of Trade and Industry, and a price series is available from the Department for 99.5% pure aluminium ingot. These prices are shown in Table II.3. It should be noted that they may understate the true value of Comalco's local sales, as not all output from the smelter is sold as ingots; a recent statement by the company's marketing manager described local sales as consisting of "billet, block, electrical conductor rod, or foundry ingot."[2]

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[1] The Minister of Trade and Industry, Mr. Adams-Schneider, in a press statement of April 21 1980, stated that the world list price should be reduced by $60 to allow for freight, which involves subtraction of only 3-4% from the CIF price. A 10% margin should therefore be ample to cover insurance and other costs incurred between Bluff and overseas markets.

[2] Evening Post (Wellington) November 4. 1980. p.33.

TABLE II.3

LOCAL MARKET PRICES FOR 99.5% PURE ALUMINIUM

Period	Price, in $NZ per tonne
Up to November 1. 1974	541.45
November 1. 1974 to June 19. 1975	615.30
June 19. 1975 to August 18. 1975	685.00
August 18. 1975 to February 1. 1976	805.70
February 1. 1976 to May 12. 1976	857.50
May 12. 1976 to July 26. 1976	928.40
July 26. 1976 to January 1. 1977	941.40
January 1. 1977 to January 29. 1978	1,083.70
January 29. 1978 to June 27. 1978	1,113.90
June 27. 1978 to December 21. 1978	1,232.50
December 21 1978 to August 30. 1979	1,304.40
August 30. 1979 to February 20. 1980	1,411.80
February 20 1980 to September 1980	1,610.09
Alcan price September 1980*	1,750.00

*Price control was removed in September 1980; see National Business Review September 1. 1980, Vol. 10 No.1. p.1.

Applying these prices to our calendar-year estimates of local sales (Table I.4) involves some simplifying assumptions about the distribution of sales through the year; for simplicity, we have assumed that sales were evenly spread month by month. On this basis we derive the estimate of local sales revenue in Table II.4.

TABLE II.4

ESTIMATED REVENUE FROM LOCAL-MARKET SALES OF ALUMINIUM, AND TOTAL REVENUE FROM LOCAL AND EXPORT SALES : $000

Calendar year	Local sales revenue	Export sales	Total revenues
1971	689	808	1,497
1972	5,244	25,384	30,628
1973	14,724	33,025	47,749
1974	18,646	45,733	64,379
1975	14,206	56,962	71,168
1976	24,853	91,728	116,581
1977	24,985	133,100	158,085
1978	26,858	151,842	178,800
1979	35,049	164,140	199,189
1980	48,442	221,525	269,967

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NOTE: IMPORT VALUES OF ALUMINIUM

Although we have not made use of them in this appendix, CIF and CDV values of imported aluminium are available from the annual foreign trade statistics. Suspicion is aroused by the fact that in many years the CDV valuation shown exceeds the CIF; but we reproduce the figures here for reference purposes.

TABLE II.5

UNIT VALUES OF IMPORTED UNWROUGHT ALUMINIUM

June year	Volume of imports tonnes	Value of imports, $000 CDV	Value of imports, $000 CIF	Unit values, $ per tonne CDV	Unit values, $ per tonne CIF
1970	13,258	7,738	7,420'	583.67	559.69
1971	16,294	9,533	9,125	585.05	560.00
1972	9,807	5,629	5,142	573.98	524.37
1973	2,776	1,796	1,464	647.04	527.29
1974	1,235	852	764	690.23	618.52
1975	2,220	1,624	1,549	731.61	697.96
1976	75	84	85	1,125.37	1,129.67
1977	274	421	440	1,536.13	1,607.22
1978	181	322	341	1,781.16	1,883.67
1979	263	426	n.a.	1,621.39	n.a.
1980	390	873	n.a.	2,240.69	n.a.

Sources: as for Table I.2

It is clear from these figures that the effect of price control from 1974 to 1980 was to hold the local market price considerably below the reported unit value of imported aluminium. This presumably represented a forward-linkage externality for local fabricators, who would have been able to purchase aluminium relatively cheaply from the local source, and export products at world prices, presumably collecting export tax incentives as they did so (this mechanism is rumoured to have boosted the cash flow and profitability of companies such as Alcan). On the other hand, it will be noted that the reported import unit values in Table II.5 are substantially above the world prices of aluminium reported in Table II.2, while the controlled local price seems to have moved fairly closely with that world price. It may well be, therefore, that so far as Comalco was concerned, there would have been little difference between selling on the local market and selling abroad, in terms of the unit return; the benefits of a New Zealand-located smelter were thus passed downstream to fabricators. Given this degree of "forward linkage", it is striking to note in Table I.1 that local consumption of primary aluminium has shown no tendency whatever to rise since 1974, suggesting that the once-for-all gains to the local economy arising from the existence of the smelter were quickly taken advantage of, leaving little further scope for downstream activity associated with this or other smelters.

APPENDIX III

ESTIMATING THE WAGE AND SALARY BILL

The smelter's wage and salary bill is not published in any systematic form, and is treated as confidential by the Labour Department which collects survey data at six-monthly intervals. There are, however, enough figures scattered around the public record to permit a reasonable set of estimates to be constructed. The key figure available to the public is the fact that up to the end of 1979, a total of $80.1 million had been paid out in wages and salaries.[1] This apparently refers to the period from the commencement of construction on the site in 1969, but it is unlikely that payments in 1969 and 1970 were very large. The 1971 accounts of New Zealand Aluminium Smelters showed "operating expenses prior years" as a total of $542,658, and we shall here assume, for working purposes, that $0.5 million of this was wages and salaries (i.e. most of it). We are then left with $79.7 million to allocate to the years 1971 to 1979.

For a first approximation, we take reported employment in the smelter and multiply it by an estimate for average earnings by year. The employment data available appear in Table III.1; it can be seen that the most consistent series appears to be the Labour Department's survey data, but that this series may well understate total employment. However, we shall here assume that it accurately represents the trend of employment, and can therefore be used in a first approximation as an employment index applied to a benchmark year.

TABLE III.1

NUMBERS EMPLOYED IN THE BLUFF SMELTER, 1971 to 1980

Calendar years	Labour Department survey data	NZ Business Who's who	Department of Statistics manufacturing census data			Press Reports
			Male	Female	Total	
1971	185*	640				650
1972	581	640				700
1973	699	750				
1974	732	880				
1975	942	880	909	48	957	950
1976	1,028	1,105	1,002	43	1,045	1,070
1977	996	1,105				1,130
1978	1,038	1,105				
1979	1,050	1,120				
1980		1,120				1,119

Sources: Labour Department figures are the averages of two survey figures for each year, taken from the Department's survey worksheets for industry code 3720, Invercargill District. In 1971 the survey dates were January and June, which accounts for the low figure, marked*.

N.Z. Business Who's Who, various issues, does not source its figures nor clearly identify the years involved.

Department of Statistics, Census of Manufacturing 1975-76, data for sector 37201/202 for Canterbury-Otago-Southland region; some upward bias thus likely. Data are for March years 1975 and 1976 (i.e. should be read in conjunction with preceding calendar year).

In order to construct a working series for earnings, we started from a 1975 press report which gave the total wage and salary bill as $7.8 million annually,[2] and took this as our benchmark for the 1975 year. From this we derived an average earnings estimate for the labour force as shown in the Labour Department worksheets.

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[1] Brown et al (1980) p.1.

[2] Christchurch Press June 26, 1975.

We then used the Department of Statistics' nominal wage index for "metals, machinery and transport equipment" to estimate average earnings for other years from 1971 to 1980, and then multiplied these by the Labour Department employment figures to obtain the estimated wage and salary payments for each year. The results of the exercise appear in Table III.2.

TABLE III.2

ESTIMATE OF WAGE AND SALARY PAYMENTS: FIRST APPROXIMATION

Calendar year	Index of nominal wages, 1975=1000	Average earnings per employee $	Number employed	Wage and salary bill $000
1971	639	5,291	300[a]	1,587
1972	689	5,705	581	3,315
1973	768	6,359	699	4,445
1974	841	6,964	732	5,098
1975	1000	8,280	942	7,800
1976	1122	9,290	1,028	9,550
1977	1265	10,475	996	10,433
1978	1408	11,659	1,038	12,102
1979	1663	13,770	1,050[b]	14,459
1980	1909	15,807	1,100[b]	17,387
Total				86,176

Sources: Wage index 1971 to 1977 is for "Rates within the jurisdiction of the Arbitration Court", for the "metals, machinery and transport equipment" sector. From 1977 to 1980 the index is for nominal weekly wage rates within the jurisdiction of all determining authorities, for "machinery and metal products". Data collated from Official Yearbooks and Monthly Abstract of Statistics.

Notes: a. Rough estimate for whole year; first half was less; second half more.
b. Estimate.

It can be seen that our total for the years 1971 to 1979 is only $68.8 million, which means that we have "lost" roughly $10 million. To see where the error arises, we can compare our series in Table III.2 with various public statements on the size of the wage and salary bill, apart from the 1975 figure already used. The following references are relevant here:

Year	Source	Information
1971	Brown et al (1980) p.21	"Compensation of employees" has an input coefficient of 0.08517 at December 1971. Applying this to the total value of output for 1971 (calculated as Brown appears to do, by multiplying output by world price, i.e. 22,400 x 500.06 = $11.2 million) suggests a total wage and salary bill of roughly $950,000 for 1971.
	N. Watson in Southland Times, November 30 1971	Wage and salary bill is running at an annual rate of $3 million.
1972	Hon. Hugh Templeton, NZPD June 13, 1972 p.63.	Proposed expansion of labour force by 100 will raise wage and salary bill above $3 million annually.

1973	E. Stocks in N.Z. Electricity Journal September 1973 p.16	Payroll is $5 million annually
1975	Hon. R. Bailey, NZPD July 23 1975 p.3236	Quotes "recent" press reports of a $5 million annual payroll.
	Christchurch Press June 26 1975.	Total annual wages and salaries are $7.8 million
1976	R. Austin in Southland Times August 25 1976.	Total wage packet for the 1976 year will exceed $10 million.
	Southland Times November 6 1976	Total wages, salaries and local purchases are running at $26 million annually.
1979	Christchurch Press March 15 1980.	1979 payroll of NZAS was $17.7m.
1980	Christchurch Press March 21, 1981.	Wages and salaries in 1980 totalled $20.7 million
Overall	Brown (1980) p.1	Total wages and salaries to the end of 1979 were $80.1 million.

Comparing these various figures with our Table III.2, we find that up to 1975 our figures look reliable within half-a-million dollars (although our 1971 guess must be recognised as probably too high). From 1976 on, however, it looks as though we have underestimated substantially. For a revised series, therefore, we take Austin's estimate of $10 million for 1976, and the company figures of $17.7 million for 1979, and $20.7 million for 1980.

We have accounted for $32.7 million of wages and salaries from 1969 to 1976, which leaves $47.4 million to be allocated to the years 1977-1979. Sophistication is unlikely to improve on the blunt instrument at this stage (and our final results are not very sensitive to minor variations in the estimated payroll); numbers employed over the period look to have been fairly constant, and so we shall abandon the nominal wage index approach and simply assign $13.5 million to 1977 and $16.5 million to 1978. The final result appears in Table III.3, with all figures rounded. Our final total to the end of 1979 is $100,000 less than Brown's figure, which is near enough for our purposes.

TABLE III.3

FINAL ESTIMATES OF WAGE AND SALARY BILL

$000

Calendar year	Wages and Salaries Paid
1969 ⎫ 1970 ⎭	500
1971	1,600
1972	3,300
1973	4,500
1974	5,100
1975	7,800
1976	10,000
1977	13,500
1978	16,500
1979	17,700
1980	20,700
Total 1969-1979	80,000
Total 1969-1980	100,200

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APPENDIX IV

COMALCO'S ELECTRICITY BILL

There are several ways of approaching the estimation of electricity use by the Bluff smelter, and the cost of power to the Company. One is to use a standard input coefficient for electricity in relation to smelter output and/or earnings. The second is to make estimates from NZED published statistics of electricity use. A third is to check results from both approaches against other published material.

1. THE INPUT COEFFICIENT APPROACH

Informed estimates indicate that the Bluff smelter uses around 17,000 KwH of electricity per tonne of aluminium produced.[1] Applying this figure to the output of the smelter as shown above, we obtain the following calendar year series:

TABLE IV.1

ESTIMATED ELECTRICITY USE

Year	Output (tonnes)	Estimated electricity use @ 17,000 KwH per tonne (000KwH)
1971	22,400	381
1972	87,700	1,491
1973	116,700	1,984
1974	110,300	1,875
1975	108,600	1,846
1976	139,800	2,377
1977	143,790	2,444
1978	149,831	2,547
1979	153,557	2,610
1980	154,740	2,631

1 H. Barr, "Electricity and the Economics of Aluminium Smelting" April 1980 unpublished, p.1. Murray Ellis, "Aluminium Smelting - Solution or Problem?" (mimeo, 1980), p.3. states that "the smelter at Tiwai Point presently uses some 17,600 Kwhs of electricity per tonne of aluminium produced. Of this 17,000 Kwhrs is used by the potlines". Paul Van Moeseke, "Aluminium Smelting in New Zealand: an Economic Appraisal" (1980) p.2 gives 17,000 Kwh as a standard world figure. T.K. McDonald & C. Ashley-Jones, "The Tiwai Point Aluminium Smelter: the National Economic Benefits of an Expansion" (1980) p.10 indicate that a 78,000 tpy expansion of output would require another 1,340 GwH of power, or an average of 17,179 KwH per tonne P.F. Chapman, The Energy Cost of Producing Copper and Aluminium from Primary Sources (1973) p.51 indicates that 15,000 KwH per tonne was required for cells alone as of 1970, and this should be marked up for losses in transforming and rectifying. (Use of power in other parts of the smelter installation would take this up towards 17,000 kwh per tonne of actual output).

Working from the cost side, the 1980 study by Brown provides electricity costs as a fraction of the value of final output from the smelter, for the two years 1971 and 1980.[1] For 1971 the coefficient was 0.05361, (i.e. electricity costs were 5.4% of the value of output) while for 1980 the figure is 0.10430. In the case of 1980, total expected payments for electricity are given as $26 million. In the case of 1971, no figure for total value of output is provided by Brown, so that his input coefficient cannot be directly converted into a dollar amount paid for power. For 1980, we can calculate the per-unit cost of Comalco's power as 1 cent per unit. (This is somewhat above other recent estimates of the price, which range between 0.7 cents[2] and 0.96 cents[3], but for our purposes Brown's figure will suffice; as usual, we are seeking upper-bound estimates.

2. OFFICIAL STATISTICS

An alternative approach is to use published statistics of electricity use and NZED revenues from the sale of electricity, and try to disaggregate Comalco out from other users. The annual Statistics in Relation to Electric Power Development and Operation analyse sales of electricity to users under 18 headings, several of which are industrial categories. Aluminium smelting comes under Group 10, "Non-ferrous Metal". In an attempt to conceal Comalco's power figures, the NZED adopted the practice of aggregating Group 10 with either or both of Groups 9 ("Iron and Steel Basic Industries") and 16 ("Manufacture of Wood, Paper and Pulp Products"). The results are as follows:

TABLE IV.2

Year to March 31	Group 9 Iron and Steel 000KwH	$000	Group 10 Non-ferrous metals 000KwH	$000	Group 16 Wood, pulp, paper 000KwH	$000
1969	112,851	869 (0.770)	29,741	335 (1.126)	727,413	5,701 (0.784)
1970	158,174	1,056 (0.668)	32,177	347 (1.078)	819,703	6,384 (0.779)
1971	221,764	1,356 (0.611)	35,708	386 (1.081)	873,449	6,764 (0.774)
1972	.....		1,935,824,000KwH	$10,218,000 (0.528)	.....	
1973	.....		2,885,497,000KwH	12,027,000 (0.417)	.....	
1974	.....		3,581,693,000KwH	15,092,000 (0.421)	.....	
1975	.....		3,667,146,000KwH	16,161,000 (0.441)	.....	
1976	.....		3,871,768,000KwH	17,756,000 (0.459)	.....	
1977	.....		4,666,880,000KwH	30,022,000 (0.643)	.....	
1978	2,838,004,000 KwH		$12,362,000 (0,436)	.....	1,915,134	32,673 (1.706)
1979	2,917,651,000KwH		$24,471,000.. (0.838)	.....	1,933,576	34,401 (1.779)

(cents per unit in brackets)

While the NZED has ensured that the official data do not contain enough clues to permit disaggregation, they do provide a consistency check on our data in Table IV.1 above. If we had a series for the price paid by the smelter for its electricity, then we could estimate the total power bill from Table IV.1, subtract the resulting estimates out from the official figures in Table IV.2, and thus obtain a rough check on the reliability of our series (and an indication of the direction of bias, if any). This we do in the next section; the only real problem is the usual veil of secrecy surrounding the power price.

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1 W.A.N. Brown et al, (1980), p.19 and p.21.

2 H. Barr "Electricity and the Economics of Aluminium Smelters" 1980, p.2.

3 Ministry of Energy, 1980 Energy Plan, p.15, Table 4.1 Note 1 gives the cheapest electricity rate for large industrial users (i.e. the Bluff smelter) as $2.67 per Gigajoule, which converts to 0.96 cents per kilowatt-hour.

3. OTHER PUBLIC INFORMATION

A search of the published record provides a small number of informed guesses at the price of Comalco's power. In 1970, before the smelter was completed but after the agreement had been signed, it was generally believed that the price would work out at around 0.20 to 0.25 cents per unit.[1] In 1975 a Massey biochemist, George Serrallach, worked through the detailed power pricing formula set out in the Manapouri agreement, and obtained an estimate of 0.17 cents for the price actually being paid.[2] After five years of operation, he estimated that the price would fall to 0.16 cents.

The following year, 1976, Serrallach published another estimate of 0.145 cents per unit[3], on a total consumption of 2,803 GwH of electricity, or a total annual payment of $4,112,000.[3] At the same time other press reports were giving a price of around 0.2 cents.[4]

A year later, in November 1977, both Government and company spokesmen stated that Comalco was paying $4.5 million annually for its power[5], which would correspond to 0.18 cents per unit on a total consumption of around 2,500 GwH.

In December 1977 the power price was renegotiated. According to one source, this involved an increase from 0.17 cents to 0.75 cents per unit, with a further increase to 0.77 cents in the New Year of 1978[6].

Other later descriptions of the effect of the price increase stated that the price rose 450%, which added $14.5 million[7] or $14.83 million[8] onto the 1978 power bill by comparison with the 1977 bill of around $5 million. (A 450% increase on 0.18 cents would raise the price to 0.81).

A further increase at the time of the general bulk tariff rise of May 1, 1979, was described in early 1980 as bringing the overall increase since 1977 to 560%[9]; on a base of 0.18 cents this would give a price of 1.0 cents per unit, corresponding to Brown's figure cited above.

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1 Ewen McCann, "The Manapouri-Comalco Deal", Canterbury Chamber of Commerce Economic Bulletin No. 536, April 1970, p.3. suggests that "0.25 cents is probably the maximum price the smelter will be paying for power. 0.21 cents is another possibility". (McCann goes on to suggest that the minimum price New Zealand should charge would be 0.5 cents). W. Rosenberg, "Some Costs and Benefits of the Comalco Project", NZMR March 1970, uses an estimate of 0.25 cents, based on a Christchurch Press leading article of 9/7/68 which gave the price as less than 0.2 cents, and a Clean Air Society statement in the Press of 4/2/70 which assumed 0.28 cents. A paper for the Save Manapouri Campaign by "engineers of the N.Z. Scenery Preservation Society Inc." entitled "Subsidy to be Paid to Comalco by New Zealand Electricity Consumers - Revised 8/10/70" states that evidence presented to the Commission of Enquiry had revealed that Comalco would pay 0.205 cents per unit at Manapouri, which would mean 0.225 cents at Bluff, with transmission costs taken into account.

2 G.F. Serrallach, "The Greatest Confidence Trick in New Zealand's History", Appendix 2.

3 "The Cost of Electricity to Comalco", NZMR October 1976, p.18. The $4 million figure is confirmed by reference to a statement by Mr. Sharp of Comalco in Craccum, 9/8/1976, p.12.

4 E.G. Southland Times 6/11/76.

5 George Gair, reported in Christchurch Star 6/11/77; and D. Hibberd in N Z Herald, 8/11/77.

6 National Business Review 21/12/77

7 Dominion 1-3-79 p.1.

8 Evening Post 17-3-79.

9 Christchurch Press 15-3-80

In late 1979 a former Comalco employee, K.W. Dimond, gave the following history of the electricity price[1].

> From 1970 to 1972..... Comalco utilised 180 MW of electricity on a continuous basis throughout the year, at a price of 0.18 cents per unit. From 1973 to 1979 the rate of use was 300 MW, at a price which increased slightly from 0.20 cents per unit in 1973 to 0.26 cents in 1978, before rising sharply to 0.8 cents as a result of the renegotiation of the company's power supply contract.

The dates in this report are clearly out by a year in some cases; the smelter only started up in 1971, not 1970; and the price renegotiation came at the end of 1977, not in 1978. These minor errors were picked up in a strong press statement from Comalco's manager, M.B. Bennett, who also claimed that Dimond "underestimates all the prices, some by as much as 400%"[2] (This last figure presumably relates to Dimond's 1978 price of 0.26 before renegotiation).

Dimond's figures with dates adjusted, nevertheless appear to correspond reasonably to those given by other sources already quoted. We are unlikely to be underestimating if we say that from 1971 to almost the end of 1977 the smelter paid around 0.2 cents per unit, from December 1977 to April 1979 about 0.8 cents, and from May 1979 1.0 cents.

Comparison of our series based on 0.2 cents up to end 1977, 0.8 cents 1978-1979 and 1 cent 1979-1980, with the published NZED statistics, confirms that our orders of magnitude are not too far out, and that if anything we are overestimating Comalco's power payments, since the residual series for iron and steel, and wood pulp and paper, shows deviations below the likely actual rather than above it.

TABLE IV.3

Calendar year	Our smelter estimate		NZED combined Groups 9+10+16		NZED combined minus smelter		
	GwH	$000	GwH	$000	GwH	$000	cents per unit
1970	-	-	1,101	8,326	1,101	8,326	0.76
1971	381	762	1,735	9,790	1,354	9,028	0,67
1972	1,491	2,982	2,648	11,575	1,157	8,593	0.74
1973	1,984	3,968	3,408	14,326	1,424	10,358	0.73
1974	1,875	3,750	3,646	15,894	1,771	12,144	0.69
1975	1,846	3,692	3,821	17,357	1,975	36,394	0.69
1976	2,377	4,754	4,468	26,956	2,091	35,037	1.06
1977	2,444	4,888	4,732	41,282	2,288		1.59
1978	2,547	20,376	4,827	55,413	2,280		1.54
1979	2,610	24,360	n.a.	n.a.			
1980	2,631	26,310	n.a.	n.a.			

Note: Smelter estimated to have paid 0.2 cents/KwH 1971-1977;
0.8 cents/KwH 1978 and 1.0 cents/KwH from May 1979 to April 1979;

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[1] Open Government Report, No.3, November 15, 1979, p.8.

[2] "Comalco Head Slams Price Submissions", Dominion 26.11.79

An interesting footnote to the electricity price story concerns the effect on NZAS of the May 1979 increase in NZED's bulk tariff for all users. In March 1979 a gloomy press release from Comalco's Corporate Affairs Manager, M.B.Bennett, stated that under the 1977 renegotiated price agreement, the 62% bulk-tariff increase which was to take effect from May 1 would translate into a 40-50% increase for Comalco, taking the smelter's power bill to "well over $30 million, compared to $5 million in 1977[1]. Bennett went on to indicate a possible bargaining counter held by Comalco in resisting the price increase: "The higher energy cost appears to have quashed for good Comalco's plan to build a third potline at Bluff. The Company recently announced plans to build a new smelter on the Queensland coast using cheaper power from thermal stations".

Had the full amount of the suggested increase been applied, the price of power to the smelter would have increased by 630-675% from 1977 to the end of 1979. In fact, as noted previously, the increase over the two years aggregated only 560%. The increase in price at May 1, 1980 appears, from the evidence available, to have been a 25% increase from 0.8 to 1.0 cents per unit, rather than the proposed 40-50% increase foreshadowed by Bennett in his March 1979 press release. Evidently some hard bargaining proceeded between March and May of 1979. In July 1979 Comalco was still claiming that the power price issue had deprived New Zealand of the third potline proposed for Bluff[2], but by the end of October the stance had changed[3]. By mid 1980 Comalco had committed itself to a third potline at an electricity price of 1.5 cents per unit[4].

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1 Dominion 1-3-79 p.1.

2 Dominion 23-7-79

3 Statement by W.F. Birch, Minister of Energy, in Parliament, reported in Evening Post 2-11-79 p.8, and 5-11-79.

4 Dominion 24-7-80.

APPENDIX V

IMPORTED INPUTS FOR THE SMELTER

Various recent papers on the economics of aluminium smelting agree that alumina, petroleum coke and cryolite together account for the great bulk of the imported requirements of a smelter such as that at Bluff. Since the Bluff smelter has been the dominant or only importer of these three items during the 1970s, we can use the published official import statistics as an indication of its direct import costs. As in the case of aluminium exports, the unit values reported to the New Zealand Customs are intra-firm transfer prices, but any biases away from "true" world values are in this case likely to be upward rather than downward, which enables us to use the official figures as they stand, as an upper-bound series. The available data are shown in Table V.1.

TABLE V.1

Imports to New Zealand of Alumina, Petroleum Coke and Cryolite

June years, or periods as shown	Alumina imports		Petroleum coke imports		Cryolite imports		Total Values
	tonnes	$000 CIF	tonnes	$000 CIF	tonnes	$000 CIF	$000
1971	6,440	266.6	1,086	454.8	17	5.0	726.4
July-Dec 1971	60,773	4,226.4	20,390	837.2	23	5.0	5,068.6
January-June 1972	79,620	5,353.6	20,241	809.4	10	3.1	6,166.1
1973	176,064	10,147.2	31,262	1,301.7	16	5.3	11,454.3
1974	291,114	15,531.2	54,146	2,063.0	61	18.7	17,612.9
1975	145,609	14,415.3	62,075	3,518.9	19	7.3	17,941.5
1976	294,125	38,947.6	50,079	5,088.9	29	16.4	44,052.9
1977	250,846	42,492.9	66,319	7,827.4	46	28.4	50,348.7[b]
July-Dec 1977	185,481	33,158.2[a]	21,209	2,762.6[a]	n.a.	n.a.	35,920.8[b]
1978	326,387	57,363.2	53,564	7,143.0	18	11.7	64,517.9
July-Dec 1978	158,312	24,526.1[a]	33,360	4,017.1[a]	n.a.	n.a.	28,543.2[b]
1979	330,211	54,737.1[a]	84,311	10,594.6[a]	n.a.	n.a.	65,331.7[b]
July-Dec 1979	161,244	27,699.0[a]	14,536	1,980.7[a]	n.a.	n.a.	29,679.7[b]
1980	259,183	48,094.4[a]	48,187	6,589.5[a]	n.a.	n.a.	54,683.9[b]
July-Dec 1980	179,990	43,576.9[a]	34,820	5,634.2	n.a.	n.a.	49,211.1

a. Published CDV values adjusted to CIF on the basis of the CIF/CDV ratio for the import division in which the item occurs.

b. Excluding cryolite.

Sources: 1971-June year 1978 from New Zealand External Trade: Imports July-December data for 1977-1980, and June year 1979 and 1980 from Monthly Abstract of Statistics trade supplements.

These figures can be used to construct a calendar-year series by the same methods as were used for Table I.3 above. The results appear in Table V.2

TABLE V.2

Calendar-year Series for Imported Inputs: $000

Calendar year	Imports of:.....			
	Alumina	Petroleum Coke	Cryolite	Total
1971	4,493.0	1,292.0	10.0	5,795.0
1972	10,427.2	1,460.3	5.8	11,893.3
1973	12,839.2	1,682.4	12.0	14,533.6
1974	14,973.3	2,791.0	13.0	17,777.3
1975	26,681.5	4,303.9	11.9	30,997.3
1976	40,720.3	6,458.2	22.4	47,200.9
1977	54,404.7	6,676.3	20.1	61,101.1
1978	48,731.1	8,397.5	20.0*	57,148.6
1979	57,910.0	8,558.2	22.0*	66,490.2
1980	63,972.3	10,243.0	25.0*	74,240.3

*Estimates, based on the trend of expenditure on the other two items.

Source: Derived from Table V.1, by methods applied to obtain Table I.3 above.

APPENDIX VI

LOCAL PURCHASES OTHER THAN ELECTRICITY

1. OPERATING EXPENSES

The costs of materials and services purchased within New Zealand are extremely difficult to track down, but fortunately their weight in the total costs of operation is relatively small, so that our final results are not very sensitive to errors under this heading. Three recent studies of aluminium smelting costs [1,2,3] in New Zealand agree in placing the proportion of local purchases of goods and services other than electricity at between 3% and 10% of the value of the final output,[1] with Bluff very much at the top end of the range as compared with hypothetical new smelters. For 1980, on the basis of the situation at the end of 1979, Brown estimates a total of $24.5 million, which provides us with one firm figure. Given his comment that "most costs per dollar of output have remained consistent" between 1971 and 1979,[4] we can construct an approximate series simply by applying an assumed coefficient of 10% of final value of output throughout the period. This is upper-bound (for 1980, using our valuation of output rather than Brown's, the coefficient works out as 9.3%) and overstates more for earlier years (if the slight upward trend in the coefficient shown by Brown, Table 3, is any indication).

The result of this exercise appears in Table VI.1.

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1 Brown (1980) p.21 gives an input coefficient of .06678 at December 1971 and .07338 at December 1979, in relation to the Southland regional economy only. He also states (p.19) that $6.1 million per year was the rate of expenditures in the New Zealand economy outside Southland as at December 1979, which would give an input coefficient for those other purchases of .02443. Aggregating this with the Southland regional figure gives a total input coefficient for New Zealand purchases of .09781. Southland purchases of $18.4 million, plus $6.1 million, gives a total of $24.4 million.

2 Van Moeseke (1980) pp.14 & 16 gives N.Z. supplies and maintenance for a new 300,000 tonne smelter as $15.4 million and notes in passing that "at Bluff this item is slightly smaller than the wage bill" and that his $15.4 million figure is "in absolute value, only slightly more than at Bluff". This $15.4 million is 4.6% of the value of output as estimated by Van Moeseke; the figure would be reduced to 3.2% if output were valued at $1,600 per tonne rather than Van Moeseke's $1,111.

3 Ellis (1980) p.10 gives a figure of $15 per tonne of aluminium produced as the expected cost of "other materials and services" for a new smelter; he also costs fuel oil at $2,940,000 for a 100,000 tonne smelter with output valued at $150 million annually. Aggreating these two would give a total of $4,440,000 or 3% of the value of output.

4 Brown (1980) p.20.

TABLE VI.1

ESTIMATE OF LOCAL NON-ELECTRICITY PURCHASES : $000

Calendar year	(1) Our preliminary series : 10% of value of output	(2) Data from public record	(3) Series used in text
1971	150		800
1972	3,063		3,100
1973	4,775		4,800
1974	6,438		6,400
1975	7,117	4,200	7,100
1976	11,658	11,200	11,700
1977	15,809		15,800
1978	17,880		17,900
1979	19,919		19,900
1980	26,997	24,500	27,000

Sources for Column (2):

1975: Report in Christchurch Press 25-6-75 stated that $350,000 per month is being spent on supplies and maintenance,

1976: Southland Times 6-11-76 gave $26 million as the annual bill for wages and salaries and locally-supplied goods and services. Subtracting our estimate of wages and salaries for 1976 ($10 million) and electricity purchases ($4.8 million) leaves $11.2 million.

1980: Brown (1980) p.19.

In Column 2 of Table VI.1 we have inserted estimates based directly upon particular pieces of information in the public record. For 1976 the public record compares closely with our estimate; for 1975 there is a less good fit (but it should be noted that the annual figure for 1975 was obtained by taking a mid-year monthly figure and multiplying it by twelve). Overall for a working series, we have settled for our 10% data except for 1971 (when we estimate local purchases as $800,000, equal to electricity purchases, by analogy to 1972) and 1980 (for which we use Brown's figure).

2. A CONSISTENCY CHECK

At this stage we have collected enough data to estimate the total operating costs of the smelter. A check on the reliability of our figures in the late 1970's is made possible by comments on cost escalation by the chairman of N.Z.A.S. at two recent annual meetings. In his report on the year 1978, he stated that operating costs (that is, wages and salaries, electricity and other materials and services) had increased by $19.78 million over 1977, of which $14.83 million corresponded to the increased cost of electricity and $4.95 million to other costs.[1]

In the report for the 1979 year, it was stated that operating costs overall were up 14% on 1978.[2]

Our data to this point are as follows for the relevant years:

Calendar year	Operating costs of the smelter			Increase in costs	
	Electricity	Other	Total	$000	%
1977	4,900	29,300	34,200	20,600	61.7
1978	20,400	34,400	54,800		
1979	24,400	37,600	62,000	7,200	13.1

It can be seen that between 1977 and 1978, we show electricity costs rising by $15.5 million compared with the $14.83 million cited above, while non-electricity local costs rose $5.1 million against the $4.95 million cited above. These figures appear resonably consistent.

Between 1978 and 1979, our operating cost series rises 13.1% compared to the 14% claimed in the company's annual report. Provisionally, no clear-cut basis for abandoning our estimates emerges from this consistency check.

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1 Evening Post 17-3-79.

2 Christchurch Press 15-3-80.

APPENDIX VII

INFORMATION FROM THE ACCOUNTS OF NZAS

"New Zealand Aluminium Smelters Ltd., is a consortium company involving three participants - Comalco Limited, Showa Aluminium Industries K.K. and Sumitomo Aluminium Smelting Co. Limited. The participants provide NZAS with alumina which is converted into aluminium. NZAS levies a charge (called a tolling charge) for this service of converting the participant-owned alumina. The stocks of alumina and aluminium remain the property of the participants at all times.....

"In accordance with the provisions of the Industry Agreement of 1969 with the New Zealand Government the tolling charge is based on all tax deductible expenses incurred in the process of conversion. Accordingly NZAS does not pay dividends or tax. The liability to pay tax within New Zealand accrues separately to the New Zealand branch of each participant company."[1]

The company structure described above means that the amount of relevant information which we can obtain from the NZAS annual accounts is strictly limited. Since it is NZAS which owns and operates the smelter, its accounts contain figures on the cost of the smelter and show depreciation allowances on a straight-line basis (50 years for buildings and site development and 25 years for plant and equipment). There is also detailed information on the financing of the investment in the smelter, which reveals that except for a State Advances loan to finance construction of housing for smelter employees, and some minor loans of working capital from the Bank of New Zealand, all investment has been financed either from equity capital supplied by the participant companies, or from loans raised by them. Consequently, interest payments on NZAS's outstanding loan liabilities go almost entirely to the foreign owners of the smelter, and from New Zealand's point of view are indistinguishable from outflows of profits to the same companies. Table VII.1 sets out figures drawn from the profit and loss accounts of NZAS; these figures are useful only as a matter of record, since no information on operating costs is provided, and the annual profit or loss is purely notional, reflecting the difference between the tolling fees paid by the partners and the actual costs of running the smelter. In the early years, the pre-set tolling charge paid by the partners was too low to meet all costs, and about 1976 it would appear that some adjustment was made to begin to bring the NZAS accumulated loss down; for years from 1977 an adjustment item appears annually in the accounts.

The only series of relevance to our calculations is the estimate of interest paid to New Zealand creditors, namely the State Advances/Housing Corporation, and the Bank of New Zealand. This item has never been of more than marginal significance in the total picture.

Table VII.2 shows the historical pattern of investment in the smelter, with bursts of new construction in 1970-71 and 1974-75. Up to the end of 1979 a total of $126 million had been invested in the operation; no information is provided on the proportion of this which would have been spent in New Zealand. The debt-equity ratio has always been very high, but since the great bulk of the debt is owed to the parent companies the figure does not have much significance.

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[1] Extract from "Statement of Accounting Policies" in the 1979 Annual Report of NZAS, Note 1.

TABLE VII.1

FIGURES FROM NZAS PROFIT AND LOSS ACCOUNT: $000

Calendar years	Profit (loss) for the year	Accumulated profit (loss)	Interest on fixed loans Total	Interest on fixed loans Paid to New Zealand-based creditors	Depreciation	Exchange gains (losses)
1970			1,296	87		
1971	(7,479)	(7,479)	3,810	125[a]	897	
1972	(2,175)	(9,654)	7,166	200[a]	2,972	89
1973	6,547	(3,107)	6,670	280[a]	3,289	876
1974	(2,688)	(5,795)	6,876	280[a]	3,311	505
1975	(6,082	(11,877)	8,391	300[a]	3,391	(2,874)
1976	5,914	(5,964)	12,044	280[a]	4,154	(6,682)
1977	2,445[b]	(3,518)	10,879	270[a]	4,519	25
1978	717[b]	(2,801)	11,333	350[a]	4,649	123
1979	7,664[b]	4,865	14,453	470[a]	4,715	(147)
1980	13,873[b]	18,737	13,384	571[a]	5,168	(5)

a. These are rough estimates of the interest paid to Housing Corporation and the Bank of New Zealand, obtained by applying the nominal interest rate of each loan to the amount outstanding at the end of the preceding year; the figures are consequently biassed upwards. A B.N.Z. loan in US dollars, raised in 1978, is not taken into account here.

b. In 1977 $8.1 million, in 1978 $14.8 million, in 1979 $14.5 million, and in 1980 $4.4 million was deducted from profits as "provision for future exchange losses" to cover increased repayment costs of foreign-currency loans when measured in $NZ. Profits shown here are net of this deduction.

TABLE VII.2

FIGURES FROM NZAS BALANCE SHEETS : $000

Position at December 31st:	Fixed assets at cost	Accumulated depreciation	Net book value of fixed assets	Construction in progress	Paid up Capital	Fixed loans outstanding [d]
1969	307[a]	-	-	5,132	500	9,800
1970	1,068[a]	-		46,553	4,000	53,835
1971	74,429	897	73,532	11,312	7,850	92,522
1972	87,976	3,867	84,110	430	8,075	84,500[c]
1973	88,638	7,140	81,498	206	8,075	73,578
1974	88,900	10,419	78,491	10,664	9,100	101,708
1975	90,363	13,683	76,679	27,124	10,700	133,421
1976	119,027	17,485	101,541	3,741	10,700	141,403
1977	123,223	21,858	101,365	1,406	10,700	143,424
1978	124,867	26,233	98,635	1,261	10,700	157,068
1979	126,495	30,796	95,699	2,685	10,700	147,579
1980	130,922	35,424	95,498	3,288	10,700	132,973

a. Land and housing only.

b. Including amount repayable during the following year.

c. Estimate from incomplete accounts in our set.

d. Before deduction of repayments due in following year.

APPENDIX VIII

ANNUAL GROSS INVESTMENT BY NZAS

In this appendix we use data from the NZAS accounts (Appendix VII) to estimate investment expenditures by the smelter consortium, and then go on to derive estimates of the expenditures within New Zealand which resulted from the investment programme. Our method of estimating gross investment for each year is as follows: we take the increase in book value of fixed assets at cost (before depreciation) during each year, subtract the value of construction in progress at the end of the preceding year, and add the value of construction in progress at the end of the current year. The results are set out in Column 3 of Table VIII.1.

TABLE VIII.1

ESTIMATES OF INVESTMENT IN BLUFF SMELTER, 1969-1979.($000).

Calendar year	1. Book value of fixed assets at cost, year-end	2. Construction in progress at year-end, at cost	3. Estimated gross investment during year
1969	307	5,132	5,439
1970	1,068	46,553	42,182
1971	74,429	11,312	38,120
1972	87,976	430	2,665
1973	88,638	206	438
1974	88,900	10,664	10,720
1975	90,363	27,124	17,923
1976	119,027	3,741	5,281
1977	123,223	1,406	1,861
1978	124,867	1,261	1,499
1979	126,495	2,685	3,052
1980	130,922	3,288	5,030

Source: Data from Appendix VII, Table VII.2. For derivation of Column 3 see accompanying text.
Investment for years prior to 1969 is here included in 1969.

It can be seen that there have been two surges of investment spending: from 1969 to 1972, when the original smelter was installed, and from 1974 to 1976 when capacity was expanded from 110,000 tpy to 150,000 tpy.

The New Zealand content of this investment is more difficult to discover. In 1971 the NZIER team reported that of the expenditure on the smelter to that time, about 56% had been spent on New Zealand[1] supplied goods and services. It is not clear whether this 56% was net of second-round and subsequent import leakages or not.

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[1] Poole et al (1971) p.21. Their wording is: "the most recent analysis of the construction costs indicate (sic) that about 56% has been spent upon goods and services supplied by New Zealand".

So far as the 1974-76 expansion programme goes, a company spokesman claimed in early 1976 that of the overal cost of $36 million (slightly more than shown in our table, which gives $33.9 million of investment 1974-76), some $25 million was being spent in New Zealand.[1] The implied import ratio, 30% is very similar to the overall ratio for the New Zealand economy as a whole.

Because of uncertainty over the basis on which these two estimates of local content were calculated, we have made two working assumptions:

1. We assume that the NZIER figure of 56% was net of second-round and subsequent import leakages;

2. We assume that the company's 1976 figure of 70% local content was not net of subsequent leakages, and that the 56% local-content ratio should be applied here also.

In order to indicate the significance of the second of these two assumptions, we show in Table VIII.2 the effect of using the 70% local-content ratio for 1974 onwards, alongside the series calculated with a 56% ratio. Only marginal changes in our aggregate figures results.

TABLE VIII.2

ESTIMATED LOCAL-ECONOMY EXPENDITURE FROM INVESTMENT PROGRAMME, $000

Calendar year	First estimate 56% of gross investment	Alternative estimate: 56% of gross investment to 1973 70% of gross investment 1974-79
1969	3,046	3,046
1970	23,622	23,622
1971	21,347	21,347
1972	1,492	1,492
1973	245	245
1974	6,003	7,504
1975	10,037	12,546
1976	2,957	3,697
1977	1,042	1,303
1978	839	1,049
1979	1,709	2,136
1980	2,817	3,521

Source: Calculated from Table VIII.1.

To ensure that our final foreign-exchange series is upper-bound, we use the higher of these estimates in Appendix X.

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[1] New Zealand Herald 13-3-76 p.13.

APPENDIX IX

TAXATION

The amount of tax paid by the smelter consortium to the New Zealand Government remains, for some reason, a closely-guarded secret. It is not at all clear why this should be so; as we have already shown, the general operating characteristics of the smelter can be reconstructed from the public record; and the consortium's pride in its contribution to New Zealand's foreign-exchange position should provide a motive for making its tax bill known. In this appendix we shall test the effects of two competing assumptions, in order to show the range over which the consortium's tax record will affect our general results. First we assume that the consortium pays full taxation at a 50% rate[1] on its profits, as estimated on the basis of our figures. Secondly, we make the alternative assumption that the consortium is a successful tax avoider, paying no tax whatever. Results appear in Table IX.2.

Our first step, in Table IX.1, is to construct a series showin the smelter's pre-tax net profits. To do this, we start with total sales revenue and subtract overseas and local operating costs, interest payments, and depreciation as recorded in the NZAS accounts.

TABLE IX.1

Estimating the Profits of the Smelter Before Tax $000

Calendar year	Sales revenue	Imported inputs	Local operating costs	Interest payments	Depreciation	Net operating surplus before tax
1971	1,497	5,800	3,200	3,810	897	-12,210
1972	30,628	11,900	9,400	7,166	2,972	-810
1973	47,749	14,500	13,300	6,670	3,289	9,990
1974	64,379	17,800	15,300	6,876	3,311	21,092
1975	71,168	31,000	18,600	8,391	3,391	9,786
1976	116,581	47,200	26,500	12,044	4,154	26,683
1977	158,085	61,100	34,200	10,879	4,519	47,387
1978	178,800	57,100	54,800	11,333	4,649	50,918
1979	199,189	66,500	62,000	14,453	4,715	51,521
1980	269,967	74,200	74,010	15,000	5,000	101,757

[1] A simple average of 55% for Comalco and 45% for the Japanese partners. Poole et al (1971) p.161 give these as the rates which would apply for an export-only smelter. For simplicity in constructing working figures we ignore here the division of Comalco's output between the local and export markets.

TABLE IX.2

SENSITIVITY OF RETURNED-VALUE RESULTS TO TAXES ACTUALLY PAID

$000

Calendar year	(1) Upper limit of tax bill (50% of net pre-tax operating surplus)	(2) Returned value if no tax paid	(3) Returned value if maximum tax paid	(4) Difference (3) - (2) as a % of (2)
1971	-	3,325	3,325	-
1972	-	9,600	9,600	-
1973	4,995	13,580	18,575	36.8
1974	10,546	15,580	26,126	67.7
1975	4,893	18,900	23,793	25.9
1976	13,342	26,780	40,122	49.8
1977	23,694	34,470	58,164	68.7
1978	25,459	55,150	80,609	46.2
1979	25,761	62,470	88,231	41.2
1980	50,879	74,480	125,359	68.3
Totals	159,569	314,335	473,904	50.8

Sources: Column 1 calculated from Table IX.1

Column 2 is local operating costs from Table IX.1 plus local interest payments from Table VII.1. In other words, this is RV1 in Appendix X.

Column 3 is Column 2 plus Column 1.

Table IX.2 gives our assessment of the consortium's maximum tax liability. It is obvious that our returned value figure is quite sensitive to the amount of tax actually paid; the upper-bound with-tax series is generally about 50% higher than the lower-bound no-tax series, for years from 1973 on.

None of the consortium partners, of course, discloses its actual tax liabilities in New Zealand. Although the original contracts required each partner to set up a New Zealand subsidiary, apparently as a basis for tax assessment, the annual accounts filed by these subsidiary companies are of no use whatever in tracing actual tax payments; the Japanese partner's subsidiaries were wound up in 1978, without any effect on our degree of knowledge of the operation. The accounts of Comalco N.Z. operations, held in the Companies Office in Wellington, record the payment of a total of $4.2 million in taxes over the nine years 1971-1979, as shown in Column 1 of Table IX.3. Comalco's "share" of our assessed tax for the smelter (Table IX.2 above) is shown in Column 2 of Table IX.3. Column 3 of that table shows the total reported income tax of Comalco Consolidated Operations, as recorded in the parent company's Australian accounts; this series presumably consists of the sum total of taxes paid in New Zealand, Australia and elsewhere, including the amounts shown for Comalco N.Z. Operations. It can be seen that our data do not rule out the possibility that New Zealand taxes were as high as our upper-bound limit, but it seems extremely implausible that half of the total tax paid by the parent company should accrue to the New Zealand Government. At this stage the amount of tax actually paid must remain an open question.

TABLE IX.3

SOME ORDERS OF MAGNITUDE ON TAX PAYMENTS BY COMALCO

Calendar year	(1) Reported income tax paid by Comalco N.Z. Operations N.Z. $000	(2) Comalco "share" of our tax assessment N.Z. $000	(3) Total income tax paid by Comalco consolidated operations A$000
1971	147	-	10,649
1972	-	-	7,936
1973	58	2,747	10,414
1974	1,202	5,800	10,417
1975	1,468	2,691	7,298
1976	537	7,338	14,574
1977	634	13,032	22,917
1978	-	14,002	24,933
1979	239	14,169	39,001

Sources: Column 1 from Comalco Ltd (N.Z. Operations) Profit and Loss Accounts, annual.

Column 2 is 55% of Table IX.2 Column 1 (the proportion reflects the higher tax rate on Comalco than on the Japanese partners).

Column 3 from Comalco Ltd Annual Report and Balance Sheet 1979, p.5.

APPENDIX X

ALTERNATIVE MEASURES OF RETURNED VALUE

The general meaning of returned value (or net foreign exchange contribution) is clear: it is the amount of net foreign exchange accruing to the New Zealand economy as a result of the operation of the smelter. There are three versions of the measure which we shall discuss here; we shall label them respectively RV1, RV2 and RV3[1].

RV1: first-round current balance of payments impact. This consists of total factor payments in New Zealand, including tax, plus all local purchases of materials for the current operation of the smelter.

RV2: RV1 net of second-round leakages; that is RV1 minus the import content of locally-purchased materials. For working purposes, we shall assume that local supplies other than electricity have an import content of 30%, and electricity 15%.

RV3: RV2 plus capital inflow to finance local-economy investment expenditure

Our series for these three versions appear in Table X.1, for both no-tax and maximum-tax possibilities.

TABLE X.1

RETURNED VALUE FROM SMELTER OPERATIONS : $000

Calendar year	RV1		RV2		RV3	
	No Tax	Maximum Tax	No Tax	Maximum Tax	No Tax	Maximum Tax
1970	300	300	300	300	23,922	23,922
1971	3,325	3,325	2,965	2,965	24,312	24,312
1972	9,600	9,600	8,220	8,220	9,712	9,712
1973	13,580	18,575	11,540	16,535	11,785	16,780
1974	15,580	26,126	13,090	23,636	20,594	31,140
1975	18,900	23,793	16,215	21,108	28,761	33,654
1976	26,780	40,122	22,550	35,892	26,247	39,589
1977	34,470	58,164	28,995	52,689	30,298	53,992
1978	55,150	80,609	46,370	71,829	47,419	72,878
1979	62,470	88,231	52,840	78,601	54,976	80,737
1980	74,480	125,359	62,430	113,310	65,951	116,831

Sources and Notes: For 1970, RV1 and RV2 are estimated wages and salaries.
RV1 data from Table IX.2. RV2 data derived from Table 3, netting out 30% of non-electricity expenditure and 15% of electricity. (Note that the 1978 price change makes this a bit risky).
RV3 is RV2 plus gross investment local content, from Table VIII.2 Col.2.

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[1] For a recent methodological discussion see Brodsky, D.A. and Sampson, G.P., "Retained Value and the Export Performance of Developing Countries", Journal of Development Studies Vol.17 No.1. October, 1980.

The figures in Table X.1 can be compared with other published estimates of the smelter's net foreign exchange earnings, set out in Table X.2. It can be seen that for 1974, 1976 and 1979 the Institute of Economic Research figures appear to correspond fairly closely with our maximum-tax RV2; since the Institute apparently works with tax as assessed by them, rather than the actual amount paid by the consortium, this may constitute some confirmation of our data (although the Institute does not explicitly state whether they have netted out second-round leakages). The 1978 figure (actually an annual estimate released in March 1979 by NZAS) is closer to our zero-tax estimates; the interesting point here is that this figure does not appear to be based on a study by the Institute of Economic Research and may be based on the consortium's own records.

TABLE X.2

SOME OTHER PUBLISHED RETURNED-VALUE ESTIMATES

Year	RV estimate $ million	Status of figure	Source
1974	22	Actual result for 1974 year	McDonald (1975)
1976	35	Extrapolation from September 1976 data	McDonald (1976)
1978	50	Late-1978 or early 1979 production rates and prices, extrapolated to annual figure	NZAS Chairman D. Hibberd reported in N.Z. Herald 19-3-1979 p.14.
1979	80	Extrapolation from October-November 1979 data	McDonald (1979)
1980	105	Extrapolation from early 1980 data	Comalco Ltd. Managing Director M. Rayner, reported in Christchurch Star 7-5-1980.
1980	64	Apparently an actual result for the year	Managing Director M. Rayner in annual report, from Christchurch Press March 21 1981, p.18.