

THE NZED FINANCIAL PROJECTIONS OF THE IMPACT OF NEW
ALUMINIUM SMELTERS : A SECOND LOOK

In June 1981 we published an analysis¹ of some data produced by New Zealand Electricity Division as their contribution to the ongoing debate over the attractiveness or otherwise of aluminium smelting developments in New Zealand. The key issue at stake in this debate has been the true cost of the electricity which the new smelters would use. The NZED study provided thirty-year forecasts of the cash flows resulting from operating a national electrical supply system without smelter developments (the +0GWH scenario) and with such developments (the "+5,000GWH scenario"). Comparison of the two series permits estimates to be made of the incremental impact of the smelter projects on NZED's financial position, and also permits an estimate of the commercial cost of supplying electricity for the smelters.

Our previous study concluded that (i) the NZED figures did not adequately identify the impact of the Aramoana smelter on its own, but did provide some idea of the likely impact of 5,000GWH worth of new electricity demand from aluminium smelters; (ii) during the fifteen years 1980/81 to 1994/95 the total cost of supplying electricity for aluminium smelters under the proposed terms of sale would be \$1,500 million more than the revenue received; and (iii) this shortfall would have to be made up either by raising the bulk tariff charged to other electricity consumers, or by direct support from the taxpayers, or by borrowing. NZED's suggested solution was to borrow the necessary amount from Government.

A response from the Minister of Energy appeared in the Otago Daily Times of June 25 1981 (see Appendix 1). The Minister took issue with points (ii) and (iii) above. The difference between costs and revenues for the first fifteen years, he stated, is expected to be \$850 million rather than \$1,500 million, the remaining \$650 million being made up of servicing charges on the proposed loan programme. An evaluation of the electricity supply package as an investment programme should exclude these charges, which arise merely from the choice of a particular mode of financing and do not affect the basic profitability or otherwise of the investment programme itself. The Minister also took issue with our use of the word "subsidy" to describe the expected shortfall of revenues relative to costs, on the grounds that a large part of the total costs in the NZED Projections are capital expenditure which will continue to be paid off long after the end of the fifteen-year period to 1995.

¹ Financial Projections of the Impact of New Aluminium Smelters on the New Zealand Electricity System: an Analysis of the NZED Study (Wellington, Coalition for Open Government).

As he put it, "smelters should not be required to pay for all the power supply by 1995, but only the proportion of it represented by the first fifteen years".

In this paper we endeavour to meet the Minister's criticisms by providing an evaluation of the proposed investment programme in new generating plant to supply the smelters, in line with the framework suggested in his Otago Daily Times article¹. On the cost side we put the additional capital expenditures and working expenses incurred by NZED in order to operate the +5,000GWh scenario instead of the +0GWh scenario; these figures are obtained simply by subtracting one set of projections (+0) from the other (+5,000). On the income side we put the additional revenues which NZED expects to receive. (Since the NZED projections were constructed on the assumption that the smelters would not be allowed to have a significant impact on the bulk tariff these additional revenues are very close to the expected receipts from the smelter companies².) We ignore all financial flows associated with the financing of investment. Our figures are in Appendix 3, Table III.1.

To take account of the residual value of investments at the end of the evaluation period, we apply 2½% straight-line depreciation to each dollar of capital expenditure (attributing, thus, an average fifty-year life to capital equipment, as suggested by the Minister). The net value of capital at the end of the evaluation period is then credited as a benefit to NZED from the programme. All dollar values are deflated to 1980/81 prices, which means that all calculations are in constant dollars. Our data on capital are in Appendix 3, Table III.2.

The results are rather straightforward and not very encouraging³. A fifteen-year evaluation for the period 1980/81 - 1994/95 shows an internal rate of return on the supply of electricity to the smelters of less than 2½%, which is not commercially attractive. A thirty-year evaluation up to 2009/10 yields a zero internal rate of return. NZED proposes, thus, to invest over \$700 million dollars for a zero return, if we take the thirty-year series; or to invest \$1,300 million for a 2½% return if we take the fifteen-year series. The latter of is presumably the one Mr. Birch had in mind in claiming that "economic studies have shown that the smelters will pay for the full cost of supplying power to them, and will provide a positive rate of return". In fact, the NZED figures appear to show that even after thirty years the smelters will still not have fully paid off the initial costs of the stations built to supply them, and the rate of return is only marginally positive for the shorter time period.

The NZED figures thus give a picture of a supply contract which is not commercially attractive unless interest rates on loan finance are expected to be zero or negative over the next thirty years. The proposal is not economically attractive from New Zealand's point of view unless we believe that capital is so abundant as to be costless and unless there are no social or environmental costs

¹ This more satisfactory approach has been made possible by the release of selected parts of the NZED computer printouts, which were not available at the time of writing the previous paper. The data newly released is reproduced in Appendix 2.

² See our previous paper, p.9, Table 2.

³ For the fifteen-year and thirty-year net-benefit streams discussed here see Appendix 3 Table III.3.

associated with the power station construction programme. Neither of these conditions seems likely to hold.

Our purpose in this paper has been very limited: to show the implications of the figures produced by NZED in defence of the smelter proposals. We do not wish to give any endorsement of the accuracy of the basic NZED projections, particularly as regards the capital works programme (about which we have serious misgivings¹). Our central point is simply that if things turn as NZED predict, the NZED will not obtain enough revenue from sales to the smelters to provide any return on the capital invested. This in turn casts doubt on NZED's ability to service the financing requirements of the extra construction programme without resorting to either higher charges to other consumers, or subsidies of one sort or another from the taxpayer.

G. BERTRAM

3-9-1981.

¹ See previous paper, pp. 12-13.

Taxpayers' Power Bill

Taxpayers would pay \$1,500 million in power subsidies until 1995 for the proposed Aramoana smelter and third cliff gorge, according to a study by Dr G. Bertram and Mr K. Johnston, of the Coalition for Open Government.

After 1995 the total subsidy is the one that would require paid may fall as taxpayers a subsidy. begin making profit from. "It is quite misleading to power supplied to the smelter, claim, as Mr Birch has done, but this depends on the idea that the division's study bility of Electricity Division 'proves' or 'confirms' that capital expenditure forecasts the bulk tariff will not be in its secret 30-year generation forecast to finance smelter forecast.

Even assuming the divi- "What the study actually sion's figures are correct, the does is to show the implica- total subsidy over the 30-year tions of a decision not to raise period would be at least \$1,000 the bulk tariff. The main im- million. plication is straightforward.

The Bertram-Johnston study enough: If the subsidy is not was done in response to a financed directly by electric claim by the Minister of Ener- ty consumers, then it will gy, the Hon W. F. Birch, that have to be financed in some the smelter projects would not other way."

In a reply to a series of questions from the Daily Times arising from the study, the Minister of Energy, the Hon W. F. Birch, confirmed that money will be borrowed for additional capital works to meet power demand.

The project will not be sub- He said the loans will be re- subsidised by electricity users. paid out of the cash surplus because an increase of about 20 percent in the average bulk generated by the smelters, tariff from 1981 to 1995 would package in the later years. be required to subsidise the Mr Birch said the \$1,500 mil- smelters. lion represents the initial bor- rowing to finance these capital works, and is not a subsidy, since the smelters "will pay for the cost of supplying power to them."

ALL TAXPAYERS

Instead the Government will borrow money to finance the subsidy, which means all tax- payes will foot the bill, rather than the amount being added to electricity users' bills.

Mr Birch invited anyone to have "detailed discussions" with the Electricity Division over its projections.

But Dr Bertram and Mr Johnston report in their study that there was "a veil of secrecy" drawn over the divi- sion's information.

They were given access to two computer printouts that yielded the results used by the division, but these were of limited use without extra infor- mation.

What the researchers were able to establish was that the division's study looked at the impact of smelters, and not specifically at the impact of the Aramoana smelter on the power situation.

They argue that the third pitline at Bluff will use exist- ing power, and may actually reduce pressure on bulk tariff during the 1990s.

But the Aramoana smelter would require a crash con- struction programme of new power stations.

By lumping the two togeth- er, the Electricity Division conceals the true impact of the Aramoana smelter, which

NORMAL PROCEDURE

Mr Birch said the difference between costs against the tax- payer and receipts from the smelter is \$600 million. If ca- pital works were to be fund- ed from cash surpluses, it would require an 11 percent increase in the bulk tariff.

Instead of this, he said, the deficit will be borrowed and repaid out of surpluses in later years, as is "normal commer- cial procedure."

He said the use of the term subsidy by Dr Bertram and

Mr Jamstone is incorrect, be- cause "economic studies have shown that the smelters will pay for the full cost of supply- ing power to them, and will provide a positive rate of re- turn."

Mr Birch emphasised that hydro dams built now will sup- ply power for more than 50 years, and smelters should not be required to pay for all the power supply by 1995, at only the proportion of 11 repre- sented by the first 15 years.

Mr Birch confirmed that the Electricity Division has not carried out a financial study looking at the impact of the proposed Aramoana smelter alone on the power supply.

On the issue of information, Mr Birch said he is "not pre- pared to make the information any more available than I have done already."

He said the information al- ready released represents "a very major concession."

Within the computer prin- touts he said there is commer- cially confidential information.

"No commercial organisa- tion, and in a sense the Elec- tricity Division is that, would be prepared to make similar information as publicly avail- able as has already been done," Mr Birch said.

APPENDIX I

Minister of Energy's Response to Previous Study

MONDAY, 16TH FEBRUARY 1951

[illegible]

[illegible]

BASIS: 1980 ENERGY PLAN INCLUDING 5000 GWH OPTION
14.80 BULK TARIFF INFLATED AS SHOWN BY LAST LINE IN SE

STION D.

1.7,80 PRICES INFLATED: 15% 86/87, 12.5% 87/88, 10% 88/89, 7.5% 89/90
PRICES INFLATED: 5% 85/86 TO 2009/10 REVENUE FORECAST 17TH SEPTEMBER 1980
INTEREST: 10% 80/81 TO 85/87, 9% 87/88, 8% 88/89, 7% 89/90, 6% 90/91, THEN 5%.

INTEREST: 10% 80/81 TD 85/87, 9% 87/88

--- 88/89: 7% 89/90: 6% 90/91: THEN 5% ---

[illegible]

30-YEAR FINANCIAL FORECAST NUMBER 53

[illegible]

Appendix 3

Table III.1

Defining the "Project": Comparison between the +0 and the +5000 Scenarios, \$million at 1980/81 prices

Year to March of:	(1) Capital +0	(2) expenditures +5000	(3) Difference	(4) --Working +0	(5) expenses--- +5000	(6) Difference	(7) ----Cash +0	(8) receipts--- +5000	(9) Difference = "project" costs receipts (8 + 6)	(10) Total project costs (3 + 6)	(11) Surplus of receipts over total costs	(12) Surplus of receipts over working expenses (9 - 6)
1981	300	300	0	164	164	0	535	535	0	0	0	0
1982	278	368	90	169	169	0	514	514	0	90	-90	0
1983	234	323	89	174	174	0	500	500	0	89	-89	0
1984	212	289	77	177	187	10	495	519	24	87	-63	14
1985	246	290	44	185	210	25	489	552	63	69	-6	38
1986	234	304	70	193	222	29	488	561	73	99	-26	44
1987	254	363	109	200	260	60	486	583	97	169	-72	37
1988	273	385	112	203	279	76	479	578	99	188	-89	23
1989	223	412	189	208	250	42	472	567	95	231	-136	53
1990	164	352	188	194	252	58	461	557	96	246	-150	38
1991	143	331	188	201	259	58	463	558	95	246	-151	37
1992	155	323	168	209	271	62	463	560	92	230	-138	30
1993	199	253	54	213	268	50	476	562	86	104	-18	26
1994	316	329	12	227	271	44	482	564	32	56	26	38
1995	394	337	-57	230	280	50	489	570	81	-7	88	31
1996	236	284	-2	234	235	1	499	579	80	49	31	29
1997	261	253	-8	241	239	-2	509	590	81	40	41	33
1998	276	212	-64	247	293	46	519	600	81	-13	94	30
1999	239	139	-100	253	307	54	528	609	81	-46	127	27
2000	338	229	-109	262	315	53	539	619	80	-56	136	27
2001	353	273	-80	262	322	60	548	628	80	-20	100	20
2002	362	275	-87	259	332	73	556	637	81	-14	95	3
2003	337	303	-34	267	339	72	566	646	80	38	42	3
2004	284	258	-26	269	348	79	575	655	80	53	27	1
2005	297	269	-28	270	345	75	583	663	80	-13	93	5
2006	287	287	0	272	350	78	592	672	80	78	2	2
2007	288	288	0	273	354	81	600	680	80	81	-1	-1
2008	287	287	0	277	361	84	603	687	84	84	0	0
2009	288	299	11	274	365	91	610	696	86	91	-5	-5
2010	237	237	0	285	373	88	617	703	86	88	-2	-2
Totals:												
1981-1995	3,625	4,958	1,333	2,952	3,516	564	7,297	8,280	983	1,897	-914	419
1981-2010	8,145	8,340	195	6,897	8,490	1,593	13,741	17,944	2,203	2,337	-134	601

Note: The figures in Appendix I have been deflated to constant 1980/81 dollars in order to construct the tables in this Appendix. This involves simply removing from the NZED figures the effect of their assumed inflation rates, namely 15% 1981/82, 12.5% 1982/83, 10% 1983/84, 7.5% 1984/85, and 5% thereafter.

TABLE 111.2

Cumulative Capital Expenditures, Cumulative Depreciation, and Net Value of Investments
\$ million, 1980/81 prices

Year to March of:	(1) -----	(2) +0GwH case	(3) -----	(4) -----	(5) -----	(6) +5,000GwH case	(7) -----	(8) -----
	Cumulative capital expenditure	Depreciation @ 2½ % on gross capital	Accumulat- ed deprec- iation	Net value of investments	Cumulative capital expenditure	Depreciation @ 2½ %	Accumulat- ed deprec- iation	Net value of investments
1981	300	-	-	300	300	-	-	300
1982	578	8	8	570	668	8	8	660
1983	812	15	22	790	991	17	24	967
1984	1,024	20	42	982	1,280	25	49	1,231
1985	1,270	26	68	1,202	1,570	32	81	1,489
1986	1,504	32	100	1,404	1,874	39	120	1,754
1987	1,758	38	137	1,621	2,237	47	167	2,070
1988	2,031	44	181	1,850	2,622	56	223	2,399
1989	2,254	51	232	2,022	3,034	66	289	2,745
1990	2,418	57	288	2,130	3,386	76	364	3,022
1991	2,561	61	349	2,212	3,717	85	449	3,268
1992	2,716	64	413	2,303	4,040	93	542	3,498
1993	2,915	68	481	2,434	4,293	101	643	3,650
1994	3,231	73	554	2,677	4,621	107	750	3,871
1995	3,625	81	634	2,991	4,958	116	866	4,092
1996	3,911	91	725	3,186	5,242	124	990	4,252
1997	4,172	98	823	3,349	5,495	131	1,121	4,374
1998	4,448	104	927	3,521	5,707	137	1,258	4,449
1999	4,737	111	1,038	3,699	5,896	143	1,401	4,495
2000	5,075	118	1,157	3,918	6,125	147	1,548	4,577
2001	5,428	127	1,284	4,144	6,398	153	1,701	4,697
2002	5,790	136	1,419	4,371	6,673	160	1,861	4,812
2003	6,127	145	1,564	4,563	6,976	167	2,028	4,948
2004	6,411	153	1,717	4,694	7,234	174	2,203	5,031
2005	6,708	160	1,877	4,831	7,443	181	2,383	5,060
2006	6,995	168	2,045	4,950	7,730	186	2,570	5,160
2007	7,283	175	2,220	5,063	8,018	193	2,763	5,255
2008	7,570	182	2,402	5,168	8,305	201	2,963	5,342
2009	7,858	189	2,591	5,267	8,593	208	3,171	5,422
2010	8,145	197	2,788	5,357	8,880	215	3,386	5,494

TABLE III.2 cont.

Year to March of:	(9) ----- Difference between +0 ----- Cumulative capital expenditure	(10) and +5,000 cases Accumulated depreciation	(11) ----- Net value of investments
1981	0	0	0
1982	90	0	90
1983	179	2	177
1984	256	7	249
1985	300	13	287
1986	370	20	350
1987	479	30	449
1988	591	42	549
1989	780	57	723
1990	968	76	892
1991	1,156	100	1,056
1992	1,324	129	1,195
1993	1,378	162	1,216
1994	1,390	196	1,194
1995	1,333	232	1,101
1996	1,331	265	1,066
1997	1,323	298	1,025
1998	1,259	331	928
1999	1,159	363	796
2000	1,050	391	659
2001	970	417	553
2002	883	442	441
2003	849	464	385
2004	823	486	337
2005	735	506	229
2006	735	525	210
2007	735	543	192
2008	735	561	174
2009	735	580	155
2010	735	598	137

TABLE III.3

Data for Commercial Project Evaluation Exercise

Year to March of:	(1)	(2)	(3)	(4)	(5)	(6)
	----- 30-year series -----			----- 15-year series -----		
	0 discount	5% discount	10% discount	0 discount	5% discount	10% discount
1981	0	0	0	0	0	0
1982	-90	-86	-82	-90	-86	-82
1983	-89	-81	-74	-89	-81	-74
1984	-63	-54	-47	-63	-54	-47
1985	-6	-5	-4	-6	-5	-4
1986	-26	-20	-16	-26	-20	-16
1987	-72	-54	-41	-72	-54	-41
1988	-89	-63	-46	-89	-63	-46
1989	-136	-92	-63	-136	-92	-63
1990	-150	-97	-64	-150	-97	-64
1991	-151	-93	-58	-151	-93	-58
1992	-138	-81	-48	-138	-81	-48
1993	-18	-11	-6	-18	-11	-6
1994	26	14	8	26	14	8
1995	88	44	23	1,189	601	313
1996	31	15	7			
1997	41	19	9			
1998	94	41	19			
1999	127	53	23			
2000	136	54	22			
2001	100	38	15			
2002	95	36	13			
2003	42	15	5			
2004	27	9	3			
2005	93	30	9			
2006	2	1	0			
2007	-1	0	0			
2008	0	0	0			
2009	-5	-1	0			
2010	135	34	9			
Total Net Present Value in 1980/81	3	-335	-384	187	-122	-228

The net benefit streams in this table are column 11 of Table III.1 adjusted for end-of-period net value of investments from Table III.2.