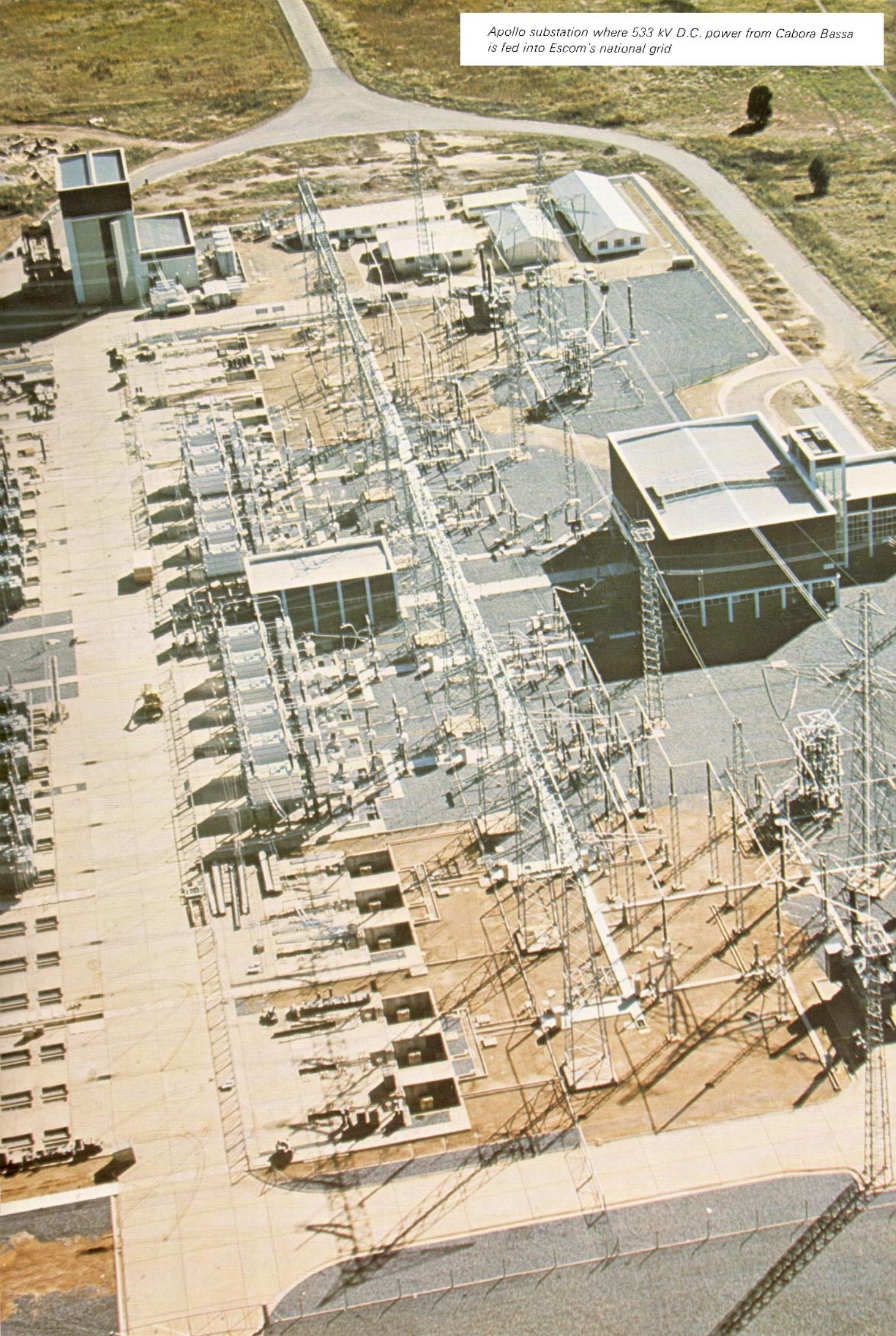


Apollo substation where 533 kV D.C. power from Cabora Bassa is fed into Escom's national grid

Electricity Supply Commission

Escom Centre, 204 Smit Street, Johannesburg

The Minister of
Economic Affairs
House of Parliament
Cape Town
12 April 1977

Sir,

As required by Section 19 of the Electricity Act, 1958, the Commission has the honour to present its fifty-fourth Annual Report and Financial Statements covering its work for the financial year ended 31 December 1976.

Members of Commission and Management

Members of the Electricity Supply Commission

Dr. R. L. Straszacker, *Chairman*

Dr. A. J. du Toit

D. J. Malan

E. Pavitt

H. H. L. Abrahamse

A. Anson Lloyd (until 23/8/1976)

Jan H. Smith

Dr. H. J. J. Reynders (from 9/11/1976)

Members of the Management Committee

General Manager
Jan H. Smith
Pr. Eng., M.A.(Oxon), B.Sc.(Oxon), B.Sc.(Eng.)(C.T.)

Assistant General Manager
I. D. van der Walt
Pr.Eng., B.Sc.(Mech.Eng.), B.Sc.(Elec.Eng.)(Witwatersrand)

Senior Manager (Operations)
F. W. Stutterheim (until 13/6/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand) (Retired)

E. E. Robinson (from 14/6/1976 until 11/10/1976)
Pr.Eng. (Retired)

I. C. McRae (from 12/10/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand), C.Eng.

Senior Manager (New Works)
N. T. van der Walt
Pr.Eng., M.Sc.(Eng.)(Witwatersrand)

Financial Manager
R. S. Bryant (until 2/8/1976)
C.I.S. (Retired)
L. Te Groen (from 3/8/1976)
C.A.(S.A.), B.Comm., C.W.A.

Commercial Manager
A. J. Levy
Pr.Eng., B.Sc.(Eng.)(Witwatersrand)

Administrative Manager and Chief Legal Adviser
P. J. T. Oosthuizen
B.A., LLB.(U.O.F.S.)

Production Assets Manager
J. L. Rothman
Pr.Eng., B.Sc., B.Sc.(Eng.)(Stellenbosch)

Personnel Manager
J. L. van der Walt
Pr.Eng., B.Sc.(Eng.)(Witwatersrand), B.Admin. (UNISA)

Managers of the Commission's Undertakings

Border, Cape Eastern and Orange River
F. O. Pearce (until 31/5/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand) (Retired)
E. F. Otten (from 1/6/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand)

Cape Northern
J. P. Rodger
Pr.Eng., B.Sc.(Eng.)(Cape Town)

Cape Western
G. D. G. Davidson (until 2/4/1976)
Pr.Eng., M.Sc.(Tech) (Manchester), B.Sc.(Eng.) (Witwatersrand) (Retired)
R. P. A. Myburgh (from 3/4/1976)
Pr.Eng., B.Sc.(Eng.) (Cape Town)

Central Generating
I. C. McRae (until 14/4/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand), C.Eng.
M. W. Walter (from 15/4/1976)
Pr.Eng., B.Sc.(Eng.)(Natal)

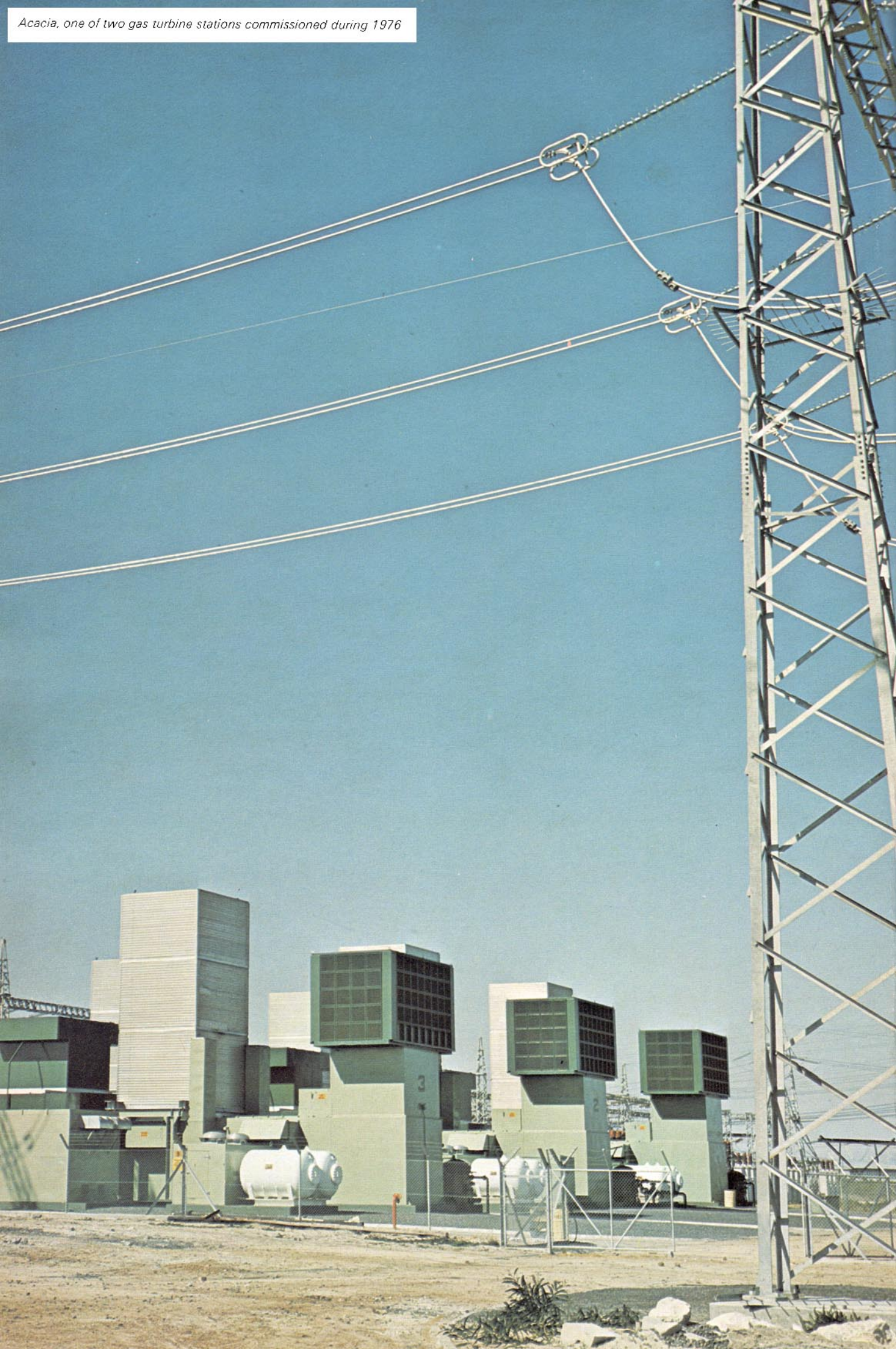
Eastern Transvaal
T. P. O'Connor
Pr.Eng., B.Sc.(Eng.)(Natal)

Natal
H. P. Alexander (until 18/2/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand) (Retired)
H. E. Wohlberg (from 19/2/1976)
Pr.Eng., B.Sc.(Eng.)(Stellenbosch)

Rand and Orange Free State
J. H. Harden (until 29/4/1976)
Pr.Eng., B.Sc.(Eng.)(Witwatersrand) (Deceased)
F. J. W. Barnard (from 1/6/1976)
Pr.Eng., B.Sc.(Eng.)(Stellenbosch), M.B.L.(UNISA)

Swawek
J. P. Brand
Pr.Eng., M.Sc.(Eng.)(Cape Town)

Contents



Acacia, one of two gas turbine stations commissioned during 1976

The year in brief

Electricity supplied

With sales of 63 356 GWh in 1976, the rate of growth of 9,5 per cent was only slightly below the rate of 10,0 per cent achieved in 1975. The 1976 achievement means that despite an acknowledged reduction in the annual rate of growth of the South African economy as a whole, Escom's annual sales have forthe eighth successive year increased by more than nine per cent.

The demand on the integrated system reached a peak of 10 085 MW on 23 June 1976. The total sent-out capacity of power stations in commercial service at that date was 11 461 MW. This meant that a reserve margin of 13,6 per cent was available under peak load conditions, which, while an improvement on the 1975 margin of 11 per cent, fell short of the 17 per cent margin which is considered the minimum in the long term for reliability of supply. For the year as a whole, the overall plant load factor, gas turbine generating plant being excluded from the calculation, reached 67,4 per cent—a figure not far below the record of 68,6 per cent attained the previous year.

Revenue and cost

Against a total revenue of R656,4 million, representing an increase of 42,7 per cent above the previous year, the costs incurred amounted to R656,3 million resulting in a small surplus. The average price per kWh sold increased by 30,3 per cent from 0,795 cents a kWh in 1975 to 1,036 cents a kWh in 1976. The average cost per kWh sold in 1976 was 23,0 per cent above the 0,842 cents a kWh recorded in 1975.

Capital expenditure

Severe escalation of costs continued during the year under review. The cost of fuel per kWh sold, having increased 19,4 per cent in 1974 and 39,3 per cent in 1975, escalated a further 34,1 per cent in 1976. An additional influence on price levels was the need to increase internal financing of the substantial capital requirements. The capital expenditure for 1976 reached R643 million (R426 million in 1975).

Electricity imports

As in the preceding year, the shortfall of generating plant reserve experienced in 1976 was due largely to the planned power imports from the Cabora Bassa hydro-electric scheme in Mozambique not materialising. The delay has, to some extent, been due to a comprehensive pre-contractual programme of testing. Regular supplies on a contractual basis are now expected during the first half of 1977.

The first 500 MW generating set was commissioned in May 1976 in the new Kriel power station, a station planned for an ultimate installed capacity of six 500 MW sets.

Gas turbine stations

The first gas turbine generating set in the system was placed in service at the new Acacia power station, Cape Town, in May 1976. The set has a generating capacity of 57 MW. Acacia power station was brought to its full installed capacity of 171 MW when the third set went into service in July 1976. Port Rex, a second gas turbine power station identical to Acacia, went into service in East London in October 1976. With the completion of these two new power stations, valuable generating capacity has been acquired for peak load and reserve duty. The value of this generating capacity has already been confirmed by Acacia during the winter months.

Hydro-electric stations

The ultimate phase of construction at Hendrik Verwoerd power station, the first large hydro-electric station, was completed in March 1976 when the fourth 80 MW generating set went into commercial service. By September 1976, the wall of the new P.K. le Roux Dam, some 120 km downstream, had been sealed, and impounding commenced. By the end of the year, commissioning of the first 110 MW hydro-electric generating set in the new Vanderkloof power station at this dam was well advanced. The station is planned to reach its full installed capacity of 220 MW in March 1977 when the second set goes into commercial service. The Hendrik Verwoerd and Vanderkloof power stations, of the conventional dam storage type, have vertical-shaft Francis turbines. The next phase in the introduction of large hydro-electric plant will be the planned commissioning in 1980-81 of four 250 MW reversible pump-turbine motor-generator units in the Drakensberg pumped storage station, Escom's first station of this type.

Nuclear power

Following a full assessment of the final three tenders submitted, a contract was signed in August for the design, construction, and commissioning of two nuclear generating sets each with nett electrical output capability of 922 MW, complete with ancillary plant and buildings, constituting virtually a complete nuclear power station. The nuclear steam supply systems of the two generating sets will employ light water reactors of the pressurised-water type. The two generating sets are scheduled for commissioning by the end of December 1982 and 1983 respectively.

Statistical highlights

Operating statistics for the year

The power stations operated by Escom produced 88,9 per cent of all electricity generated in the Republic of South Africa in 1976.

Maximum one-hour simultaneous demand on total interconnected system (23 June 1976)	10 085 MW
Total electricity sold	63 356 GWh
Total coal burnt	37 257 351 metric tons
Total water consumed	190 929 megalitres

Plant in service at 31 December 1976

Total nominal generating capacity:

190 boilers with a total steam-raising output of 13 397 kg/s
142 turbo-generators with a total power output of 12 443,5 MW

Major overhead transmission lines:

Direct current:

533 kV (monopolar)	1 030 km

Alternating current:

400 kV	5 861 km
275 kV	4 804 km
220 kV	761 km
132 kV	10 839 km
88 kV and below	71 008 km

Underground cables:

132 kV	16 km
33-88 kV	316 km
22 kV and under	5 828 km
Capacity of transformers	78 966 MVA

Financial

Total revenue for the year	R656 381 000
Total expenditure for the year	R656 322 000
Total capital investment in commercial operation at 31 December 1976	R2 311 725 000
Average cost per kWh sold	1,036 cents
Average price per kWh sold	1,036 cents

Staff – total employed at 31 December 1976

Whites	13 503
Non-whites	23 412

Commercial

Sales of electricity

Total sales of electricity for the year 1976 reached 63 356 GWh, an increase of 9,5 per cent over the total sales in the preceding year (10,0 per cent in 1975). The year 1976 thus becomes the eighth successive year in which the sales of the preceding year are exceeded by more than 9 per cent.

The sales to the various categories of consumers, and to the different sectors within some of these categories, are indicated in Tables 1 to 4 for the years 1971 to 1976.

In 1976, sales to the mining industry showed an increase of 7,5 per cent (3,0 per cent in 1975), a rate slightly above the average experienced during the past five years. As shown in Table 3, this was due to a revival of sales to the gold sector. Table 3 shows moreover that considerable growth was experienced also in the coal mining sector. The percentage increase of sales in the major categories of bulk supplies and industrial supplies was less in 1976 than the yearly average for the past five years. In absolute terms, however, the 1976 rates of growth experienced in the bulk and industrial categories were vigorous compared with the rate of 7,5 per cent for mining sales. The dominant role in the total sales picture, taken over from mining in 1975 by the bulk and industrial categories, was thus consolidated by the sales results of 1976.

Table 5 indicates the total sales of electricity in each of Escom's distribution undertakings for the six years 1971 to 1976. The Rand and O.F.S. Undertaking alone accounted for 58,8 per cent of the total sales (58,6 per cent in 1975), with a growth rate during the year of 9,8 per cent (8,9 per cent in 1975). The Natal Undertaking showed a rate of growth of 8,3 per cent (7,8 per cent in 1975). The Cape Northern Undertaking sales increased by 12,5 per cent, a rate well above the figure of 10,6 per cent attained in 1975. Sales in the Border Undertaking increased by 12,9 per cent, a rate appreciably higher than the figure of 8,5 per cent recorded in 1975. The remaining distribution undertakings showed diminished rates of growth in 1976 compared with the growth achieved in 1975. The rates of growth of the sales in the individual distribution undertakings are discussed in detail in a later section of this report.

Progress with rural electrification depends upon the proximity of farming schemes to the main distribution networks. The extension charges covering the capital cost of connecting such schemes to the network are frequently unacceptable to farmers unless their use of electricity embraces much more than domestic comforts only. Although severe increases in the price of petroleum fuels have in recent years tended to discourage farmers from generating their own electricity, Escom has also not been immune to inflation, which has seriously affected not only its operating costs but also its capital costs. Consequently, many of the additional supplies provided during the year were either to consumers previously connected or to new consumers in the vicinity of previously established rural schemes. Notwithstanding the problems as a result of inflation, a total of 2 614 new farming supplies were provided, as indicated in Table 6, an increase during the year of 8,2 per cent (9,4 per cent in 1975).

Table 1
Sales of electricity to categories of consumers

Category of supply	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
	Millions of kWh (GWh)							
Bulk supplies	9 265	10 716	12 751	15 522	18 055	**20 096**	11,3	16,7
Direct supplies:								
Domestic and street lighting	918	1 001	1 106	909	1 014	**1 132**	11,6	4,3
Industrial	11 014	12 641	14 026	16 105	18 049	**19 907**	10,3	12,6
Mining	14 227	14 509	15 800	16 941	17 444	**18 746**	7,5	5,7
Traction	2 616	2 782	2 895	3 108	3 307	**3 475**	5,1	5,8
Total	38 040	41 649	46 578	52 585	57 869	**63 356**	9,5	10,7
	Per cent of total							
Bulk supplies	24,3	25,7	27,4	29,5	31,2	**31,7**		
Direct supplies:								
Domestic and street lighting	2,4	2,4	2,4	1,7	1,8	**1,8**		
Industrial	29,0	30,4	30,1	30,7	31,2	**31,4**		
Mining	37,4	34,8	33,9	32,2	30,1	**29,6**		
Traction	6,9	6,7	6,2	5,9	5,7	**5,5**		
Total	100,0	100,0	100,0	100,0	100,0	**100,0**		

Table 2
Sales of electricity to neighbouring territories, GWh

Neighbouring territories	1971	1972	1973	1974	1975	**1976**
Lesotho	12,2	16,6	19,7	26,2	31,4	**41,9**
Mozambique	0,8	15,5	151,2	215,5	203,1	**216,5**
Rhodesia	—	—	—	4,8	9,6	**10,8**
Swaziland	—	—	8,4	19,1	38,6	**48,1**
Transkei	—	—	—	—	—	***9,2**
Total	13,0	32,1	179,3	265,6	282,7	**326,5**

*Sales since date of independence 26 October 1976.

Table 3
Sales of electricity to sectors of the mining industry, GWh

Mining category	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
Antimony	39	35	42	51	53	**61**	15,1	9,4
Asbestos	152	161	168	193	238	**266**	11,8	11,8
Chrome	25	31	33	52	42	**61**	45,2	19,5
Coal	563	589	620	648	705	**812**	15,2	7,6
Copper	374	422	565	653	679	**728**	7,2	14,2
Diamonds	297	325	334	338	346	**343**	−0,9	2,9
Gold	11 662	11 773	12 263	12 803	13 108	**13 918**	6,2	3,6
Iron	78	78	86	104	121	**180**	48,8	18,2
Manganese	14	23	27	30	37	**49**	32,4	28,5
Platinum	962	990	1 581	1 978	2 001	**2 184**	9,1	17,8
Other	61	82	81	91	114	**144**	26,3	18,7
Total	14 227	14 509	15 800	16 941	17 444	**18 746**	7,5	5,7

Table 4
Sales of electricity to sectors of industry, GWh

Sector of industry	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
Building cement and quarrying	824	878	1 096	1 148	1 115	**1 068**	−4,2	5,3
Chemical	1 444	1 639	1 921	2 160	2 382	**2 655**	11,5	13,0
Engineering, iron, steel and base metals	5 652	6 863	7 687	8 835	10 180	**11 173**	9,8	14,6
Foodstuffs, consumer goods, commercial, and other	2 600	2 741	2 747	3 359	3 790	**4 350**	14,8	10,8
Paper and paper products	494	520	575	603	583	**661**	13,4	6,0
Total	11 014	12 641	14 026	16 105	18 050	**19 907**	10,3	12,6

Table 5
Total sales of electricity in Escom distribution undertakings, GWh

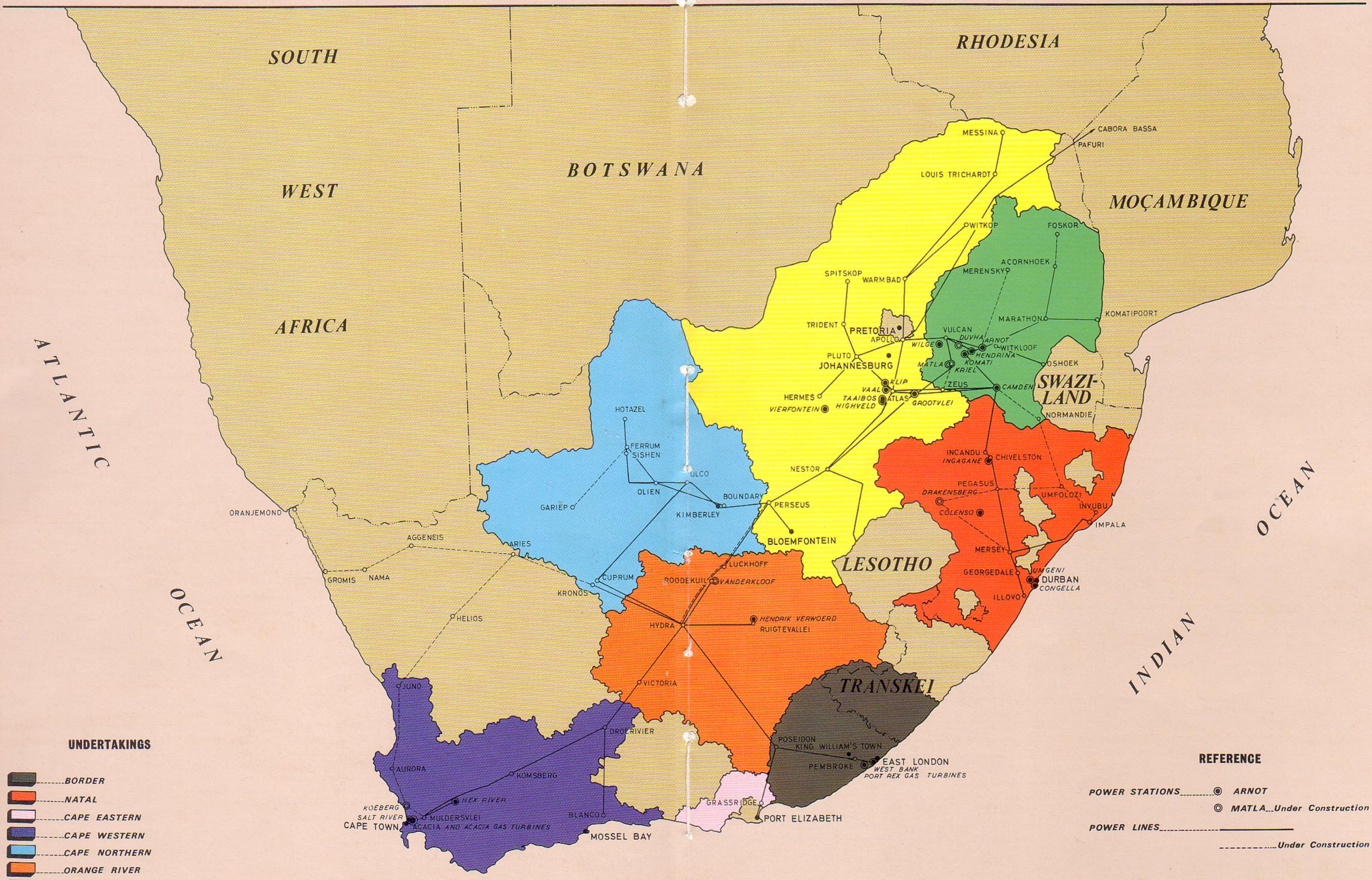
Undertaking	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
Border	400	448	504	551	598	**675**	12,9	11,0
Cape Eastern	7	8	9	11	13	**14**	5,2	14,7
Cape Northern	790	896	1 060	1 211	1 340	**1 507**	12,5	13,8
Cape Western	2 494	2 771	3 149	3 852	4 656	**4 930**	5,9	14,6
Eastern Transvaal	4 562	5 235	6 098	6 527	7 267	**8 028**	10,5	12,0
Natal	6 072	6 938	7 581	8 500	9 166	**9 931**	8,3	10,3
Orange River	95	144	239	786	915	**1 035**	13,1	61,2
Rand and O.F.S.	23 620	25 209	27 938	31 147	33 914	**37 236**	9,8	9,5
Total	38 040	41 649	46 578	52 585	57 869	**63 356**	9,5	10,7

Table 6
Total number of farm supplies at the year end

Undertaking	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
Border	642	688	716	773	805	**864**	7,3	6,1
Cape Eastern	387	388	432	475	511	**525**	2,7	2,7
Cape Northern	1 777	2 033	2 130	2 240	2 336	**2 497**	6,9	7,0
Cape Western	5 805	6 071	6 389	6 772	7 533	**7 959**	5,7	6,5
Eastern Transvaal	2 717	3 187	3 634	4 080	4 474	**4 864**	8,7	12,4
Natal	4 140	4 652	5 080	5 578	6 150	**6 752**	9,8	10,3
Orange River	4	25	73	137	173	**197**	13,9	*
Rand and O.F.S.	6 719	7 570	8 398	9 248	10 065	**11 003**	9,3	10,4
Total	22 191	24 614	26 852	29 303	32 047	**34 661**	8,2	9,3

*Growth rate not meaningful.

ESCOM MAP SHOWING UNDERTAKINGS AND NATIONAL GRID



UNDERTAKINGS

- BORDER
- NATAL
- CAPE EASTERN
- CAPE WESTERN
- CAPE NORTHERN
- ORANGE RIVER
- EASTERN TRANSVAAL
- RAND AND ORANGE FREE STATE

REFERENCE

POWER STATIONS ◉ ARNOT
◎ MATLA...Under Construction

POWER LINES ——————
- - - - - - - - - - Under Construction

100 50 0 100 200 300 400 KILOMETRES

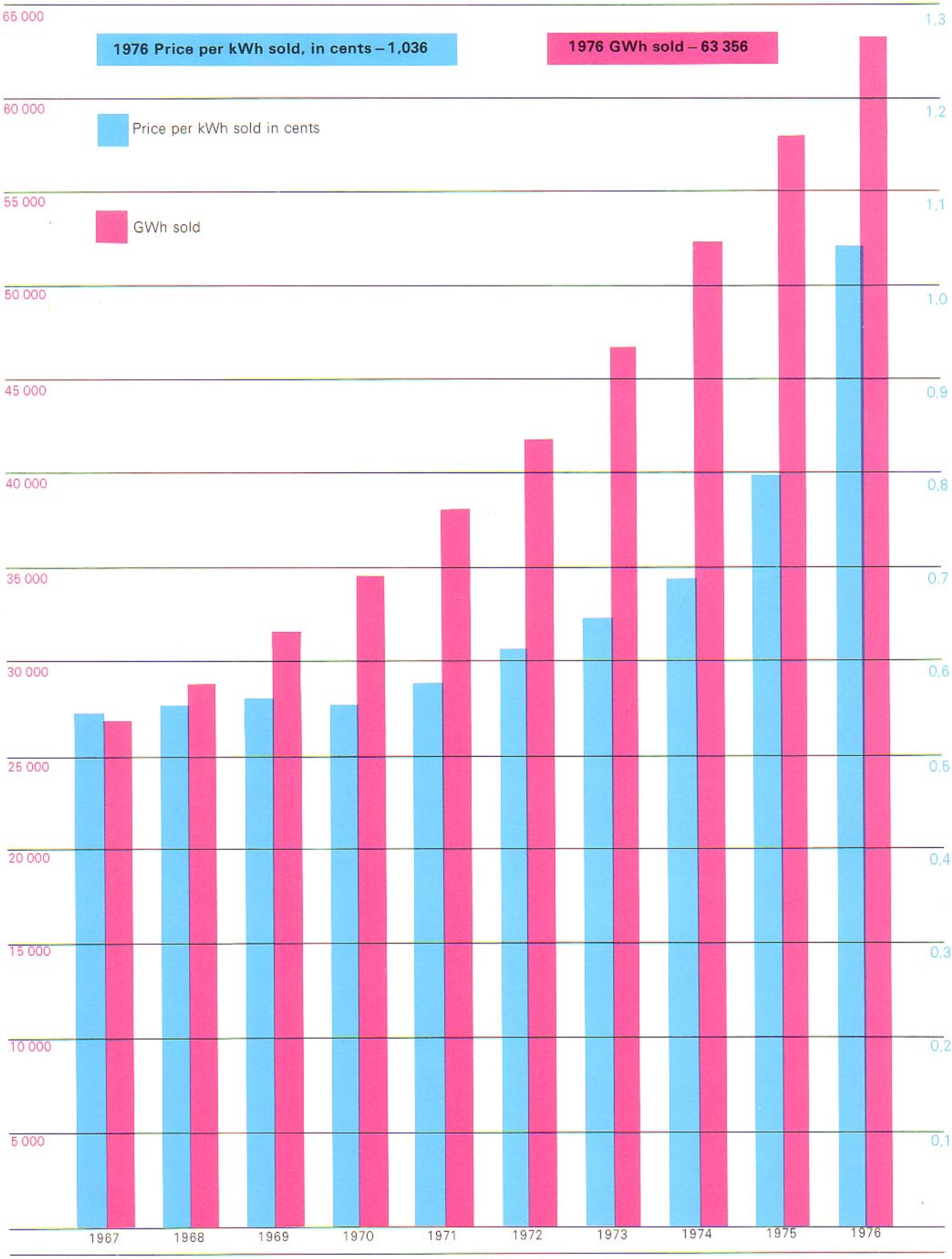
Tariffs

The continued escalation of costs in 1976, and the need to raise more of the capital requirements by internal financing, made a further rise in the price of electricity unavoidable. Two tariff increases were imposed in all the distribution undertakings during the year: an increase of approximately 15 per cent from April 1976 and a further increase of about 13 per cent from September 1976. The decision to introduce the tariff increase for 1976 in two steps was taken in accordance with the general campaign to combat inflation and is aimed at distributing the impact of the increase over a period.

Amended tariffs incorporating the increase of 13 per cent were introduced in September 1976, with initial discounts of 25 per cent in the Border, Cape Western, Natal and Orange River Undertakings, and an initial discount of $2\frac{1}{2}$ per cent in the Cape Eastern Undertaking. A further increase of 25 per cent has been announced, to take effect in all the distribution undertakings from January 1977.

The upward adjustments applicable to the different distribution undertakings are indicated in Table 7. The surcharges or discounts are applicable only to the standard tariff charges, and not to extension charges and other fixed contractual payments.

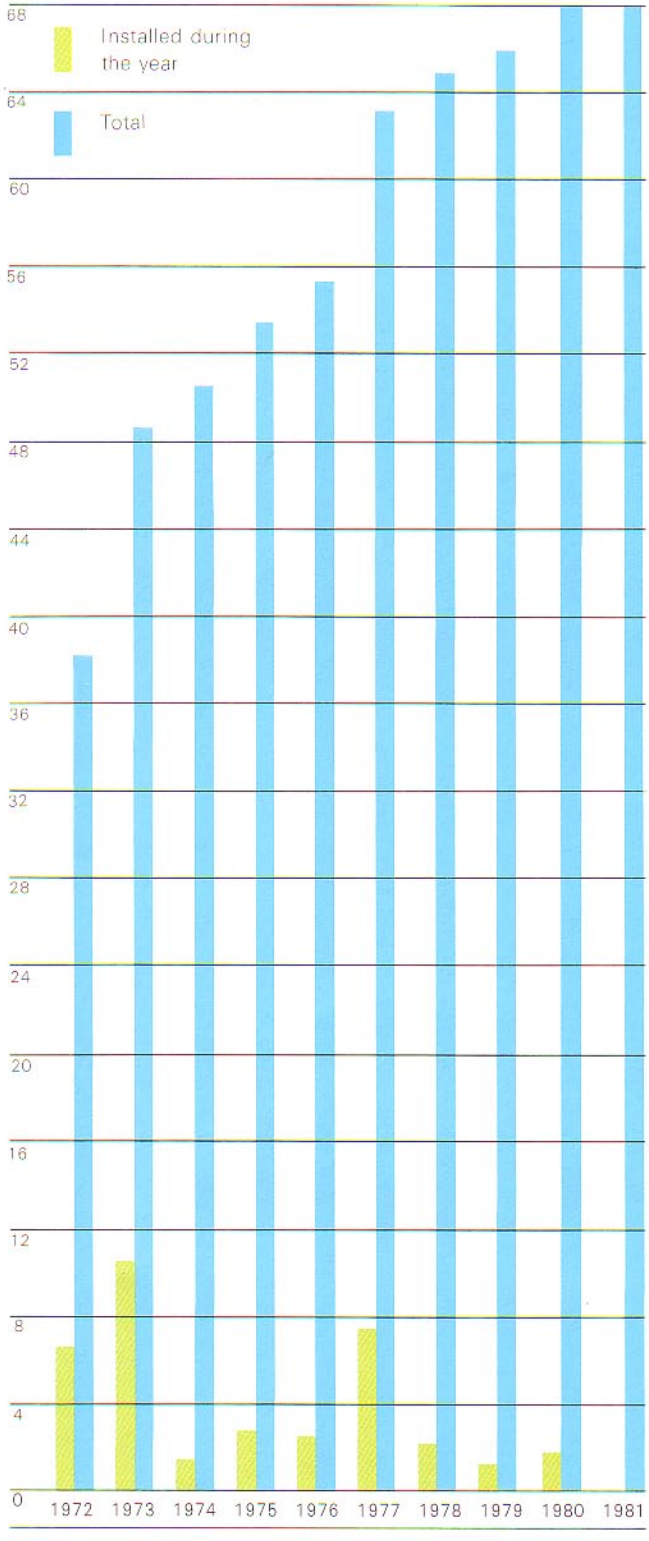
Electricity sales



Expansion of Escom's transmission system

275 and 220 kV lines, km			Planned		
1972	0650,2	3825,7	1977	741,9	6306,8
1973	1068,5	4894,2	1978	191,9	6498,7
1974	0161,6	5055,8	1979	124,6	6623,3
1975	0284,6	5340,4	1980	167,0	6790,3
1976	0224,5	5564,9	1981	—	6790,3

72 Hundreds of kilometres



400 kV lines, km			Planned		
1972	771,1	3274,5	1977	0487,0	6347,8
1973	922,2	4196,7	1978	1128,0	7475,8
1974	842,8	5039,5	1979	0238,0	7713,8
1975	059,3	5098,8	1980	0396,0	8109,8
1976	762,0	5860,8	1981	0090,0	8199,8

84 Hundreds of kilometres

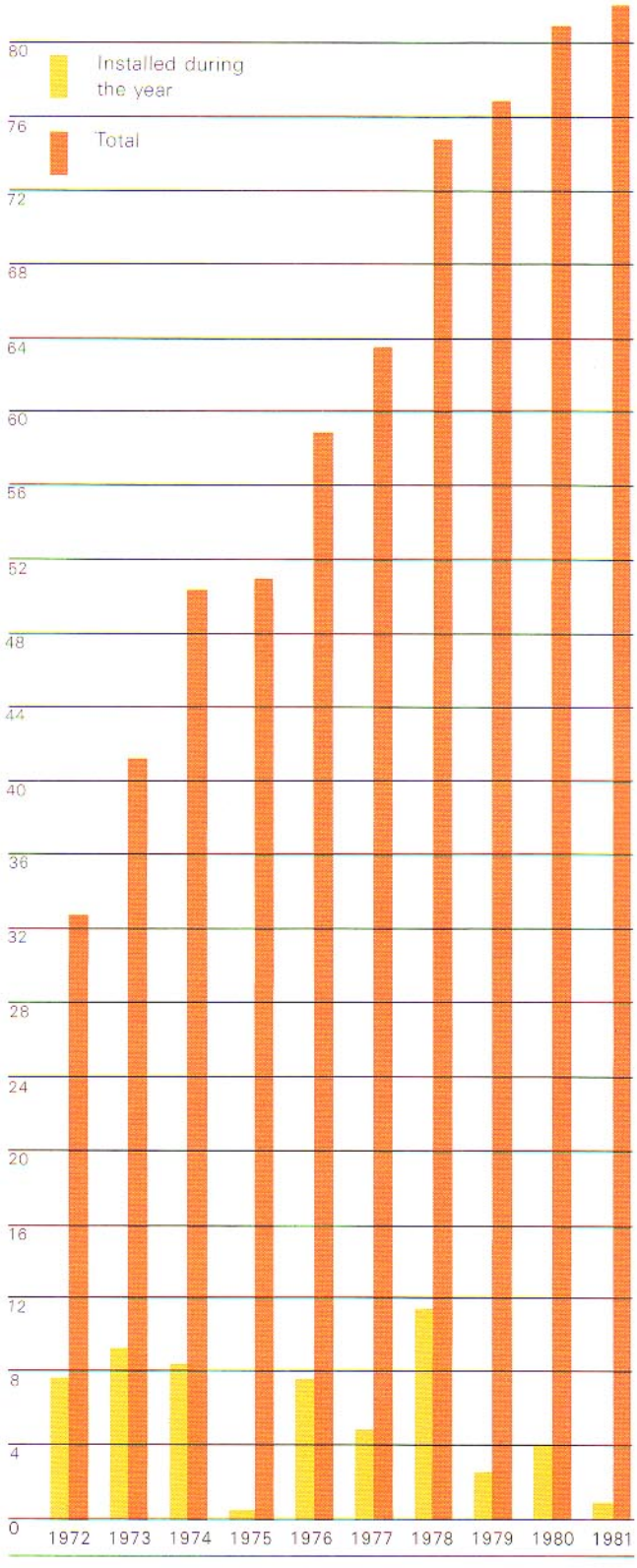


Table 7
Surcharges and discounts on standard tariffs in the distribution undertakings

Distribution undertaking	Discount or surcharge applicable January 1976, per cent	Surcharge from April 1976, per cent	Surcharge/discount from September 1976, per cent	Discount or surcharge applicable from January 1977, per cent
Border	Surcharge 30	50	(70) −25*	Discount 5
Cape Eastern	Surcharge 40	60	(80) −2½*	Surcharge 22½
Cape Northern	Surcharge 7½	22½	40	Surcharge 75
Cape Western	Surcharge 22½	40	(60) −25*	Discount 5
Eastern Transvaal	Discount 7½	5	20	Surcharge 47½
Natal	Surcharge 25	42½	(62½) −25*	Discount 5
Orange River	Surcharge 40	60	(80) −25*	Discount 5
Rand & O.F.S.	Surcharge 2	17½	32½	Surcharge 65

*Tariffs incorporating the proposed surcharges shown in brackets were replaced by amended tariffs with initial discounts.

Operations

The difficulties experienced in 1975 as a consequence of the failure to receive supplies on a regular contractual basis from the Cabora Bassa hydro-electric scheme persisted through the year 1976. The availability of additional reserve generating capacity, as a result of the installation of new gas turbine generating plant, helped to improve matters: the reserve margin at the time of the integrated peak demand was 13,6 per cent, compared with the 1975 margin of 11 per cent.

As in 1975, it was necessary in 1976 to retain a relatively high load on the low-merit generating plant having a higher operating cost per kWh sent out. The steady reduction of generation at the non-pithead coal power stations in the coastal provinces—a trend maintained until 1974—could again not be achieved in 1976. Thus 30,9 per cent of the Cape Western Undertaking's electricity needs had to be sent out from the local power stations burning coal railed from remote collieries (27,2 per cent in 1975). The corresponding percentages were 43,9 per cent for the Border Undertaking (42,0 per cent in 1975) and 16,0 per cent for the Natal Undertaking (12,0 per cent in 1975).

Generation of electricity

Statement No. 4 in the appendix is a tabulation of the principal operating statistics of the power stations for the year 1976. The total generation in all power stations for the year was 70 287,1 GWh, which exceeds the corresponding figure for 1975 by 7,3 per cent. During 1975, the corresponding increase was 9,5 per cent. The

reason for the reduced percentage growth of Escom's own generation, during a year in which vigorous growth of sales continued, was a substantial increase in the supplies received from Cabora Bassa. As in 1975, however, the Cabora Bassa supplies were throughout 1976 on a pre-contractual, non-firm basis. The sudden cessation of these supplies was frequently a source of embarrassment to the Operations Department, requiring the provision of alternative generating capability at short notice. The substantial increase during 1976 of electricity purchases, due predominantly to the increased supplies from Cabora Bassa, is shown in Table 8.

It can be seen from Table 9 that the hourly maximum demand in 1976 on the interconnected system was 10 085 MW. In comparison with the maximum of 9 185 MW reached in the preceding year, the increase in 1976 was 9,8 per cent (7,4 per cent in 1975). To cope with the increase of 9,8 per cent in demand, there was an increase of 12,5 per cent in the sent-out rating of generating capacity in operation at the time of peak demand from 10 192 MW in 1975 to 11 461 MW in 1976.

Plant performance and maintenance

The system load factor for 1976, calculated on the total energy sent out to all consumers and the one-hour simultaneous peak demand, was 76,1 per cent. Compared with electric utilities in other countries, this is a high yearly system load factor, and is indicative of the sustained demand on the power stations throughout the year.

Table 8
Source and destination of Escom's supplies of electricity, GWh
(consumption of power station auxiliaries excluded)

	1971	1972	1973	1974	1975	**1976**
Sent out from Escom power stations	40 739,3	44 475,1	49 759,1	56 251,2	61 498,4	**66 188,2**
Purchased (see Statement No. 2)	8,3	9,7	11,3	7,9	34,9	**1 225,5**
Total supplies sent out	40 747,6	44 484,8	49 770,4	56 259,1	61 533,3	**67 413,7**
Supplied to undertakings:						
Border	408,0	462,1	520,2	594,3	648,2	**734,0**
Cape Eastern	8,3	9,7	11,3	13,1	18,5	**20,7**
Cape Northern	879,9	999,8	1 182,6	1 345,9	1 494,9	**1 674,6**
Cape Western	2 755,7	3 078,8	3 495,8	4 241,3	5 098,6	**5 402,8**
Eastern Transvaal	4 687,2	5 438,8	6 205,4	6 679,0	7 309,6	**8 122,1**
Natal	6 407,6	7 370,2	8 041,1	9 087,1	9 671,5	**10 471,1**
Orange River	101,8	156,8	257,8	822,3	968,3	**1 086,1**
Rand and O.F.S.	25 499,1	26 959,4	30 036,2	33 459,3	36 304,4	**39 902,3**
Central Generating Undertaking: own consumption	—	9,2	20,0	16,8	19,3	*—
Total supplied	40 747,6	44 484,8	49 770,4	56 259,1	61 533,3	**67 413,7**
Percentage increase (+) compared with previous year	9,16	9,17	11,88	13,04	9,37	**9,56**

*Extraneous supplies, such as river pumps, townships, workshops, etc., previously regarded as Central Generating Undertaking's own consumption, are now included in the distribution undertakings' supplies and treated as sales to Central Generating Undertaking.

Capacity of the Republic's Power Stations, MW

1972	1973	1974	1975	1976		1977	1978	1979	1980	1981
538	590	550	550	1 202		1 538	393	2 800	1 450	1 950
9 551	10 141	10 691	11 241	12 443		13 981	14 374	17 174	18 624	20 574
12 556	13 109	13 622	14 134	15 344		16 830	17 311	20 173	21 681	23 639

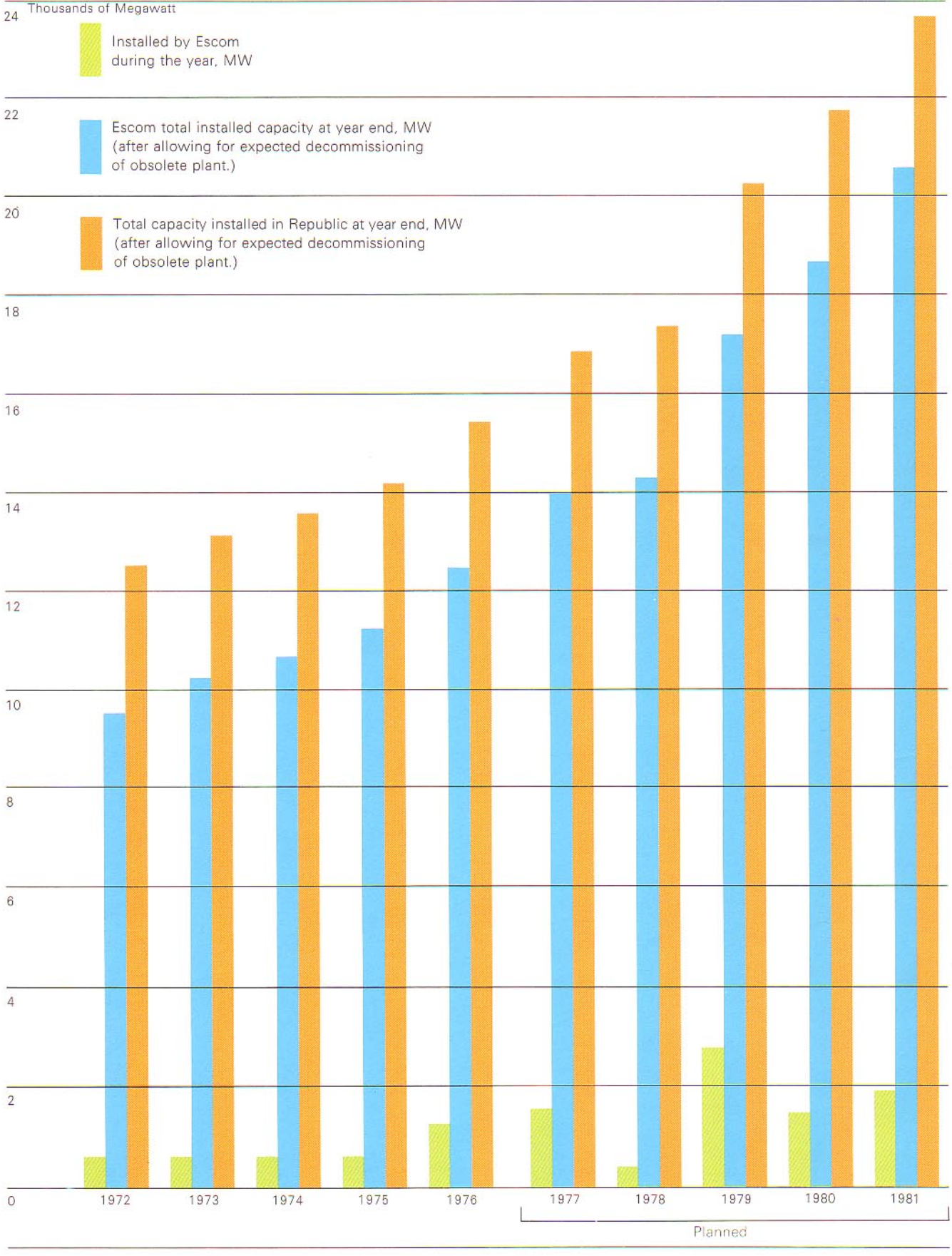


Table 9
Demand in each undertaking at the time of maximum demand on total Escom system, megawatts

Undertaking	Year	1967	1968	1969	1970	1971	1972	1973	1974	1975	**1976**
	Time	11h00	12h00	09h00	12h00	09h00	10h00	19h00	09h00	09h00	**09h00**
	Date	14/7/67	13/6/68	25/7/69	16/7/70	17/6/71	1/8/72	13/7/73	4/9/74	24/7/75	**23/6/76**
Border		52,6	63,1	59,0	69,0	74,0	87,0	91	106	124	**132**
Cape Northern		95,8	110,3	114,5	136,8	144,8	163,0	197	218	241	**250**
Cape Western		255,5	273,0	315,5	357,5	432,4	470,4	542	647	779	**840**
Eastern Transvaal		409,0	456,1	541,2	598,2	565,8	772,0	827	946	990	**1 089**
Natal		545,7	635,7	747,4	825,3	994,0	1 088,0	1 222	1 438	1 498	**1 567**
Orange River		—	—	—	10,3	18,3	23,0	31	114	105	**132**
Rand and O.F.S.		2 868,6	3 119,4	3 277,1	3 624,4	3 885,9	4 026,8	4 440	5 083	5 448	**6 075**
Maximum simultaneous de-demand on total Escom system		4 227,2	4 657,6	5 054,7	5 621,5	6 115,2	6 630,2	7 350	8 552	9 185	**10 085**

Table 10
Hourly maximum demand of Escom's distribution undertakings, megawatts

Undertaking	1967	1968	1969	1970	1971	1972	1973	1974	1975	**1976**
Border	58,9	64,9	67,7	70,2	80,3	88,3	100,8	114,0	127,0	**145,0**
Cape Eastern	1,5	1,7	2,0	2,0	2,3	2,5	2,3	5,1	5,2	**5,7**
Cape Northern	102,2	117,5	127,3	139,8	157,1	170,1	201,9	231,0	249,5	**273,2**
Cape Western	276,6	298,6	326,8	389,8	442,8	491,7	554,1	707,1	807,0	**882,0**
Eastern Transvaal	424,7	485,2	575,5	615,3	680,4	786,1	867,8	924,6	1 019,8	**1 197,1**
Natal	660,0	712,0	794,0	867,0	1 060,0	1 177,0	1 263,0	1 438,0	1 498,0	**1 618,0**
Orange River	—	—	7,6	12,4	20,5	30,3	88,2	117,5	135,2	**179,9**
Rand and O.F.S.	2 868,6	3 119,4	3 277,1	3 624,4	3 885,9	4 054,9	4 467,8	5 147,0	5 455,5	**6 074,8**
Aggregate of non-simultaneous maximum demands	4 392,5	4 799,3	5 178,0	5 720,9	6 329,3	6 800,9	7 545,9	8 684,3	9 297,2	**10 375,7**

To accommodate a system yearly load factor of this magnitude, while operating with a shortfall of reserve generating capacity, all generating plant should be available in running order whenever required. As can be seen from the operating statistics in Statement No. 4 the availability of the more recently commissioned coal-burning power stations fell short of what must be regarded as adequate for base-load plant. This poor availability was due to coal mill problems, boiler tube failures, turbine blading failures and electric rotor faults.

Escom continued its discussions during the year with the air pollution authorities on smoke, fly ash, and dust emission from power station chimneys. Power stations brought into operation by Escom before the early sixties on sites remote from urban areas were equipped with mechanical dust collectors which are now not regarded as adequate. To reduce air pollution from these power stations, the mechanical collectors are now being replaced by modern electrostatic precipitation equipment. This work is in progress at the Highveld and Taaibos power stations and will also be carried out at Komati power station in the future. At all power stations completed subsequent to Komati, modern electrostatic precipitator equipment has been or is being installed. The application of strict operating and maintenance practices is being enforced at all power stations in consultation with the air pollution authorities.

The live-line maintenance of major transmission lines was continued in 1976 with the introduction of live-line bare-hand and cover-up techniques. Live-line maintenance can now be carried out on most alternating current transmission lines with operating voltages from 11 kV to 400 kV. The technique can also be applied to the high voltage direct current line from Cabora Bassa.

There were several interruptions in supplies to coastal areas during the year due, in some cases, to protection problems and in others to human errors. High-voltage transmission equipment has advanced to the stage where supervision entails the operation of sophisticated equipment having intricate control devices. Notwithstanding the employment of specialist supervisory staff, the fallibility of people remains an important limitation.

The faults experienced during the year on major transmission lines were due mainly to sugar-cane, bush and forest fires, lightning, atmospheric pollution, and fouling of insulators by birds. Escom has made substantial contributions to the technology of protection against lightning effects; the problems arising from fires beneath high voltage transmission lines, and from atmospheric pollution, are also receiving attention.

Abundant rainfall during the first half of the year brought about changes in the habits of birds in certain areas, to the extent that their pollution of insulators caused serious interruptions to supplies. The areas worst affected were in the Border, Cape Eastern and Orange River Undertakings. Bird guards are being fitted to transmission line towers with a view to overcoming this problem.

Coal supplies

As already mentioned in the preamble to this chapter, one of the effects of the failure to obtain contractual supplies from Cabora Bassa on a steady, firm basis in 1976 was to raise the coal burning rates of the non-pithead power stations in Natal and in the Cape. This added further to the increase in the average cost of coal burnt. The overall average coal cost for a period such as a year can readily be kept to a minimum under ideal conditions, when adequate base-load generating capacity is available, simply by scheduling planned shutdown and minimising the output demanded from the least efficient power stations with the highest fuel cost per kWh sent out. Such ideal conditions did not exist during the year under review: in addition to the unreliability of the Cabora Bassa base-load supplies, there were also prolonged forced outages of Escom's own generating plant.

The consequences are illustrated in the figures of Tables 11 and 12. Table 11 shows that the percentage increase of the coal burnt in the Transvaal and O.F.S. pithead power stations in 1976 was of the same order as the 7,3 per cent increase of the total generated energy. In the Cape and Natal railhead stations, remote from their supplying collieries, the percentage increase of the burning rates was disproportionately high. The adverse effect of the increased coal consumption by the non-pithead power stations in the Cape and in Natal is readily understood in the light of the high average costs per ton of coal delivered to these power stations, as shown in Table 12. Following the large increases in controlled

price and in railage which took effect from September 1976, the cost per ton of delivered coal reached levels of R18 to R19 in the Western Cape and R17 to R18 in Natal.

Special arrangements had to be made for the procurement and delivery of coal to the various power stations in the quantities indicated by Table 11, with the result that coal stocks were undesirably low at some stations throughout the year. Production problems at the Springfield, Coalbrook, Vierfontein, and New Largo collieries aggravated the position, so that additional costs were incurred in supplementing the coal supplies at the stations normally fed by these collieries. The supplementary supplies had to be railed or hauled by road from various sources. The Transvaal Coal Owners Association being unable to supply the full requirements of the stations in the Cape, it was necessary to rail the shortfall from various pithead collieries. This coal was defective in quality compared with the coal which is normally railed long distances.

Water supplies

The quantities and sources of water used in the coal-burning power stations in the past two years are indicated in Table 13.

The major coal-burning power stations, situated in the Transvaal and the northern Orange Free State, are the principal users of raw water. In 1976, these power stations sent out 57 624 GWh of energy, which is some 85 per cent of the total sent out to the interconnected system, and is an increase of 6,0 per cent on the corresponding output for 1975. The associated raw water consumption, excluding colliery and construction usage, was 168 257 megalitres, which is some 91 per cent of the total fresh water consumption, and is an increase of 7,2 per cent on the corresponding consumption for 1975.

The figures indicate that no improvement was achieved in 1976 of the water consumption per kWh sent out from these stations, as compared with the preceding year. However, the deterioration was not severe, the specific water consumption of this group of stations having increased slightly from 2,89 litres per kWh sent out in 1975 to 2,92 litres per kWh sent out in 1976.

In the interests of water conservation and pollution control, efforts were continued during the year to implement closed water systems at power stations wherever possible, thereby reducing blowdowns and other discharges to a minimum.

Table 11
Coal burnt per year in different areas, millions of metric tons

Geographic area	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
Eastern Cape*	0,230	0,263	0,295	0,150	0,177	**0,213**	20,3	−1,5
Natal	3,067	2,450	2,013	2,117	2,557	**2,938**	14,9	−0,9
Transvaal and O.F.S.	19,515	21,618	25,009	27,998	30,727	**33,128**	7,8	11,2
Western Cape	0,604	0,622	0,591	0,627	0,770	**0,978**	27,0	10,1
Total	23,416	24,953	27,908	30,892	34,231	**37,257**	8,8	9,7

*Incorporated in Central Generating Undertaking as from 1974.

Table 12
Yearly average cost of coal burnt in different areas, rand per metric ton

Geographic area	1971	1972	1973	1974	1975	**1976**	Percentage increase 1976/75	Average yearly increase over 5 years per cent
Eastern Cape*	6,31	6,83	8,17	8,87	11,33	**14,10**	24,4	17,4
Natal	4,08	4,10	4,13	4,96	6,98	**9,29**	33,1	17,9
Transvaal and O.F.S.	1,76	1,83	2,03	2,58	3,51	**4,71**	34,2	21,8
Western Cape	7,06	7,44	9,06	10,04	12,81	**15,79**	23,3	17,5
Overall average	2,25	2,25	2,39	2,92	4,02	**5,43**	35,1	19,3
Percentage increased compared with previous year	−0,4	0,0	6,2	22,2	37,7	**35,1**		

*Incorporated in Central Generating Undertaking as from 1974.

Table 13
Water used in Escom coal-fired power stations, megalitres
(includes colliery and construction usage)

Area and source of water	Potable water		Crude river water		Water from other sources, including boreholes, dams and sewage		Sea water circulated (estimated)	
	1975	**1976**	1975	**1976**	1975	**1976**	1975	**1976**
Eastern Cape								
East London Municipality	126	**137**						
Sea water (estimated)							86 965	**100 444**
Total, Eastern Cape	126	**137**					86 965	**100 444**
Natal								
Durban Municipality	2 578	**3 672**						
Sea water (estimated)							132 161	**138 621**
Tugela River			2 154	**2 576**				
Ngagane River			10 168	**10 472**				
Total, Natal	2 578	**3 672**	12 322	**13 048**			132 161	**138 621**
Transvaal and O.F.S.								
Vaal River	*2 022	***1 651**	53 574	**52 138**				
Bronkhorstspruit			6 834	**6 717**				
Komati River			73 763	**79 326**				
Usutu complex			26 798	**31 619**				
Other	*80	***146**			484	**732**		
Total, Transvaal & O.F.S.	2 102	**1 797**	160 969	**169 800**	484	**732**		
Western Cape								
Cape Town Municipality	432	**434**						
Worcester Municipality	505	**666**						
Hex River			526	**643**				
Sea water (estimated)							334 957	**293 543**
Total, Western Cape	937	**1 100**	526	**643**			334 957	**293 543**
Total, all Escom	5 743	**6 706**	173 817	**183 491**	484	**732**	554 083	**532 608**

*Includes water consumed by distribution stations in Transvaal and O.F.S.

New works

Generating plant

The generating plant commissioned during 1976, as well as the plant under construction and on order at the end of 1976, is listed below.

Plant having a nominal power output capacity of 1 202 MW was taken into service during 1976, bringing the total installed capacity to 12 443,5 MW, as shown in detail in Statement No. 1.

Construction work on the following major power generation projects commenced or continued during the year:

Coal-burning generating plant

Hendrina power station

The ninth 200 MW non-reheat generating set in this power station was taken into commercial service in May 1976. The station now has an installed capacity of 1 800 MW.

The tenth and last 200 MW set in this station was commissioned in December 1976 and will be placed in commercial service in January 1977.

Grootvlei power station

The civil and structural work for the sixth and last 200 MW non-reheat generating set was completed during the year, and erection of the boiler and turbo-generator plant is in progress. This set is the second at Grootvlei to employ non-evaporative cooling of the condenser circulating

water in a dry cooling tower. A unique feature is the stainless steel tubed surface condenser, which provides the interface between the condensate circuit and the indirect dry cooling circuit. This feature is being pioneered by Escom as a further development of the dry cooling system already installed for the fifth set. The cooling system for the fifth set, which has become well known internationally, continued to operate satisfactorily during 1976.

This station at present has an installed capacity of 1 000 MW, made up of five 200 MW sets. Commissioning of the sixth set is planned for the second half of 1977.

Kriel power station

The civil and structural work for the first four of six 500 MW generating sets was completed during the year. The first set was taken into commercial service in May 1976, and although commissioning of the second set was well advanced by the end of the year, it is not expected to be in commercial service before April 1977. Commissioning of the third set is planned for December 1977.

The commissioning programme in this station has been hampered by various unforeseen difficulties. A major problem—severe slagging in the boiler of the first set—was attributed to the furnace design and burner arrangement. Exhaustive tests were carried out on both boiler and coal, and remedial measures are in hand.

Coal for this power station is supplied from the Kriel Colliery, where both underground and strip mining will be adopted.

Table 14
Power station plant taken into service during 1976 and on order at 31 December 1976

Name of power station	Plant taken into service in 1976		Plant under construction or on order at 31 December 1976	
	Boilers kg/s	Generators MW	Boilers kg/s	Generators MW
Coal-fired steam plant:				
Duvha	—	—	3 048	3 600
Grootvlei	—	—	215	200
Hendrina	214	200	214	200
Kriel	440	500	2 200	2 500
Matla	—	—	3 048	3 600
Conventional storage hydro plant:				
Hendrik Verwoerd	—	160	—	—
Vanderkloof	—	—	—	220
Pumped storage hydro plant:				
Drakensberg	—	—	—	1 000
Gas turbines:				
Acacia	—	171	—	—
Port Rex	—	171	—	—
Nuclear plant:				
Koeberg	—	—	—	1 844

Matla power station

This station, which is being built about four kilometres from Kriel, will have an ultimate installed capacity of 3 600 MW, made up of six 600 MW generating sets.

Construction of the civil and mechanical works associated with the first three sets is proceeding. The construction, for the first time in an Escom station, of a concrete boiler house structure by means of sliding shuttering was completed for the first set. The turbine house will also have a concrete structure.

The first generating set is planned for commissioning during the winter of 1979, the second in September of the same year, and the third one year later.

The colliery to supply coal to this station is being established, and is expected to commence production by the end of 1978. Coal will be produced by underground mining methods.

Duvha power station

This station, which is being built about fourteen kilometres south-east of Witbank, is also planned for an ultimate installed capacity of 3 600 MW, made up of six 600 MW generating sets.

The excavations for the first set are progressing well, following the successful completion of site levelling during the year.

As in the case of Matla, steel and reinforced concrete were considered as alternatives for the station building structures. Steel structures were however decided upon in this case.

Economies in design are being effected wherever possible by replication of drawings used for Matla.

The reinforced concrete chimney, 300 metres in height, will be the first multi-flue chimney erected for an Escom power station.

The first generating set is planned for commissioning in September 1979, and the second and third at one-year intervals thereafter.

The colliery which is to supply coal to this station is being established. Coal will be produced by surface strip mining. It is expected that production will commence late in 1978.

Hydro-electric generating plant

Hendrik Verwoerd conventional-storage power station

The third and fourth 80 MW generating sets of this surface power station were taken into service in January and March 1976 respectively, bringing this station to its ultimate installed capacity of 320 MW.

An abundant river flow during the rainy season, and the consequent high water level of the Hendrik Verwoerd Dam, enabled this station to operate at a load factor of 68,4 per cent for the year as shown in Statement 4. This

is a high load factor for the amount of generating capacity installed, and particularly for a hydro-electric station planned essentially for peak-load and reserve duty. It is indicative of the important role that this station is playing in Escom's interconnected system.

Vanderkloof conventional-storage power station

This underground station is situated at the P.K. le Roux Dam on the Orange River, some 120 km downstream of the Hendrik Verwoerd Dam.

The P.K. le Roux Dam was closed according to programme in September 1976, and impounding of water commenced. In November, the turbine runner of the first 110 MW generating set was turned by water from the new dam.

The first set will be taken into commercial service in January 1977. The second set, also of 110 MW capacity, is planned for commissioning in February 1977 and commercial operation in March 1977, bringing the station to its ultimate installed capacity of 220 MW.

Like the Hendrik Verwoerd station, the Vanderkloof station will also be remote-controlled from the national control centre at Simmerpan near Germiston, a distance of 640 km. The starting, synchronising and loading sequences will be fully automatic.

Drakensberg pumped storage scheme

This dual-purpose scheme, a joint venture with the Department of Water Affairs, planned to supplement the water resources of the Vaal River basin in addition to providing peak-load generating capacity from off-peak surplus electrical energy, will be Escom's first pumped storage project and will house four pump-turbines, each with a power generating capacity of 250 MW.

The borehole drillings and underground exploratory excavations were completed during the year. Access to the vicinity of the underground caverns has been obtained, and comprehensive testing of the ground conditions and rock properties is in progress to enable the design parameters for the construction of the cavern complex to be determined. The construction of the access and tailrace tunnels is in progress, and the main civil contract has been awarded for the construction of the underground cavern complex, high-pressure tunnels, and penstocks.

The preliminary contracts awarded to two manufacturers selected on the basis of tenders submitted for the advanced design and model testing of the pump-turbines were concluded during the year. On the basis of the preliminary contracts, the main contract has now been placed for the pump-turbines. Tenders have been received for the generator-motors and enquiries issued for the station cranes.

A physical model of the complete hydraulic waterway system of the scheme is undergoing testing and a computerised version of the corresponding mathematical

model which is being developed in parallel, is well advanced. Analysis and comparison of the measured and computed results will enable the optimum design of the waterways to be selected.

The layout of the surface works is being planned to minimise adverse effects on the environment.

Commissioning of the first 250 MW generating unit is scheduled for September 1980. The second, third and fourth sets are planned for commissioning at four-monthly intervals to complete the station to its ultimate installed capacity of 1 000 MW by September 1981.

Elandsberg pumped storage scheme

A site in the south-western Cape, 13 km west of Wolseley and 14 km south-west of Tulbagh, has been selected for this station, which is to be built underground, making use of the existing Voëlvlei Dam as a lower reservoir and a new dam, to be constructed at Suurvlakte in the Elandskloofberg, as an upper reservoir.

Exploratory investigations are in progress at the site. Geological drilling has been completed and the cores recovered are being analysed. Excavation of an adit and various underground headings into the rock in the vicinity of the proposed underground machine hall is continuing, and some geomechanical testing of the rock has already been carried out. Further testing is scheduled for completion during the first half of 1977. The results obtained will be used to design the complex of underground caverns required to house the generating plant and auxiliaries.

The commissioning of generating sets in this station is likely to commence, on the basis of present planning, in the late eighties. Present indications are that approximately 1 000 MW of generating capacity can be installed.

Nuclear generating plant

Koeberg power station

After a full assessment of the final three tenders submitted, a contract was signed in August for the design, construction and commissioning of two 922 MW generating sets, complete with associated plant and buildings, constituting virtually a complete nuclear power station. An associated contract was also placed for the provision of fuel services. The nuclear steam supply systems of the two generating sets will employ light water reactors of the pressurised-water type.

The first-stage excavation at site for the nuclear islands was completed during the year. Construction of the diaphragm wall is in progress, within which the second-stage excavation will be carried out.

A surface faulting study has indicated that there are no faults capable of generating a seismic event within 8 km of the site. The final stage of the fault study will be examination of the rock foundation on completion of the excavation.

The design of the cooling water intake basin, involving the construction of breakwaters into 8 metres of water, has been optimised, and an invitation to tender for this work has been issued.

The two generating sets are scheduled for commissioning by the end of December 1982 and 1983 respectively.

Gas turbine generating plant

Acacia power station

The first 57 MW generating set was taken into service in this station in Cape Town during May 1976, and the ultimate installed capacity of 171 MW was reached when the third set of identical capacity went into service in July.

This station was used for both peak load and reserve duty during the winter. The quick-starting characteristic of gas turbine generating plant is a decided advantage for this type of duty.

The fuel oil required is supplied to this station by pipeline from a refinery at Milnerton. The installation of remote control equipment is in progress to enable this station to be controlled from the national control centre at Simmerpan near Germiston.

Port Rex power station

The three 57 MW generating sets in this station at East London were taken into service during October 1976 thereby completing the station to its ultimate installed capacity of 171 MW. The generating sets are identical to those installed at Acacia.

The fuel oil required is supplied to this station by pipeline from a fuel depot at East London. As in the case of Acacia, the installation of remote control equipment is in progress to enable this station to be controlled from the national control centre at Simmerpan near Germiston.

Research and development

The Central Research Laboratory at Rosherville was occupied during the year with investigations into a great variety of problems arising from the operation of plant. The progressively increasing size and sophistication of Escom's power stations and the attendant operating problems have required greater depth of investigation and the acquisition of additional experimental equipment. A new high-speed computer terminal has been installed at Rosherville.

Among the research undertaken during the year, either at Rosherville or from Rosherville as a base, were an investigation of the hydraulic aspects of the Drakensberg pumped storage scheme by means of models, vibration studies with particular reference to large coal mills, and studies of the wearing properties of coal during grinding. Investigations were also conducted into the industrial uses of radioactive isotopes, noise of plant in operation and air pollution. With the object of providing basic design data

for the computer analysis of the steel-frame towers required for Escom's national microwave radio network, an industrial-sized wind tunnel was constructed to study wind loading of a model of the towers which in the field will be 105 metres in height. The important feature of these towers is that their deformation at specified points must not exceed a stipulated minimum. The wind tunnel constructed for this work will also be used for air pollution research.

Research was also carried out during the year into the techniques of protecting equipment against lightning effects. Monitoring stations have been established in areas where severe lightning prevails, to investigate the failure of lightning arresters. In connection with these investigations, directional dust gauges of the type developed by the Central Electricity Generating Board in the United Kingdom are being used to measure the level of pollution at 70 different sites, and a transmission line insulator test station has been built at the site of the Koeberg nuclear power station.

A number of short-term research investigations were also undertaken, including the assessment of silicon greases for insulators, the measurement of overvoltages induced in control cables, earthmat resistivity surveys, and the investigation of problems associated with power line carrier equipment.

Co-operation was maintained, through joint research projects and by representation on the appropriate committees, with the Council for Scientific and Industrial Research, the South African Bureau of Standards, the Department of Water Affairs and the universities.

National communication and control

The interconnection of the power stations and distribution undertakings on a national scale provides the opportunity of performing the functions of generation, transmission and distribution of electricity at the lowest possible operating cost. The necessary co-ordination and control, from an overall point of view, of generation, transmission and distribution will be achieved from the control centre near Germiston. A national microwave network will enable the control centre to communicate directly with power stations, major distribution stations, and regional control centres; it will also serve as a system of channels for an integrated automatic telephone network.

The initial phase of developing this network will link the national control centre with Hydra and Georgedale, major distribution stations in the northern Cape and Natal respectively. By the end of 1976, some fifty microwave radio stations were in the course of construction in the Transvaal, Orange Free State, Natal and Northern Cape. Their completion is expected during 1977. An enquiry has been issued for the next phase, which will expand the network in the Cape and provide connection to the Koeberg nuclear power station. This phase is planned for completion by 1981.

The national microwave radio network also interlinks the repeater stations for mobile radio. During the year, the coverage by mobile radio of the licensed areas was substantially extended. There are at present approximately 1 000 mobile radios in operation.

The channels made available by the radio network for data transmission, supervisory control, back indication and remote operations will be used by the computerised system control and load despatch unit. A contract was placed during the year for the computer hardware and software packages, the function of which will be to improve economic efficiency by optimal sharing of load among the power stations. It is expected that the unit will commence operating in 1979.

To house the national control centre, a new building has been erected near Germiston and was substantially completed by the end of the year. A feature of the building is that the main antenna tower for the microwave radio network is mounted upon a central reinforced concrete core. The building will contain a control room, computer hardware and communications equipment.

Water supply systems for coal-fired power stations in the Eastern Transvaal

The development of pipelines and pumping systems for the utilisation of water from the Komati and Usutu rivers from the early sixties onwards was described in the 1975 report. Escom continued working on these water supply systems during the year, on behalf of the Department of Water Affairs.

The pumping stations and multiple pipelines to safeguard the provision of raw water to the Arnot and Hendrina power stations from the upper Komati River system were completed during the year. This water supply system can now be operated to its full design capacity. Additional pumps to serve as reserve remain to be installed early in 1977.

A consequence of the implementation of measures to conserve water has been that surplus water is available from the upper Komati scheme for consumption by a future power station. During 1977 and 1978, the Department of Water Affairs intends extending the scheme to supply the surplus water to Duvha power station.

To protect the Arnot, Hendrina, Komati and Duvha power stations against the possible failure of the Komati scheme to supply the water required, the Department of Water Affairs proposes to provide the safeguard of obtaining water when necessary from the Vaal River. To benefit fully from this proposal, it is planned to install additional pumping plant at Hendrina power station around 1979.

The engineering of the Usutu River Government Water Scheme continued in 1976. Progress was made with the provision of automatic control facilities for the scheme. The necessary radio equipment was satisfactorily commissioned and two-way communication has been

established for speech as well as data. A computer is in operation at the master control station at Jericho Dam, and data from the various pumping stations and reservoirs comprising the scheme can be displayed and logged. Early in 1977 it should be possible to control the scheme on remote manual control from Jericho Dam; full automatic control should be possible by mid-1977. The design work on the final phase of the scheme has been completed and the enquiries for the necessary pumps and pipelines have been issued. The additional pipelines and first additional pump are planned to be in service by the middle of 1978.

The Usutu scheme is being extended to provide Matla power station with water until this station receives a supply from the Vaal River at the end of 1979. Design work is well advanced on a pipeline from Kriel to Matla and a pumping station at Kriel, the first pump being planned for commissioning early in 1978.

Major transmission projects

Following the commissioning in 1975 of a 400 kV series capacitor bank at Komsberg distribution station near Laingsburg and two 75 MVAR synchronous condensers at Muldersvlei distribution station, a 132 kV 100 MVAR shunt capacitor bank has been commissioned at Muldersvlei. These devices were used effectively during the year for voltage control. Further improvement of the national transmission system was obtained by the commissioning in June 1976 of a 400 kV series capacitor bank near Victoria West.

The construction of all 400 kV lines in the western Cape was delayed by the fact that certain landowners refused to grant servitudes. At a hearing before the Electricity Control Board in March 1976 all outstanding cases were discussed and favourably resolved. However, the result was that construction started late, the lines affected being two 400 kV lines between Muldersvlei distribution station and Acacia distribution station, in the Cape Town area, and one 400 kV line from Muldersvlei distribution station, by-passing Koeberg nuclear power station to Aurora distribution station near Langebaanweg, continuing northwards to Juno distribution station near Vredendal and then on to Helios substation near Kromrivier. At present construction is progressing satisfactorily in the Darling and Muldersvlei areas. Construction continued of the 400 kV transmission line running westwards from Hydra distribution station near De Aar and of the substations required for completing the third 400 kV line line to the south-western Cape. Apart from improving the reliability of supplies to the south-western Cape, this line will also supply power to the Sishen-Saldanha railway and the mining areas of the north-western Cape, as well as providing an additional link with the Koeberg nuclear power station in the future.

Some strengthening of the national transmission system was necessary during the year to provide for additional hydro-electric generation from the Orange River project. To handle the increased output from Hendrik Verwoerd power station, 220 kV switching yards were completed at Ruigtevallei substation near Hendrik Verwoerd Dam and at Hydra distribution station. Two 220/132 kV 250 MVA in-line transformers were installed at Ruigtevallei and the two 132 kV transmission lines to Hydra were uprated to 220 kV operation. To prepare for hydro-electric generation at Vanderkloof power station, a 220 kV yard consisting of a 220 kV busbar and a 220/132 kV 125 MVA transformer, was completed at Roodekuil substation near Petrusville. A 220 kV transmission line 105 km in length from Vanderkloof via Roodekuil to Hydra distribution station, was completed. A 220 kV busbar and two 315 MVA 400/220 kV transformers were installed at Hydra.

In East London, a 132 kV switchyard at the new Port Rex gas turbine power station was completed during the year. The 132 kV lines required to connect this station to the national system via the Buffalo and Pembroke substations were also completed.

To provide electricity for the continuing expansion of industry in Natal, planning and design work is well advanced on a 400 kV transmission line from Camden power station near Ermelo to Richards Bay, with intermediate substations for electrification of the South African Railways Ermelo – Richards Bay railway. A major 400/275 kV distribution station is being planned for the Richards Bay area. These projects are scheduled for completion in 1979. Planning and design work is also continuing on the establishment of a 400 kV transmission line from the Drakensberg pumped storage power station to Pegasus, a new distribution station near Dundee. To complete its connection with the national transmission network, another 400 kV line is being planned from Drakensberg to Mersey distribution station near Pietermaritzburg. The scheduled completion date for these projects is early 1980.

The high-voltage national transmission network was also enhanced during the year by the commissioning of a variety of 400 kV equipment and lines in the Transvaal and Orange Free State. A second 400 kV transmission line 124 km in length was commissioned from Kriel power station to Atlas distribution station in the Vereeniging area. A 400 kV line 227 km long was commissioned from Grootvlei power station to Nestor distribution station near Virginia, and a further 138 km from Nestor to Perseus distribution station near Dealesville. At Nestor, three 400 kV 250 MVAR capacitor banks were placed in service. In connection with the Cabora Bassa scheme, testing and commissioning work continued during the year on the high voltage direct current transmission line and the direct current converter at Apollo distribution station near Pretoria.

Personnel

Total personnel employed on 31 December 1976:

Table 15

	Number	% increase during 1976
White salaried employees	7 822	9,9
White monthly-paid employees	5 681	7,6
Non-white employees	23 412	8,4
Total	36 915	8,6

The overall percentage increase in employees during the year under review was 8,6 per cent (12,1 per cent in 1975) and is attributed largely to the construction, commissioning, and operation of further new plant for Kriel, Matla, Duvha, Koeberg, Drakensberg and Vanderkloof power stations.

Recruitment campaigns were conducted in Western Europe and the United States of America during the year with a view to recruiting additional staff with special skills. As a result of these campaigns, 40 immigrants were engaged (78 in 1975).

Education and training

Training facilities for apprentices were extended during the year by the opening of the maintenance training centre at Meyerton in August. Training commenced with a group of 60 apprentices; when fully operational, the centre will accommodate up to 200 trainees. Development also continued at the Henley training centre, which at present caters for 50 trainees; when completed, it will accommodate 200.

The facilities available to trainees cover a wide range: workshop practice at Rosherville, maintenance techniques at Meyerton, operation, maintenance and technical services at Klip and Henley. A training simulator for 500 MW turbo-generators, built to a basic design provided by the Central Electricity Generating Board in the United Kingdom, was put into operation at Henley in August 1976.

A total of 450 apprentices were undergoing training during the year (352 in 1975).

The training of pupil technicians is undertaken in collaboration with the Colleges for Advanced Technical Education. As an improvement on the training already offered, a special 15-week induction programme was introduced during the year. A total of 330 pupil technicians were being trained in 1976 (293 in 1975).

The introduction of new plant, equipment, and techniques gives rise to a need for additional training, and special courses were presented as required. As an example, the South African Airways assisted in devising courses on the operation of the new gas turbine plant installed in the Cape. A further example concerns live-line maintenance techniques, new to this country, to reduce working costs and improve system stability.

Training under a management development programme also commenced during the year. The requirements for this training were studied by an outside firm of management consultants, and a number of appropriate courses were then devised. By the end of the year, a group drawn from senior management had completed some of the courses.

Under the Escom bursary loan scheme, 56 new bursaries were granted to students during 1976, bringing the total number of bursars attending the various universities to 143 (114 in 1975). The academic progress of bursars at universities was satisfactory. Of 143 bursars in 1976, 9 per cent were repeating their previous year of study (25 per cent in 1975). At the end of 1976, 38 students were due to graduate (15 in 1975) and enter Escom's service as employees.

For the 1976 academic year, 62 scholarships were granted to dependants of Escom employees under the Dr. H. J. van der Bijl Scholarship Scheme (51 in 1975). Of these, 34 were renewals and 28 were new awards.

Amenities, sport, recreation

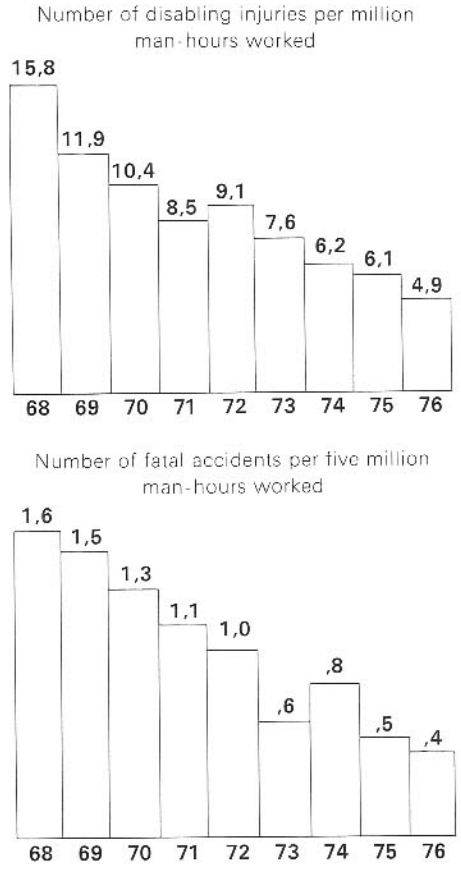
In 1976 a new pension scheme with improved benefits was introduced. The conditions are applicable to all employees, irrespective of race or colour and over 99 per cent of all Escom employees are now members of this pension fund.

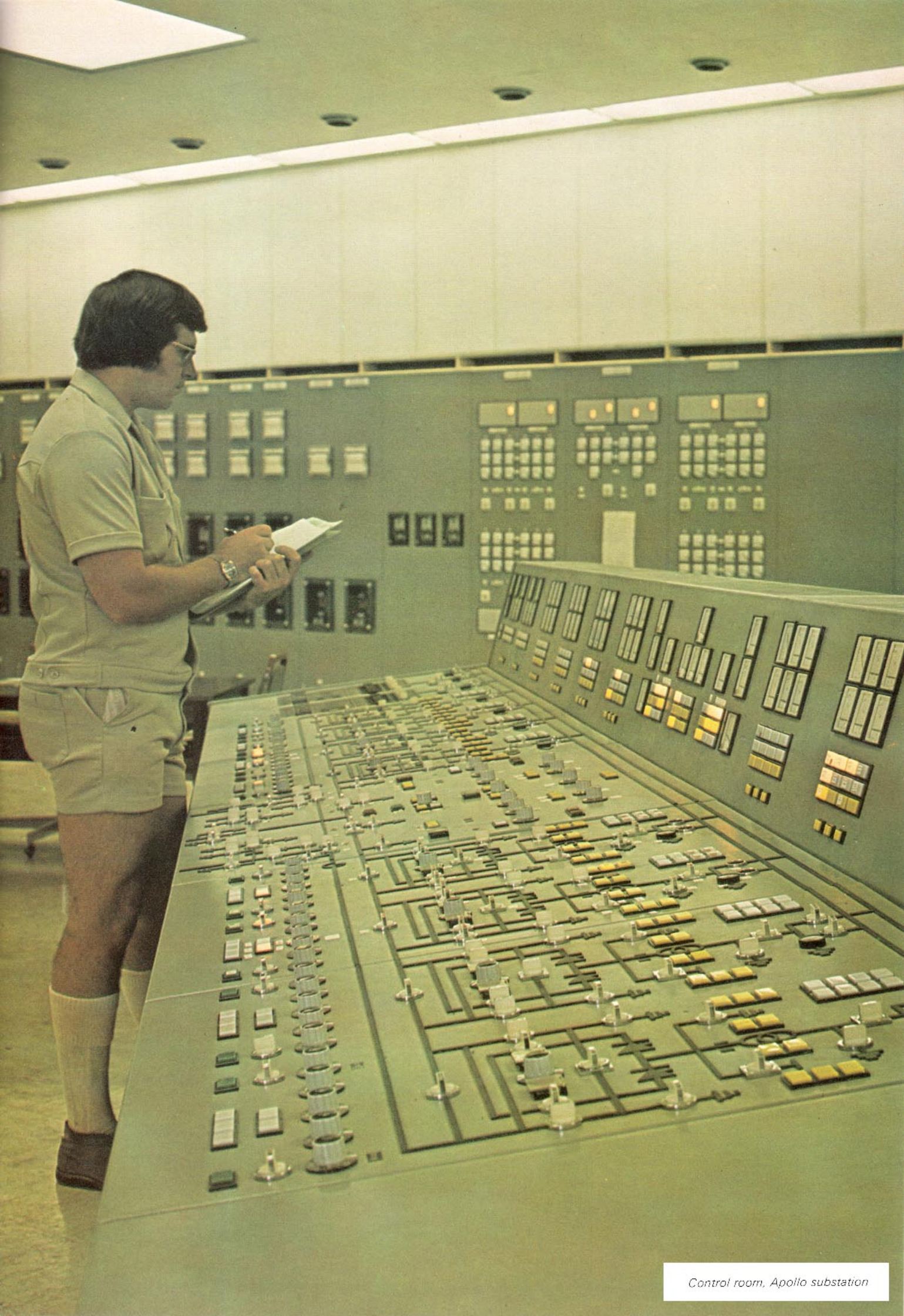
The Federation of Escom Clubs consists at present of 23 affiliated clubs with a membership of 14 400.

Prevention of accidents

The programme for the prevention of accidents is making satisfactory progress. Even by international standards, the results achieved have been encouraging. As illustrated by the diagram below, the number of disabling injuries and of fatilities arising from work injuries fell during the year under review to the lowest level experienced in the past nine years.

Programme for the prevention of accidents





Control room, Apollo substation

Capital expenditure

Expenditure on Capital Account for 1976 totalled R643 million.

During the year expenditure on Capital Account earning revenue increased by R303 million (1975: R161 million) and totalled R2 312 million at the year end, the additional items earning revenue being inclusive of commissioning of plant at Kriel, Hendrina, Hendrik Verwoerd, Port Rex and Acacia power stations.

Expenditure on uncompleted works amounted to R900 million at the end of 1976, the main concentration of works under construction being at Kriel, Grootvlei, Matla, Duvha and Koeberg power stations.

The above mentioned expansion on capital works has resulted in substantially increased working capital requirements and as a consequence the value of stores, materials, movable plant and equipment on hand increased by R61 million to R208 million as at 31 December 1976.

Loans and the capital markets

The following finance was obtained during the year ended 31 December 1976:

	Rand million		
	Total	Local	Foreign
Internal registered stocks	160	160	
Acceptance credits	40	40	
Direct placements	245		245
Revolving credit loans	174		174
Import financing facilities	68		68
Foreign payment financing	13		13
Other short term borrowing	134	134	
	834	334	500
	100%	40%	60%

Notes:

1. Of the Internal Registered stocks totalling R160 million above, R116 million was allotted to the Statutory Funds.
2. As will be seen from the above Escom was successful in raising 60% (i.e. R500 million) of its total borrowing requirement from foreign sources.

Resulting from anticipated adverse conditions on the foreign market Escom's dependence on the local market will be increased in the forseeable future.

As the capacity of the local market is limited taking into account Escom's estimated future financial requirements it is clear that greater attention will have to be given to generating substantial internal funds via the Capital Development Fund.

Capital Development Fund

Contributions amounting to R53,6 million (1975: R40,7 million) were made to the Capital Development Fund during 1976 and the amount standing to the credit of the Fund at 31 December 1976 was R181,6 million.

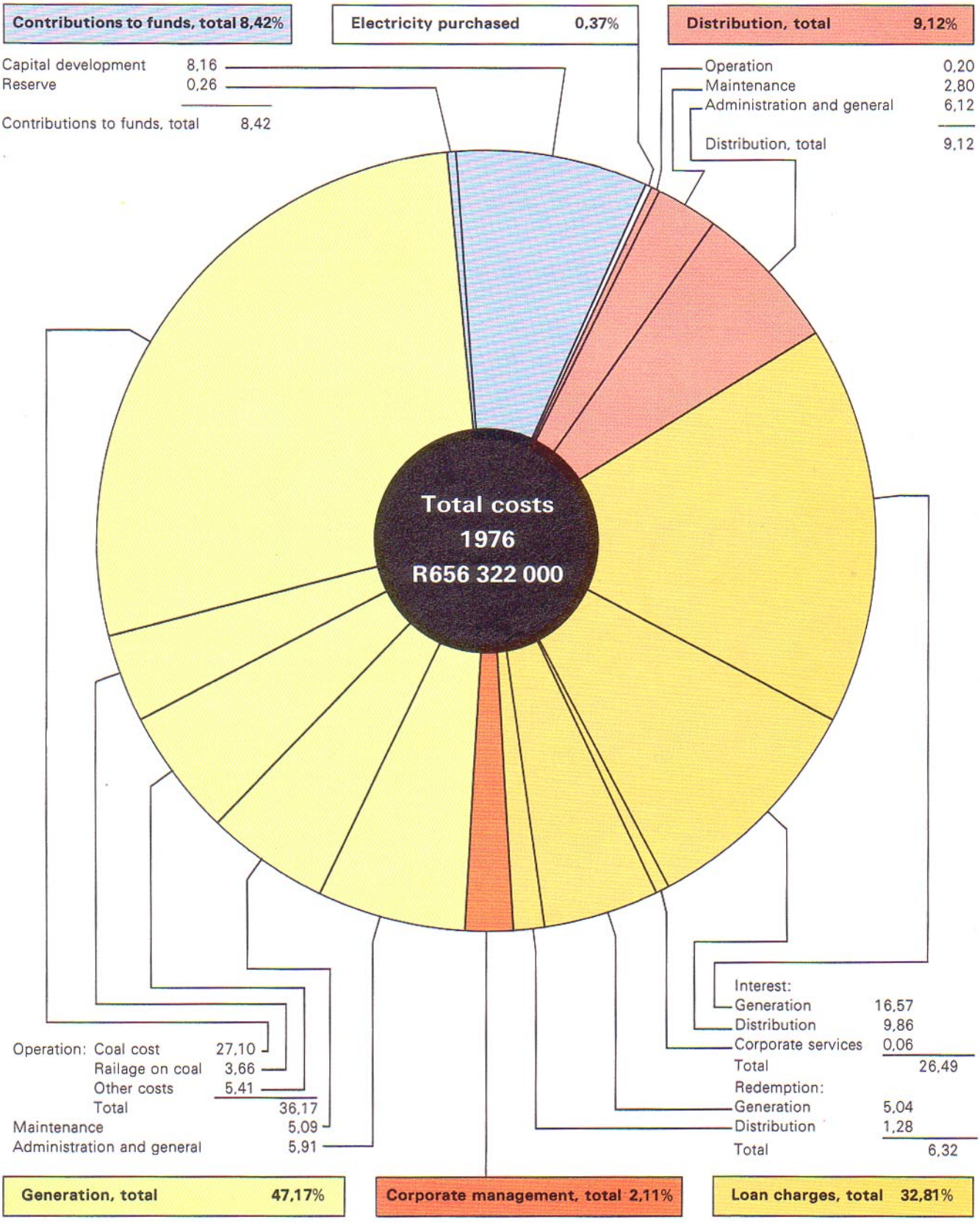
Reserve Fund

The Reserve Fund received contributions of R1,7 million during the year.

Replacement and betterment expenditure amounted to R4,3 million (1975: R2,0 million) and the balance in the Fund at the end of the year was R195,9 million, an increase of R12 million over the preceding year.

Revenue Account

Total revenue from sales of electricity in 1976 was R656,4 million which represents an increase of R196,3 million (42,7 per cent) above the previous year. The accumulated deficit on Revenue Account decreased by R0,08 million to R39 million at the end of 1976. It is anticipated that this deficit will be reduced during 1977 by tariff increases already approved.


Contributions to funds, total 8,42%
Capital development 8,16
Reserve 0,26
Contributions to funds, total 8,42
Electricity purchased 0,37%
Distribution, total 9,12%
Operation 0,20
Maintenance 2,80
Administration and general 6,12
Distribution, total 9,12
Total costs
1976
R656 322 000
Interest:
Generation 16,57
Distribution 9,86
Corporate services 0,06
Total 26,49
Redemption:
Generation 5,04
Distribution 1,28
Total 6,32
Operation: Coal cost 27,10
Railage on coal 3,66
Other costs 5,41
Total 36,17
Maintenance 5,09
Administration and general 5,91
Generation, total 47,17%
Corporate management, total 2,11%
Loan charges, total 32,81%

Kriel power station, where the first 500 MW set was commissioned in May 1976

Auditors' report and financial statements

The report of the auditors

The Chairman and Members
Electricity Supply Commission
Johannesburg

We have examined the financial statements of the Commission for the year ended 31 December 1976.

Redemption Fund

We have also examined the position of the Redemption Fund established by the Commission in terms of the Schedule to the Electricity Act, 1958, to provide for the redemption of the loans issued by the Commission and have reported thereon on Schedule 9.

Corporate Services

The net expenditure under this heading, after crediting amounts chargeable to electricity supply account under other headings, has been allocated to:

(a) Capital and Reserve Fund expenditure.

(b) Electricity supply account of Undertakings.

The amount allocated to electricity supply account has been apportioned by the Commission. We have no reason to disagree with the apportionment so made.

General

In terms of Section 18(8) of the Electricity Act, 1958 we report that:

(a) We have found the financial statements of the Commission to be in order, and in our opinion, they present the information required by the Act.

(b) The financial statements fairly present the financial position of the Commission and the results of its operations.

(c) Due provision, in terms of the Act, has been made for the redemption and repayment of moneys borrowed by or advanced to the Commission.

(d) Land and rights, buildings and facilities and production plant are stated at cost.

(e) Sums fixed by the Commission have been set aside to the Reserve Fund and Capital Development Fund under Section 13 as prescribed.

(f) All our requirements as auditors have been complied with and carried out.

Alex. Aiken & Carter
Halsey, Button & Perry
Chartered Accountants (S.A.), Auditors

Johannesburg
4 April 1977

Balance sheet

at 31 December 1976

	Notes	R000		R000	1975
Capital expenditure, at cost	3.1		**3 211 261**		2 569 803
Land and rights		**33 372**		30 138	
Buildings and facilities		**136 470**		118 756	
Production plant		**2 141 883**		1 860 023	
Total in commission		**2 311 725**		2 008 917	
Works under construction		**899 536**		560 886	
Equipment and stores			**184 774**		128 420
Movable plant and equipment, at cost		**54 833**		40 016	
less Accumulated depreciation		**23 637**		18 853	
		31 196		21 163	
Stores and materials	3.2	**153 578**		107 257	
External investments	3.3		**38 366**		33 749
Deferred expenditure	3.4		**65 014**		57 790
			3 499 415		2 789 762
Financed by					
External borrowings			**2 309 584**		1 771 498
Loans outstanding (Schedule 1)	3.5	**1 998 646**		1 895 068	
less Escom stock held internally	3.6	**709 031**		619 603	
		1 289 615		1 275 465	
Import financing facilities taken up		**128 473**		61 046	
Other short-term loans and advances (Schedule 2)		**891 496**		434 987	
Net current liabilities			**125 771**		103 100
Current liabilities and provisions			**206 420**		173 829
Accounts payable		**112 337**		125 602	
Sundry provisions		**16 656**		6 436	
Interest accrued		**42 452**		32 972	
Bank overdrafts		**34 975**		8 819	
Current assets			**80 649**		70 729
Accounts receivable		**75 134**		48 444	
Payments in advance		**2 662**		1 701	
Funds at call		**—**		17 554	
Bank balances and cash		**2 853**		3 030	
Total net debt			**2 435 355**		1 874 598
Statutory funds, reserves and provisions			**1 064 060**		915 164
Capital Development Fund (Schedule 7)		**181 601**		112 887	
Reserve Fund (Schedule 8)		**195 861**		183 825	
Redemption Fund (Schedule 9)		**325 683**		318 865	
Unrealised surplus on Escom stock held internally	3.6	**27 861**		25 848	
Provision for repayment of foreign loans		**22 118**		14 865	
Capital reserve	3.7	**349 938**		297 951	
		1 103 062		954 241	
less Accumulated deficit	3.8	**39 002**		39 077	
			3 499 415		2 789 762

Electricity supply account

for the year ended 31 December 1976

R000

1975		Notes	1976 Total	Corporate Services	Central Generating	Distribution Total	Cape Western	Cape Northern	Cape Eastern	Border
460 073	**Electricity sold**	2.1	**656 381**	—	—	**656 381**	**73 195**	**21 756**	**624**	**14 035**
277 242	**Operating expenditure**	2.2	**385 739**	**14 100**	**311 594**	**60 045**	**11 285**	**3 528**	**296**	**2 656**
167 777	**Loan charges**	2.3	**215 299**	**387**	**141 815**	**73 097**	**8 699**	**4 511**	**179**	**2 008**
42 130	**Contributions to funds**	2.4	**55 284**	—	**35 372**	**19 912**	**2 178**	**1 053**	**35**	**617**
—	**Distribution of costs**	2.5	—	**(14 487)**	**(488 781)**	**503 268**	**50 941**	**13 425**	**122**	**9 327**
487 149			**656 322**	—	—	**656 322**	**73 103**	**22 517**	**632**	**14 608**
27 076	**(Surplus)/deficit for the year**		**(59)**	—	—	**(59)**	**(92)**	**761**	**8**	**573**
(136)	**Surplus on network taken over**		**(16)**	—	—	**(16)**	—	—	—	—
12 137	**Accumulated deficit/(surplus) at beginning of year**		**39 077**	—	—	**39 077**	**5 627**	**1 274**	**341**	**1 463**
39 077	**Accumulated (surplus)/deficit at end of year**		**39 002**	—	—	**39 002**	**5 535**	**2 035**	**349**	**2 036**

R000

1975 Distribution Undertakings									1975	
Orange River	Natal	Eastern Transvaal	Rand and O.F.S.	Corporate Services	Central Generating	Total	Cape Western	Cape Northern	Cape Eastern	Border
9 749	**121 499**	**78 337**	**337 186**	—	—	460 073	55 860	15 479	483	9 956
1 504	**11 220**	**7 269**	**22 287**	11 719	218 210	47 313	9 487	2 969	250	2 064
2 655	**11 879**	**10 662**	**32 504**	387	110 055	57 335	6 153	3 358	133	1 349
755	**3 480**	**2 937**	**8 857**	—	31 750	10 380	1 080	430	33	410
7 328	**86 730**	**56 566**	**278 829**	(12 106)	(360 015)	372 121	43 262	9 782	101	7 609
12 242	**113 309**	**77 434**	**342 477**	—	—	487 149	59 982	16 539	517	11 432
2 493	**(8 190)**	**(903)**	**5 291**	—	—	27 076	4 122	1 060	34	1 476
(16)	—	—	—	—	—	(136)	—	—	—	—
1 191	**7 951**	**1 963**	**19 267**	—	—	12 137	1 505	214	307	(13)
3 668	**(239)**	**1 060**	**24 558**	—	—	39 077	5 627	1 274	341	1 463

1975 Distribution Undertakings						
Orange River	Natal	Eastern Transvaal	Rand and O.F.S.
7 000	83 707	55 382	232 206
661	8 575	5 854	17 453
1 910	9 978	8 573	25 881
417	2 460	1 270	4 280
5 182	69 200	39 868	197 117
8 170	90 213	55 565	244 731
1 170	6 506	183	12 525
(136)	—	—	—
157	1 445	1 780	6 742
1 191	7 951	1 963	19 267

Notes to the financial statements

at 31 December 1976

1. Accounting policies

The principal accounting policies adopted by the Commission, which are consistent with previous years except where otherwise indicated, are as follows:

Capital expenditure and equipment

Interest is added to the cost of capital works under construction until such assets are taken into commercial operation.

Capital expenditure is not depreciated but is maintained at cost while the relevant assets are in commercial operation. Charges are made against working costs to provide for the repayment of loans. (See note on amortisation of borrowings.)

Movable plant and equipment is depreciated at rates considered appropriate to reduce cost to estimated residual value over the useful lives of the assets.

Stores and material

Stores and materials on hand are valued at average cost.

Foreign currencies

Foreign currency liabilities which are covered by forward exchange contracts are converted to Rand at the protected rates of exchange. Other foreign assets and liabilities are converted to Rand at the rates of exchange ruling at the balance sheet date. The currencies most favourable to the bondholders are used to convert loans raised in European Units of Account.

Deferred expenditure

Discount on loans issued

Discount on loans issued, is held as deferred expenditure and is charged to costs over the terms of the loans.

Exchange adjustment of foreign liabilities

Net losses arising from the conversion of foreign long term loan balances at the balance sheet date are written off over the periods of the loans.

Amortisation of borrowings

A redemption fund is established in terms of the Electricity Act, 1958 and provision for the redemption of loans is made over periods not exceeding 25 years.

The State President, in terms of Section 10(2) of the Act, has directed that the provisions relating to the establishment of the redemption fund should not apply to foreign loans; provision for repayment of such loans is made over periods not exceeding 25 years.

The redemption fund provisions are not applied to short-term loans and advances, as these are made under the provisions of paragraph 1(3) of the Schedule to the Act in anticipation of the raising of loans.

2. Electricity Supply Account

R000

1975	Note		Increase %	1976 Total	Corporate Services	Central Generating	Distribution Undertakings: Total	Cape Western	Cape Northern	Cape Eastern	Border	Orange River	Natal	Eastern Transvaal	Rand and O.F.S.
460 073	2.1	**Electricity sold**	42,67	**656 381**				**73 195**	**21 756**	**624**	**14 035**	**9 749**	**121 499**	**78 337**	**337 186**
148 347		Industrial	43,08	**212 253**				**25 307**	**2 333**	**363**	**1 382**	**868**	**37 763**	**46 036**	**98 201**
145 864		Bulk	45,06	**211 595**				**29 033**	**4 528**	**62**	**11 527**	**8 832**	**62 027**	**8 486**	**87 100**
114 952		Mining	42,30	**163 580**				—	**10 013**	—	—	—	**3 092**	**18 224**	**132 251**
33 608		Traction	37,14	**46 089**				**7 926**	**4 245**	—	—	—	**14 840**	**4 913**	**14 165**
17 302		Domestic and lighting	32,15	**22 864**				**10 929**	**637**	**199**	**1 126**	**49**	**3 777**	**678**	**5 469**
277 242	2.2	**Operating expenditure**		**385 739**	**14 100**	**311 594**	**60 045**	**11 285**	**3 528**	**296**	**2 656**	**1 504**	**11 220**	**7 269**	**22 287**
171 832		Operations		**238 714**	**232**	**237 147**	**1 335**	**148**	**111**	**5**	**176**	**82**	**168**	**138**	**507**
33 538		Maintenance		**51 791**	**8**	**33 406**	**18 377**	**3 880**	**658**	**76**	**602**	**151**	**2 508**	**3 250**	**7 252**
114		Electricity purchased		**2 399**	—	**2 251**	**148**	—	—	**107**	—	**41**	—	—	—
71 758		Administration and general expenses		**92 835**	**13 860**	**38 790**	**40 185**	**7 257**	**2 759**	**108**	**1 878**	**1 230**	**8 544**	**3 881**	**14 528**
167 777	2.3	**Loan charges**		**215 299**	**387**	**141 815**	**73 097**	**8 699**	**4 511**	**179**	**2 008**	**2 655**	**11 879**	**10 662**	**32 504**
136 963		Interest and finance charges		**173 832**	**390**	**108 744**	**64 698**	**7 702**	**4 056**	**160**	**1 831**	**2 349**	**10 340**	**9 485**	**28 775**
18 082		Redemption of local loans		**20 167**	**(3)**	**11 921**	**8 249**	**997**	**455**	**19**	**177**	**306**	**1 389**	**1 177**	**3 729**
12 732		Repayment of foreign loans		**21 300**	—	**21 150**	**150**	—	—	—	—	—	**150**	—	—
42 130	2.4	**Contributions to funds**		**55 284**	—	**35 372**	**19 912**	**2 178**	**1 053**	**35**	**617**	**755**	**3 480**	**2 937**	**8 857**
1 400		Reserve Fund		**1 700**	—	**514**	**1 186**	**32**	**19**	**1**	**206**	**208**	**544**	**46**	**130**
40 730		Capital Development Fund		**53 584**	—	**34 858**	**18 726**	**2 146**	**1 034**	**34**	**411**	**547**	**2 936**	**2 891**	**8 727**
—	2.5	**Distribution of costs**		—	**(14 487)**	**(488 781)**	**503 268**	**50 941**	**13 425**	**122**	**9 327**	**7 328**	**86 730**	**56 566**	**278 829**
—		Corporate burden		—	**(14 487)**	**9 190**	**5 297**	**698**	**289**	**10**	**126**	**151**	**814**	**741**	**2 468**
—		Interconnectors		—	—	**2 135**	**(2 135)**	—	**53**	—	—	**(732)**	—	**(181)**	**(1 275)**
—		Use of circuits		—	—	—	—	—	**345**	**8**	**122**	**(130)**	—	**(4)**	**(341)**
—		Transmission costs		—	—	**(10 175)**	**10 175**	**5 861**	**453**	**15**	**624**	**998**	**1 915**	—	**309**
—		Electricity supplied		—	—	—	—	—	—	—	—	—	—	**896**	**(896)**
—		Excess local generating costs		—	—	**(17 104)**	**17 104**	**6 221**	—	—	**2 600**	—	**8 283**	—	—
—		Pooled generation		—	—	**(472 827)**	**472 827**	**38 161**	**12 285**	**89**	**5 855**	**7 041**	**75 718**	**55 114**	**278 564**

R000

1975					Distribution Undertakings: Total	Cape Western	Cape Northern	Cape Eastern	Border	Orange River	Natal	Eastern Transvaal	Rand and O.F.S.
55 860	15 479	483	9 956	7 000	83 707	55 382	232 206						
19 050	1 691	284	1 028	947	25 587	31 865	67 895						
22 027	3 273	54	8 107	6 020	42 357	6 216	57 810						
—	6 923	—	—	—	1 947	13 022	93 060						
6 651	3 094	—	—	—	10 675	3 738	9 450						
8 132	498	145	821	33	3 141	541	3 991						
11 719	218 210	47 313	9 487	2 969	250	2 064	661	8 575	5 854	17 453			
—	165 498	6 334	535	254	18	104	90	1 510	932	2 891			
—	21 395	12 143	2 623	388	56	419	136	2 260	2 353	3 908			
—	26	88	—	—	88	—	—	—	—	—			
11 719	31 291	28 748	6 329	2 327	88	1 541	435	4 805	2 569	10 654			
387	110 055	57 335	6 153	3 358	133	1 349	1 910	9 978	8 573	25 881			
387	86 147	50 429	5 394	2 963	117	1 228	1 649	8 662	7 609	22 807			
—	11 326	6 756	759	395	16	121	261	1 166	964	3 074			
—	12 582	150	—	—	—	—	—	150	—	—			
—	31 750	10 380	1 080	430	33	410	417	2 460	1 270	4 280			
—	—	1 400	—	—	—	200	200	1 000	—	—			
—	31 750	8 980	1 080	430	33	210	217	1 460	1 270	4 280			
(12 106)	(360 015)	372 121	43 262	9 782	101	7 609	5 182	69 200	39 868	197 117			
(12 106)	7 709	4 397	518	244	9	89	95	737	621	2 084			
—	1 319	(1 319)	—	—	—	—	(248)	—	(181)	(890)			
—	425	(425)	—	342	9	120	(256)	—	(314)	(326)			
—	(10 170)	10 170	5 782	526	16	685	949	1 990	—	222			
—	—	—	—	—	—	—	—	—	665	(665)			
—	(23 062)	23 062	8 528	—	—	2 654	—	11 880	—	—			
—	(336 236)	336 236	28 434	8 670	67	4 061	4 642	54 593	39 077	196 692			

			1975	
3. Balance sheet	R000		R000	
3.1 Capital expenditure				
Balance at beginning of year		**2 569 803**		2 175 842
Discount on loans issued in prior years transferred to deferred expenditure (Note 3.4)	—		31 548	
Assets decommissioned, sold or scrapped	**1 181**		39	
		1 181		31 587
		2 568 622		2 144 255
Expenditure during the year		**642 639**		425 548
Balance at end of year		**3 211 261**		2 569 803
Commitments in respect of capital expenditure contracted for amount to approximately		**2 169 000**		811 500
This expenditure will be financed from external borrowings and from cash generated by means of the Capital Development Fund				
3.2 Stores and materials				
Consists of				
Gas, oil		**221**		—
Coal		**14 084**		8 013
Construction material		**85 452**		50 705
Maintenance and consumable stores		**53 821**		48 539
		153 578		107 257
3.3 External investments				
Held for				
Reserve Fund (Schedule 4)		**9 422**		9 334
Redemption Fund (Schedule 5)		**2 147**		2 399
		11 569		11 733
Housing loans to employees secured by first mortgage		**26 796**		22 015
Entire share capital of Rand Mines Power Supply Company Limited		**1**		1
		38 366		33 749
3.4 Deferred expenditure				
Loan discount		**33 000**		32 666
Exchange adjustment of foreign liabilities		**15 690**		17 065
Expenditure on future fuel supplies		**16 324**		8 059
		65 014		57 790
3.5 Loans outstanding				
Loans and instalments repayable during next year amount to		**17 838**		58 240
These repayments will be made out of the Redemption Fund and the Provision for repayment of Foreign Loans.				

3.6 Escom stock held for	R000		1975 R000	
	Book value	Nominal value	Book value	Nominal value
Capital Development Fund (Schedule 3)	**175 409**	**177 161**	109 518	110 966
Reserve Fund (Schedule 4)	**183 881**	**193 033**	169 315	177 870
Redemption Fund (Schedule 5)	**317 184**	**333 173**	309 911	325 029
Repayment of foreign loans (Schedule 6)	**4 696**	**5 664**	5 011	5 738
	681 170	**709 031**	593 755	619 603
Unrealised surplus being excess of nominal over book values	**27 861**		25 848	
3.7 Capital reserve				
Loans repaid		**400 444**		347 276
Machinery and plant financed out of Reserve Fund		**10 360**		10 360
		410 804		357 636
less Cost of land and rights, buildings and facilities and production plant sold and scrapped		**60 866**		59 685
		349 938		297 951

3.8 Accumulated deficit

In terms of the Electricity Act, 1958, the undertakings of the Commission are, as far as practicable, carried on neither at a profit nor at a loss, and its charges are adjusted accordingly from time to time.

4. Commitments

In addition to the commitment for capital expenditure referred to in Note 3.1, the Commission is committed to:

1. The payment of approximately R1 442 000 (R2 279 000 in 1975) in respect of loans granted to employees under the Commission's Home Ownership Scheme and not yet paid out.

2. The payment to the Electricity Supply Commission Pension and Provident Fund, in addition to the normal contributions, of R191 000 per annum for the period ending 31 December 1985.

3. The purchase from certain stockholders of Electricity Supply Commission Local Registered Stock as follows:

R4 500 000 – 6,75 per cent 1991 not later than September 1978 at R97 per cent.
R2 000 000 – 6,75 per cent 1991 at the option of the stockholders at R97 per cent.

5. Contingent liabilities

The Commission has indemnified the Electricity Supply Commission Pension and Provident Fund against any loss resulting from the negligence, dishonesty or fraud of the Fund's officers or of the Trustees.

Loans outstanding

at 31 December 1976 — Schedule 1

Loan No.		Per cent		Out-standing R000	1975 R000
Internal registered stock					
33	16 000	4,625	1975/80	**16 000**	16 000
34	16 000	4,875	1975/80	**16 000**	16 000
35	16 500	5,125	1976/81	**16 500**	16 500
36	20 000	5,125	1977/82	**20 000**	20 000
37	22 000	5,125	1976/82	**22 000**	22 000
38	24 000	5,125	1977/83	**24 000**	24 000
39	24 000	5,375	1978/83	**24 000**	24 000
40	22 000	5,625	1979/84	**22 000**	22 000
42	20 000	5,375	1979/84	**20 000**	20 000
43	16 000	5,375	1979/85	**16 000**	16 000
44	16 000	5,375	1980/85	**16 000**	16 000
45	17 000	5,500	1980/86	**17 000**	17 000
46	16 000	5,875	1981/86	**16 000**	16 000
47	18 000	6,250	1981/86	**18 000**	18 000
49	18 000	6,125	1982/87	**18 000**	18 000
50	22 000	5,250	1982/87	**22 000**	22 000
51	29 000	5,000	1983/88	**29 000**	29 000
52	40 000	5,000	1980/83	**40 000**	40 000
53	20 000	5,000	1982/84	**20 000**	20 000
54	20 000	5,500	1982/84	**20 000**	20 000
55	32 000	5,875	1983/85	**32 000**	32 000
56	38 000	6,500	1983/85	**38 000**	38 000
58	30 000	6,500	1989/91	**30 000**	30 000
60	35 000	6,750	1991	**35 000**	35 000
61	35 000	6,875	1992	**35 000**	35 000
64	12 000	6,500	1992	**12 000**	12 000
65	37 000	6,875	1992	**37 000**	37 000
70	10 000	6,500	1993	**10 000**	10 000
71	70 000	6,875	1993	**70 000**	70 000
75	22 000	6,500	1993	**22 000**	22 000
76	48 000	6,875	1993	**48 000**	48 000
78	20 000	6,500	1994	**20 000**	20 000
79	30 000	6,875	1994	**30 000**	30 000
81	10 000	6,500	1994	**10 000**	10 000
82	25 000	6,875	1994	**25 000**	25 000
83	18 000	7,500	1995	**18 000**	18 000
84	3 000	7,000	1995	**3 000**	3 000
85	35 000	8,750	1995	**35 000**	35 000
86	10 000	8,500	1995	**10 000**	10 000
87	45 000	9,250	1996	**45 000**	45 000
88	10 000	8,750	1996	**10 000**	10 000
89	20 000	9,250	1996	**20 000**	20 000
90	30 000	9,250	1996	**30 000**	30 000
91	10 000	8,750	1996	**10 000**	10 000
Carried forward				**1 047 500**	1 047 500

Loan No.		Per cent		Out-standing R000	1975 R000
Brought forward				**1 047 500**	1 047 500
92	20 000	9,250	1997	**20 000**	20 000
93	22 000	9,125	1997	**22 000**	22 000
94	5 000	8,750	1997	**5 000**	5 000
95	25 000	8,500	1997	**25 000**	25 000
96	28 000	8,250	1997	**28 000**	28 000
97	7 000	8,000	1997	**7 000**	7 000
98	45 000	8,250	1997	**45 000**	45 000
99	30 000	8,250	1997	**30 000**	30 000
100	20 000	8,375	1998	**20 000**	20 000
101	5 000	8,000	1998	**5 000**	5 000
102	30 000	6,250	1976	**—**	30 000
103	24 000	8,000	1998	**24 000**	24 000
104	6 000	7,625	1998	**6 000**	6 000
105	30 000	7,250	1979	**30 000**	30 000
106	45 000	8,000	1998	**45 000**	45 000
107	27 000	9,000	1999	**27 000**	27 000
108	3 000	8,500	1999	**3 000**	3 000
109	12 000	8,000	1976	**—**	12 000
110	30 000	9,500	1999	**30 000**	30 000
111	11 000	10,750	2000	**11 000**	11 000
112	29 000	10,750	2000	**29 000**	29 000
113	40 000	10,750	2000	**40 000**	40 000
114	25 000	10,750	2000	**25 000**	25 000
115	5 000	10,250	2000	**5 000**	5 000
116	30 000	10,750	2000	**30 000**	30 000
117	5 000	10,875	1985	**5 000**	(a) 5 000
118	55 000	11,000	2000	**55 000**	(b) 55 000
119	10 000	10,750	1980/95	**10 000**	(c) 10 000
120	4 000	11,000	1986	**4 000**	—
121	40 000	11,400	2001	**40 000**	—
122	6 000	11,100	1981/96	**6 000**	—
123	40 000	12,750	1996	**(a) 40 000**	—
124	10 000	12,650	1986	**(b) 10 000**	—
125	20 000	12,450	1981	**(c) 20 000**	—
126	40 000	12,500	2001	**40 000**	—
Carried forward				**1 789 500**	1 671 500

Loan No.			Per cent		Out-standing R000	1975 R000
Brought forward					**1 789 500**	1 671 500
Foreign bond issues						
557	DM	50 000 000	(8 921)	6,500	**3 569**	4 461
562	US$	15 000 000	(10 776)	7,000	**1 078**	2 155
574	UA	15 000 000	(10 906)	7,000	**5 820**	7 809
577	DM	100 000 000	(18 034)	6,500	**12 820**	14 596
578	DM	100 000 000	(19 583)	8,500	**17 625**	19 583
580	UA	12 000 000	(8 627)	9,250	**6 984**	8 149
584	DM	100 000 000	(19 556)	8,000	**19 556**	19 556
592	UA	20 000 000	(14 210)	8,250	**19 424**	19 938
598	US$	20 000 000	(14 304)	8,500	**11 085**	12 158
604	DM	100 000 000	(25 132)	6,250	**25 132**	25 132
607	SF	50 000 000	(8 293)	6,500	**8 293**	8 293
610	DM	100 000 000	(24 975)	7,000	**24 975**	24 975
614	US$	15 000 000	(10 080)	9,250	**9 408**	9 744
Direct placings						
559	US$	20 000 000	(14 357)	6,250	**—**	2 108
589	DM	10 000 000	(2 054)	8,000	**2 054**	2 054
593	DM	20 000 000	(3 644)	8,500	**3 644**	3 644
596	DM	20 000 000	(4 016)	8,500	**4 016**	4 016
597	DM	40 000 000	(9 437)	8,500	**8 257**	9 437
620	US$	40 000 000	(27 244)	9,375	**27 244**	27 244
					2 000 484	1 896 552
less Payable by stockholders in respect of internal registered stock					**1 838**	1 484
117	Not later than 27 February 1976					(a) 1
118	Not later than 27 February 1976					(b) 785
119	Not later than 27 February 1976					(c) 698
123	Not later than 31 January 1977				**(a) 548**	
124	Not later than 31 January 1977				**(b) 523**	
125	Not later than 31 January 1977				**(c) 767**	
					1 998 646	1 895 068

Short-term loans and advances

at 31 December 1976

Schedule 2

Loan No.			R000	Per cent		Outstanding	R000 1975
Foreign bond issues							
621	US$	25 000 000	(17 028)	10,0000	1975/80	**17 028**	17 028
622	DM	100 000 000	(27 851)	9,2500	1975/80	**27 851**	27 851
625	US$	30 000 000	(26 119)	10,2500	1975/83	**26 119**	26 119
Direct placings							
587	SF	50 000 000	(8 355)	8,5000	1971/76	—	8 355
591	SF	40 000 000	(6 892)	8,5000	1971/76	—	6 892
595	SF	40 000 000	(7 176)	7,5000	1971/76	—	7 176
600	SF	9 000 000	(1 585)	6,5000	1972/77	**1 585**	1 585
601	D.FL	50 000 000	(11 740)	6,5000	1972/79	**8 805**	11 740
608	SF	50 000 000	(8 324)	6,7500	1973/80	**8 324**	8 324
609	SF	35 000 000	(7 647)	6,7500	1973/78	**7 647**	7 647
611	SF	75 000 000	(16 304)	6,5000	1973/80	**16 304**	16 304
613	SF	50 000 000	(10 850)	7,2500	1973/78	**10 850**	10 850
615	SF	20 000 000	(4 318)	8,5000	1974/79	**4 318**	4 318
616	US$	35 000 000	(23 839)	8,5000	1974/82	**21 455**	22 647
618	DM	70 000 000	(20 138)	10,5000	1975/79	**20 138**	20 138
619	SF	30 000 000	(8 003)	9,0000	1975/82	**8 003**	8 003
624	SF	50 000 000	(13 298)	9,0000	1975/80	**13 298**	13 298
626	US$	30 000 000	(25 832)	7,0000	1975/76	—	25 832
627	SF	50 000 000	(16 226)	8,5000	1975/78	**16 226**	16 226
628A	US$	30 000 000	(26 119)	8,3125	1975/76	—	26 119
629	M£	5 000 000	(10 743)	8,5000	1976/81	**10 048**	—
630A	US$	15 000 000	(13 066)	6,3125	1976/77	**13 066**	—
631	SF	50 000 000	(17 185)	7,7500	1976/80	**17 185**	—
632	DM	75 000 000	(25 351)	9,7500	1976/80	**25 351**	—
633	US$	20 000 000	(17 384)	7,7500	1976/77	**17 384**	—
633A	US$	10 000 000	(8 706)	8,5000	1976/77	**8 390**	—
634	US$	10 000 000	(8 706)	8,5000	1976/77	**8 706**	—
637	US$	5 000 000	(4 353)	7 1875	1976/78	**4 353**	—
638	DM	13 000 000	(4 476)	7,0000	1976/77	**4 476**	—
639	DM	10 290 875	(3 553)	7,0000	1976/77	**3 108**	—
640	DM	4 111 852	(1 423)	7,0000	1976/77	**1 418**	—
641	SF	20 000 000	(7 088)	6,2500	1976/78	**7 088**	—
642	US$	10 000 000	(8 718)	8,5000	1976/81	**8 718**	—
643	US$	10 000 000	(8 706)	7,0000	1976/77	**8 706**	—
644	DM	10 000 000	(3 619)	7,3750	1976/77	**3 619**	—
Short-term loans						**349 567**	286 452
Other short-term advances						**541 929**	148 535
						891 496	434 987

Investments of the Capital Development Fund

at 31 December 1976

Schedule 3

R000

Description			Loan No.	Nominal value	Book value
Escom internal registered stock					
8,5	per cent	1997	95	7 000	6 752
8,25	per cent	1997	98	7 400	7 316
8,375	per cent	1998	100	2 000	1 991
8	per cent	1998	103	2 000	2 000
8	per cent	1998	106	13 000	13 000
9,5	per cent	1999	110	12 000	11 912
10,75	per cent	2000	112	8 766	8 584
10,75	per cent	2000	113	19 995	19 581
10,75	per cent	2000	114	800	795
10,75	per cent	2000	116	10 000	9 941
11	per cent	2000	118	28 000	27 652
11,4	per cent	2001	121	31 000	31 000
12,75	per cent	1996	123	5 500	5 500
12,65	per cent	1986	124	1 700	1 700
12,5	per cent	2001	126	28 000	27 685
Total (Note 3.6)				177 161	175 409
Interest accrued					3 929
					179 338
Market value			156 359		

Investments of the Reserve Fund

at 31 December 1976

Schedule 4

Description		Loan No.	Nominal value R000	Book value R000
Escom internal registered stock				
4,625 per cent	1975/80	33	1 624	1 387
4,875 per cent	1975/80	34	2 442	2 142
5,125 per cent	1976/81	35	2 631	2 330
5,125 per cent	1977/82	36	1 597	1 363
5,125 per cent	1976/82	37	1 913	1 717
5,125 per cent	1977/83	38	2 475	2 231
5,375 per cent	1978/83	39	336	274
5,625 per cent	1979/84	40	2 349	2 025
5,375 per cent	1979/84	42	1 561	1 404
5,375 per cent	1979/85	43	476	397
5,375 per cent	1980/85	44	1 217	1 049
5,5 per cent	1980/86	45	1 934	1 722
5,875 per cent	1981/86	46	2 705	2 482
6,25 per cent	1981/86	47	3 704	3 296
6,125 per cent	1982/87	49	2 223	2 049
5,25 per cent	1982/87	50	3 731	3 188
5 per cent	1983/88	51	5 216	4 348
5 per cent	1980/83	52	3 313	2 894
5 per cent	1982/84	53	2 583	2 266
5,5 per cent	1982/84	54	2 354	2 135
5,875 per cent	1983/85	55	4 392	4 002
6,5 per cent	1983/85	56	4 814	4 252
6,5 per cent	1989/91	58	3 902	3 721
6,75 per cent	1991	60	4 486	4 385
6,875 per cent	1992	61	4 050	3 998
6,5 per cent	1992	64	20	19
6,875 per cent	1992	65	8 919	8 775
6,875 per cent	1993	71	7 276	6 923
6,5 per cent	1993	75	1 543	1 433
6,875 per cent	1993	76	8 717	8 429
6,5 per cent	1994	78	1 985	1 872
6,875 per cent	1994	79	6 966	6 836
6,5 per cent	1994	81	1 982	1 829
6,875 per cent	1994	82	3 483	3 349
7,5 per cent	1995	83	1 724	1 724
7 per cent	1995	84	1 554	1 475
8,75 per cent	1995	85	8 920	8 920
8,5 per cent	1995	86	1 830	1 787
9,25 per cent	1996	87	903	903
9,25 per cent	1996	90	67	67
8,75 per cent	1996	91	227	226
9,125 per cent	1997	93	310	310
8,75 per cent	1997	94	98	98
8,5 per cent	1997	95	3 966	3 826
8,25 per cent	1997	96	346	336
8,25 per cent	1997	98	6 480	6 406
8,25 per cent	1998	99	7 455	7 233
8,375 per cent	1998	100	2 817	2 805
7,25 per cent	1979	105	5 537	5 473
8 per cent	1998	106	1 850	1 850
10,75 per cent	2000	111	673	673
10,75 per cent	2000	114	4	4
10,75 per cent	2000	116	3 356	3 337
10,875 per cent	1985	117	2 982	2 971
10,75 per cent	1980/95	119	5 946	5 945
Carried forward			165 964	156 891

Description		Loan No.	Nominal value R000	Book value R000
Brought forward			165 964	156 891
11 per cent	1986	120	1 704	1 676
11,4 per cent	2001	121	401	401
11,1 per cent	1981/96	122	2 510	2 510
12,75 per cent	1996	123	3 986	3 986
12,65 per cent	1986	124	3 995	3 995
12,45 per cent	1981	125	9 973	9 973
12,5 per cent	2001	126	4 500	4 449
Total (Note 3.6)			193 033	183 881
Republic of South Africa				
5,25 per cent	1979		700	686
Municipal stocks				
Bloemfontein				
5,375 per cent	1975/80		100	93
Cape Town				
5,375 per cent	1980/85	203	600	531
5,5 per cent	1981/86	208	850	743
5,5 per cent	1983/88	219	610	522
5,5 per cent	1980	227	100	95
6,5 per cent	1981	240	210	204
Durban				
3 per cent	1967/77	50	1	1
5,375 per cent	1974/79	68	600	572
5,375 per cent	1976/80	70	800	750
6 per cent	1972/77	74	334	332
5 per cent	1984	84	500	430
5,5 per cent	1982	87	450	411
6 per cent	1980	88	500	479
6 per cent	1981	91	1 000	948
6,5 per cent	1981	93	1 000	968
Germiston				
5,375 per cent	1985	16	150	129
Johannesburg				
5,375 per cent	1974/79	36	120	114
Pretoria				
5 per cent	1961/81	7	246	225
5,375 per cent	1975/78	44	100	98
5,375 per cent	1975/78	47	100	97
6,25 per cent	1977/82	49	200	190
5,5 per cent	1980/83	56	200	180
6,5 per cent	1981/84	59	200	190
Rand Water Board				
6,5 per cent	1984	33	250	238
7 per cent	1987	35	200	196
External investments (Note 3.3)			10 121	9 422
			203 154	193 303
Interest accrued				2 697
				196 000
Market value			149 549	

Investments of the Redemption Fund

at 31 December 1976

Schedule 5

Description		Loan No.	Nominal value R000	Book value R000
Escom internal registered stock				
5,125 per cent	1976/81	35	353	282
5,125 per cent	1977/82	36	131	119
5,125 per cent	1976/82	37	3 440	3 149
5,125 per cent	1977/83	38	8 313	7 558
5,375 per cent	1978/83	39	67	62
5,625 per cent	1979/84	40	500	460
5,375 per cent	1979/84	42	6 085	5 517
5,375 per cent	1979/85	43	6 128	5 515
5,375 per cent	1980/85	44	7 367	6 579
5,5 per cent	1980/86	45	4 848	4 362
5,875 per cent	1981/86	46	7 566	6 980
6,25 per cent	1981/86	47	4 143	3 911
6,125 per cent	1982/87	49	6 295	5 898
5,25 per cent	1982/87	50	6 514	5 624
5 per cent	1983/88	51	9 650	8 030
5 per cent	1982/84	53	3 328	2 909
5,5 per cent	1982/84	54	3 502	3 173
5,875 per cent	1983/85	55	10 191	9 560
6,5 per cent	1983/85	56	3 648	3 498
6,5 per cent	1989/91	58	9 539	9 014
6,75 per cent	1991	60	4 248	4 062
6,875 per cent	1992	61	6 343	6 141
6,5 per cent	1992	64	2 066	1 955
6,875 per cent	1992	65	4 165	3 952
6,5 per cent	1993	70	2 257	2 086
6,875 per cent	1993	71	5 150	4 884
6,5 per cent	1993	75	1 884	1 625
6,875 per cent	1993	76	1 442	977
6,5 per cent	1994	78	4 066	3 677
6,875 per cent	1994	79	11 277	10 945
6,5 per cent	1994	81	3 565	3 271
6,875 per cent	1994	82	9 257	8 882
7,5 per cent	1995	83	613	509
7 per cent	1995	84	129	99
8,75 per cent	1995	85	8 727	8 650
8,5 per cent	1995	86	1 529	1 451
9,25 per cent	1996	87	4 368	4 154
8,75 per cent	1996	88	199	180
9,25 per cent	1996	89	4 765	4 697
9,25 per cent	1996	90	12 559	12 209
8,75 per cent	1996	91	7 803	7 418
9,25 per cent	1997	92	2 109	2 095
9,125 per cent	1997	93	1 185	1 108
8,75 per cent	1997	94	955	917
8,5 per cent	1997	95	13 167	12 690
8,25 per cent	1997	96	7 226	7 051
8 per cent	1997	97	221	198
8,25 per cent	1997	98	10 732	10 605
8,25 per cent	1998	99	7 500	7 272
8,375 per cent	1998	100	2 731	2 615
Carried forward			243 846	228 575

Description		Loan No.	Nominal value R000	Book value R000
Brought forward			243 846	228 575
8 per cent	1998	101	2 143	2 038
8 per cent	1998	103	714	656
7,625 per cent	1998	104	2 078	1 998
7,25 per cent	1979	105	6 966	6 933
8 per cent	1998	106	29 990	29 990
9 per cent	1999	107	287	241
8,5 per cent	1999	108	505	468
9,5 per cent	1999	110	8 640	8 566
10,75 per cent	2000	111	190	179
10,75 per cent	2000	112	56	52
10,75 per cent	2000	114	33	31
10,25 per cent	2000	115	701	665
10,75 per cent	2000	116	15 009	14 919
10,875 per cent	1985	117	1 113	1 109
11 per cent	2000	118	8 790	8 680
10,75 per cent	1980/95	119	959	959
11,4 per cent	2001	121	2 366	2 366
12,75 per cent	1996	123	4 503	4 503
12,65 per cent	1986	124	1 800	1 800
12,45 per cent	1981	125	41	41
12,5 per cent	2001	126	2 443	2 415
Total (Note 3.6)			333 173	317 184
Republic of South Africa				
5,25 per cent	1979		300	294
6 per cent	1985		500	488
Municipal stocks				
Bloemfontein				
5,375 per cent	1975/80		80	74
Cape Town				
5,375 per cent	1980/85	203	300	265
Durban				
3 per cent	1967/77	50	668	651
5,375 per cent	1974/79	68	120	115
Germiston				
5,375 per cent	1985	16	20	17
Johannesburg				
3 per cent	1967/77	21	60	58
5,375 per cent	1974/79	36	194	185
External investments (Notes 3.3)			2 242	2 147
			335 415	319 331
Interest accrued				3 892
				323 223
Market value		236 163		

Investments in Escom foreign loan bonds

at 31 December 1976

Schedule 6

R000

Description		Loan No.		Foreign currency	Nominal value	Book value
German	6,5 per cent 1965/80	557	DM	619 800	111	102
Euro-dollar	7 per cent 1967/77	562	$	56 000	40	39
Units of Account	7 per cent 1968/78	574	UA	150 000	218	186
German	6,5 per cent 1968/83	577	DM	3 414 000	616	553
German	8,5 per cent 1970/85	578	DM	422 000	83	75
Units of Account	9,25 per cent 1970/80	580	UA	300 000	436	390
German	8 per cent 1971/86	584	DM	3 126 000	611	531
Units of Account	8,25 per cent 1971/86	592	UA	733 000	1 067	802
German	6,25 per cent 1972/86	604	DM	6 271 000	1 576	1 283
German	7 per cent 1973/88	610	DM	2 284 000	570	431
Euro-dollar	9,25 per cent 1974/89	614	$	500 000	336	304
Total (Note 3.6)					5 664	4 696
Interest accrued						236
						4 932
Market value				6 282		

Capital Development Fund Account

for the year ended 31 December 1976

Schedule 7

	R000		R000	
			1975	
Amounts set aside		**53 584**		40 730
Cape Western Undertaking	**2 146**		1 080	
Cape Eastern Undertaking	**34**		33	
Cape Northern Undertaking	**1 034**		430	
Border Undertaking	**411**		210	
Natal Undertaking	**2 936**		1 460	
Eastern Transvaal Undertaking	**2 891**		1 270	
Rand and Orange Free State Undertaking	**8 727**		4 280	
Central Generating Undertaking	**34 858**		31 750	
Orange River Undertaking	**547**		217	
Income from investments		**15 130**		8 461
Interest earned	**15 118**		8 449	
Adjustment of investment values	**12**		12	
Accumulated balance at beginning of year		**112 887**		63 696
Balance at end of year		**181 601**		112 887

Reserve Fund Account

for the year ended 31 December 1976 — Schedule 8

	R000		R000	
			1975	
Amounts set aside		**1 700**		1 400
Cape Western Undertaking	**32**		—	
Cape Eastern Undertaking	**1**		—	
Cape Northern Undertaking	**19**		—	
Border Undertaking	**206**		200	
Natal Undertaking	**544**		1 000	
Eastern Transvaal Undertaking	**46**		—	
Rand and Orange Free State Undertaking	**130**		—	
Central Generating Undertaking	**514**		—	
Orange River Undertaking	**208**		200	
Income from investments		**14 670**		12 903
Interest earned	**14 348**		12 849	
Adjustment of investment values	**322**		54	
		16 370		14 303
Expenditure during the year		**4 334**		1 981
Cape Western Undertaking	**97**		9	
Cape Eastern Undertaking	**—**		1	
Cape Northern Undertaking	**106**		38	
Border Undertaking	**—**		2	
Natal Undertaking	**288**		413	
Eastern Transvaal Undertaking	**19**		5	
Rand and Orange Free State Undertaking	**315**		315	
Central Generating Undertaking	**3 497**		1 197	
Orange River Undertaking	**12**		1	
		12 036		12 322
Accumulated balance at beginning of year		**183 825**		171 503
Balance at end of year		**195 861**		183 825

Redemption Fund Account

for the year ended 31 December 1976 — Schedule 9

	R000		R000	
				1975
Balance at beginning of year		**318 865**		296 578
Amounts contributed during year		**20 131**		18 082
Cape Western Undertaking	**984**		759	
Cape Eastern Undertaking	**19**		16	
Cape Northern Undertaking	**455**		395	
Border Undertaking	**165**		121	
Natal Undertaking	**1 389**		1 166	
Eastern Transvaal Undertaking	**1 178**		964	
Rand and Orange Free State Undertaking	**3 714**		3 074	
Central Generating Undertaking	**11 921**		11 326	
Orange River Undertaking	**306**		261	
Other contributions		**36**		36
Proceeds of sales of fixed property		**1 168**		111
Income from investments		**27 483**		24 058
Interest earned	**27 830**		25 750	
Adjustment of investment values	**(347)**		(1 692)	
		367 683		338 865
Repayment of internal registered stock		**42 000**		20 000
5 per cent 1971/75 (Loan 32)			20 000	
6,25 per cent 1976 (Loan 102)	**30 000**			
8 per cent 1976 (Loan 109)	**12 000**			
Balance at end of year		**325 683**		318 865

We report that we have examined the accounting records of the Redemption Fund and are satisfied as to the correctness thereof and as to the maintenance of the Fund at the amount required by the schedule to the Electricity Act 1958.

In reviewing the valuation of the Fund at 31 December 1976 we have taken into account the market value of the investments at that date.

Alex. Aiken & Carter
Halsey, Button & Perry
Chartered Accountants (S.A.)
Auditors

Johannesburg
4 April 1977

Power stations: principal equipment installed

at 31 December 1976 — Statement No. 1

Power station	Type	Station capacity: Boilers kg/s	Station capacity: Generators MW	Assigned sent-out rating MW	Boilers: No.	Boilers: Continuous maximum rating each kg/s	Main turbo-generators: No.	Main turbo-generators: Normal rating each MW	Steam conditions at turbine inlet: Pressure MPa (abs)	Steam conditions at turbine inlet: Temperature °C
Coal-fired station, Eastern Cape										
West Bank 1	Steam	27,6	22,5		4	6,9	3	7,5	1,6	371
West Bank 2	Steam	85,6	45,0		4	21,4	3	15,0	2,9	427
		53,0	40,0		2	26,5	2	20,0	2,9	427
		138,6	85,0		6		5			
West Bank 1 and 2		166,2	107,5	101	10		8			
Sub-total		166,2	107,5	101	10		8			
Coal-fired, stations, Natal										
Colenso	Steam	113,5	75,0		5	22,7	3	25,0	2,0	385
		50,4	30,0		2	25,2	1	30,0	2,0	385
		163,9	105,0	91	7		4			
Congella	Steam	201,6	70,0		8	25,2	2	35,0	4,3	435
			37,0				1	37,0	4,3	435
		201,6	107,0	97	8		3			
Ingagane	Steam	567,0	500,0	465	5	113,4	5	100,0	8,4	510
Umgeni	Steam	181,6	120,0		8	22,7	4	30,0	4,2	454
		164,0	120,0		5	32,8	2	60,0	4,2	454
		345,6	240,0	222	13		6			
Sub-total		1 278,1	952,0	875	33		18			
Coal-fired stations, Transvaal and O.F.S.										
Arnot	Steam	1 998,6	2 100,0	1 980	6	333,1	6	350,0	15,9	510/510
Camden	Steam	1 814,4	1 600,0	1 520	8	226,8	8	200,0	10,3	538
Grootvlei	Steam	856,8	1 000,0		4	214,2	5	200,0	10,3	538
		230,6			1	230,6				
		1 087,4	1 000,0	950	5		5			
Hendrina	Steam	1 927,8	1 800,0	1 710	9	214,2	9	200,0	10,3	538
Highveld	Steam	554,4	480,0	440	8	69,3	8	60,0	6,3	482
Klip	Steam	567,5	396,0		25	22,7	12	33,0	2,5	390
			*28,0							
		567,5	424,0	372	25		12			
Komati	Steam	567,0	500,0		5	113,4	5	100,0	8,4	510
		566,8	500,0		4	141,7	4	125,0	8,4	510
		1 133,8	1 000,0	925	9		9			
Kriel	Steam	440,0	500,0	475	*1	440,0	1	500,0	16,0	510/510
Taaibos	Steam	584,0	480,0	440	8	73,1	8	60,0	4,2	441
Vaal	Steam		297,0				9	33,0	2,5	427
		430,2	†21,0		18	23,9				
		430,2	318,0	282	18		9			
Vierfontein	Steam	503,5	360,0	336	19	26,5	12	30,0	4,2	441
Wilge	Steam	62,8			4	15,7				
		201,6	60,0		4	50,4	2	30,0	4,2	454
		73,1	180,0		1	73,1	3	60,0	4,2	454
		337,5	240,0	221	9		5			
Sub-total		11 379,1	10 302,0	9 651	125		92			

Power station	Type	Station capacity: Boilers kg/s	Station capacity: Generators MW	Assigned sent-out rating MW	Boilers: No.	Boilers: Continuous maximum rating each kg/s	Main turbo-generators: No.	Main turbo-generators: Normal rating each MW	Steam conditions at turbine inlet: Pressure MPa (abs)	Steam conditions at turbine inlet: Temperature °C
Coal-fired stations, Western Cape										
Hex River	Steam	100,8	60,0		4	25,2	3	20,0	4,2	427
		69,2	60,0		2	34,6	2	30,0	4,2	482
		170,0	120,0	114	6		5			
Salt River 1	Steam	75,6	60,0		6	12,6	3	20,0	2,9	385
Salt River 2	Steam	328,0	120,0		10	32,8	4	30,0	4,2	482
			120,0				2	60,0	4,2	482
		328,0	240,0		10		6			
Salt River 1 and 2		403,6	300,0	285	16		9			
Sub-total		573,6	420,0	399	22		14			
Total, coal-fired stations		13 397,0	11 781,5	11 026	190		132			
Gas turbine stations										
Acacia (Western Cape)	Gas turbine		171,0	171			3	57,0		
Port Rex (Eastern Cape)	Gas turbine		171,0	171			3	57,0		
Total gas turbine stations			342,0	342			6			
Hydro-electric stations, conventional storage										
Hendrik Verwoerd	Hydro		320,0	320			4	80,0		
Total, Hydro stations			320,0	320			4			
Total all Escom		13 397,0	12 443,5	11 688	190		142			

*Four 7 MW house sets installed at Klip
†Three 7 MW house sets installed at Vaal

Transmission lines and cables:

Circuit kilometres (excluding service connections on reticulation systems)

at 31 December 1976

Statement No. 1
(continued)

(a) Transmission lines

Undertaking	533 kV D.C. (Monopolar)	400 kV	275 kV	220 kV	165 kV	132 kV	88 kV	66 kV	42 kV	33 kV	22 kV 21 kV	11 kV	6,6 kV	3,3 kV	2,0 kV 2,1 kV 2,2 kV	380 V 220 V	Total
Border				159,85		9,55		706,18		57,48	584,16	1 472,93		5,78		180,89	3 176,82
Cape Eastern											252,00	226,67				17,34	496,01
Cape Northern			189,00		221,60	2 200,74		604,96			1 589,04	1 836,43				125,60	6 767,37
Cape Western						1 164,80		1 854,37		163,66	1 136,35	5 915,72	553,10			2 268,97	13 056,97
Eastern Transvaal			807,63			1 757,76	1 076,68	291,38		10,20	4 604,10	4 644,23	115,89	13,52	79,96	344,05	13 745,40
Natal			1 220,45			1 280,68	2 336,48			907,05	696,61	8 178,04	8,30		1,53	811,03	15 440,17
Orange River				494,97		152,77		819,07			1 184,24	130,31				2,81	2 784,17
Rand & O.F.S.		430,49	2 586,52			4 035,36	6 131,63	126,57	2 431,22	14,80	2 145,89	12 479,49	553,66		1,62	1 316,08	32 253,33
Central Generating	1 029,70	5 430,36		106,46		16,00											6 582,52
							9 544,79	4 402,53	2 431,22	1 153,19	12 192,39	34 883,82	1 230,95	19,30	83,11	5 066,77	
Totals "A"	1 029,70	5 860,85	4 803,60	761,28	10 839,26		17 531,73				53 476,34						94 302,76

(b) Underground cables

Border											0,02	32,20		3,75		44,18	80,15
Cape Eastern																2,64	2,64
Cape Northern								0,32			1,87	2,00				34,12	38,31
Cape Western						15,75		47,30		57,10	5,77	1 257,21	15,46	0,71		1 700,32	3 099,62
Eastern Transvaal											40,77	68,40	3,15	1,67	4,78	146,20	264,97
Natal							1,89			4,45	5,83	399,91	6,52	0,47	0,02	233,44	652,53
Orange River																	—
Rand & O.F.S.							41,15		163,44	0,33	185,67	445,27	682,33	0,21		503,23	2 021,63
							43,04	47,62	163,44	61,88	239,93	2 204,99	707,46	6,81	4,80	2 664,13	
Totals "B"					15,75		315,98				5 828,12						6 159,85

(c) Total lines & cables

A + B = C 1976	1 029,70	5 860,85	5 564,88	10 855,01			9 587,83	4 450,15	2 594,66	1 215,07	1 215,32	37 088,81	1 938,41	26,11	87,91	7 730,90	
D 1975	1 029,70	5 098,85	5 340,38	9 854,92			17 847,71				59 304,46						100 462,61
Additions: C − D = E	—	762,00	224,5	1 000,09			17 094,82				55 491,10						93 909,77
							752,89				3 813,36						6 552,84

Capacity of transformers in service

at 31 December 1976

Statement No. 1
(continued)

Undertaking	Number		Capacity MVA	
	1975	1976	1975	1976
Border	1 215	1 306	672,641	685,724
Cape Eastern	594	636	16,680	18,079
Cape Northern	3 048	3 190	1 375,184	1 617,768
Cape Western	10 658	11 191	4 271,180	4 579,222
Eastern Transvaal	6 141	6 635	7 037,891	7 820,685
Natal	8 464	9 189	8 857,162	9 212,736
Orange River	285	301	2 370,505	3 755,262
Rand & O.F.S.	17 557	19 144	31 346,241	33 890,414
Central Generating	1 157	1 185	16 497,104	17 385,919
Totals	49 119	52 777	72 444,588	78 965,809

Power purchased from outside sources

Statement No. 2

Purchased from	kWh					
	1971	1972	1973	1974	1975	**1976**
Water Affairs Department	1 886 712	2 986 020	3 506 570	4 518 726	8 451 200	**9 877 852**
Port Elizabeth Municipality (Aloes)	5 058 867	5 706 956	6 426 031	1 375 020	—	—
Port Elizabeth Municipality (Summit)	1 375 320	958 440	1 337 160	1 977 465	1 264 860	**1 283 933**
Transvaal Sugar Corporation	6 000	—	—	—	—	—
Cabora Bassa	—	—	—	—	25 152 400	**1 214 338 300**
Pretoria Municipality	—	2 160	—	—	—	—
Total kWh purchased	8 326 899	9 653 576	11 269 761	7 871 211	34 868 460	**1 225 500 085**
Total kWh sold	38 040 020 852	41 648 918 788	46 578 458 899	52 585 098 245	57 869 160 163	**63 355 717 041**
Purchased as percentage of sales	0,022%	0,023%	0,024%	0,015%	0,060%	**1,934%**

kWh sold and number of consumers, 1976

Statement No. 3

In licensed areas of Undertakings

	Bulk			Domestic and street lighting			Industrial			Mining				Traction			Total		
	kWh	Per cent	Number of consumers	kWh	Per cent	Number of consumers	kWh	Per cent	Number of consumers	kWh	Per cent	Number of consumers	kWh	Per cent	Number of consumers	kWh	Per cent	Number of consumers
Border	597 339 680	2,97	19	30 858 017	2,82	4 146	46 652 263	0,23	507	—		—	—		—	674 849 960	1,07	4 672
Cape Eastern	2 590 320	0,01	1	3 722 642	0,34	658	7 817 969	0,04	292	—		—	—		—	14 130 931	0,02	951
Cape Northern	336 310 505	1,67	29	26 734 896	2,45	3 099	123 487 541	0,62	966	725 268 485	3,87	77	294 895 030	8,49	3	1 506 696 457	2,38	4 174
Cape Western	2 538 896 006	12,64	56	482 012 267	44,09	59 474	1 422 540 958	7,13	16 542	—		—	486 928 120	14,01	6	4 930 377 351	7,78	76 078
Eastern Transvaal	842 466 967	4,19	32	36 438 634	3,33	2 975	4 901 397 250	24,58	6 319	1 869 415 811	9,97	119	378 630 299	10,90	8	8 028 348 961	12,67	9 453
Natal	5 381 512 614	26,78	37	171 858 304	15,72	16 506	3 101 864 766	15,55	12 948	215 035 264	1,15	35	1 060 792 232	30,53	14	9 931 063 180	15,68	29 540
Orange River	997 612 534	4,97	37	1 011 210	0,09	121	36 185 677	0,18	138	—		—	—		—	1 034 809 421	1,63	296
Rand and O.F.S.	9 399 028 127	46,77	154	340 551 014	31,16	18 503	10 305 907 728	51,67	23 430	15 936 509 918	85,01	102	1 253 443 993	36,07	2	37 235 440 780	58,77	42 191
Total electricity	20 095 756 753	100,00	365	1 093 186 984	100,00	105 482	19 945 854 152	100,00	61 142	18 746 229 478	100,00	333	3 474 689 674	100,00	33	63 355 717 041	100,00	167 355
Per cent of total		31,72			1,73			31,48			29,59			5,48			100,00	

In provinces of South Africa and neighbouring territories

Cape	4 502 684 760	22,41	127	541 312 337	49,52	67 140	1 629 274 451	8,17	18 259	677 214 265	3,61	68	731 823 150	21,06	8	8 082 308 963	12,76	85 602
Natal	5 231 468 430	26,03	25	158 415 874	14,49	15 102	3 061 876 135	15,35	11 535	215 035 264	1,15	35	891 381 182	25,66	12	9 558 176 885	15,08	26 709
O.F.S.	1 017 103 145	5,06	71	12 035 612	1,10	1 204	848 646 008	4,25	1 128	3 910 215 102	20,86	24	323 652 532	9,31	2	6 111 652 399	9,65	2 429
Transvaal	9 018 510 368	44,88	132	381 371 810	34,89	22 002	14 405 494 238	72,23	30 181	13 943 764 847	74,38	206	1 527 832 810	43,97	11	39 276 974 073	61,99	52 532
Lesotho	41 945 969	0,21	3	—	—	—	—	—	—	—	—	—	—	—	—	41 945 969	0,07	3
Mozambique	216 499 400	1,08	2	—	—	—	—	—	—	—	—	—	—	—	—	216 499 400	0,34	2
Rhodesia	10 806 648	0,05	1	—	—	—	—	—	—	—	—	—	—	—	—	10 806 648	0,02	1
Swaziland	48 113 100	0,24	1	—	—	—	—	—	—	—	—	—	—	—	—	48 113 100	0,08	1
Transkei	8 624 933	0,04	3	51 351	0,00	34	563 320	0,00	39	—	—	—	—	—	—	9 239 604	0,01	76
Total electricity	20 095 756 753	100,00	365	1 093 186 984	100,00	105 482	19 945 854 152	100,00	61 142	18 746 229 478	100,00	333	3 474 689 674	100,00	33	63 355 717 041	100,00	167 355

Power station operating statistics, 1976

Statement No. 4

Power station	Energy generated GWh	Energy sent out GWh	Maximum demands 1 hour sent out MW	Station load factors, per cent *A	Station load factors, per cent *B	Overall thermal efficiency, per cent Generated	Overall thermal efficiency, per cent Sent out	*Availability, per cent	Water used litre/kWh s.o. (excludes colliery and construction)	Coal burnt, metric tons	Kg of coal per kWh sent out	Calorific value of coal as received (weighted average) MJ/kg	Station heat rate, MJ per kWh sent out
Coal-fired station, Eastern Cape:													
West Bank 1 and 2	341,1	321,9	98	36,3	37,4	22,5	21,3	79,0	0,43	213 428	0,663	25,53	16,93
Sub-total	341,1	321,9	—	36,3	—	22,5	21,3	79,0	0,43	213 428	0,663	25,53	16,93
Coal-fired stations, Natal:													
Colenso	387,7	360,0	134	45,0	30,6	17,5	16,4	87,1	4,83	314 915	0,875	25,28	22,12
Congella	449,6	410,3	114	48,2	41,0	20,8	19,0	80,1	0,93	322 908	0,787	24,11	18,97
Ingagane	3 224,3	3 023,5	478	74,0	72,0	29,1	27,3	87,2	3,03	1 665 529	0,551	23,95	13,20
Umgeni	966,4	901,6	223	46,2	46,0	23,1	21,6	92,9	3,65	634 880	0,704	23,68	16,67
Sub-total	5 028,0	4 695,4	—	61,1	—	25,6	23,9	87,8	3,10	2 938 232	0,626	24,05	15,06
Coal-fired stations, Transvaal and O.F.S.:													
Arnot	13 505,5	12 703,7	1 977	73,0	73,2	36,2	34,0	80,2	2,43	6 107 587	0,481	22,02	10,59
Camden	10 330,2	9 831,7	1 493	73,6	75,0	32,4	30,8	78,1	2,49	4 932 331	0,502	23,29	11,69
Grootvlei (under construction)	5 699,8	5 407,4	982	64,8	62,7	32,8	31,2	76,4	1,89	2 991 915	0,553	20,88	11,55
Hendrina	11 328,8	10 793,3	1 637	73,1	75,1	32,6	31,0	79,1	2,62	5 354 863	0,496	23,38	11,60
Highveld	2 540,1	2 359,2	485	61,0	55,4	28,2	26,2	91,9	3,44	1 782 640	0,756	18,20	13,76
Klip	1 739,0	1 590,6	389	48,7	46,5	20,2	18,5	95,0	5,37	1 501 173	0,944	20,65	19,49
Komati	6 581,9	6 105,5	877	75,1	79,3	29,4	27,3	80,8	3,08	3 482 895	0,570	23,12	13,18
Kriel (under construction)	1 995,6	1 854,8	566	†59,8	†50,2	36,1	33,6	68,0	3,85	919 185	0,496	21,65	10,74
Taaibos	2 186,6	1 999,6	433	51,7	52,6	27,2	24,8	84,1	3,98	1 793 688	0,897	16,15	14,49
Vaal	1 994,4	1 855,0	299	74,9	70,6	21,2	19,7	89,0	5,06	1 786 507	0,963	18,99	18,29
Vierfontein	1 698,6	1 567,1	349	53,1	51,1	22,5	20,8	90,7	4,70	1 383 772	0,883	19,62	17,32
Wilge	1 676,4	1 555,9	227	80,1	78,0	25,9	24,0	90,1	4,56	1 091 127	0,701	21,37	14,98
Sub-total	61 276,9	57 623,8	—	69,4	—	30,9	29,0	81,8	2,92	33 127 683	0,575	21,56	12,40
Coal-fired stations, Western Cape:													
Hex River	391,7	369,7	117	36,9	36,0	24,1	22,7	95,6	3,53	242 236	0,655	24,19	15,84
Salt River 1 and 2	1 367,5	1 298,4	294	51,9	50,3	26,7	25,4	91,8	0,33	735 772	0,567	25,05	14,20
Sub-total	1 759,2	1 668,1	—	47,6	—	26,1	24,7	92,9	1,04	978 008	0,586	24,84	14,56
Total for all coal-fired stations	68 405,2	64 309,2	—	67,6	—	30,2	28,4	82,1	2,87	37 257 351	0,579	21,87	12,66
Gas turbine stations:													
Acacia (Western Cape)	22,8	22,7	189	2,7	2,2			74,4	—	—	—	—	
Port Rex (Eastern Cape)	3,4	3,2	127	0,9	1,2			72,3	—	—	—	—	
Total for gas turbine stations	26,2	25,9	—	2,2	—			73,8	—	—	—	—	
Hydro-electric stations:													
Hendrik Verwoerd	1 828,0	1 825,4	388	68,4	53,6			91,4	0,04	—	—	—	
Vanderkloof (under construction)	27,7	27,6	134	—	—			—	—	—	—	—	
Total for hydro stations	1 855,7	1 853,0	—	68,9	—			91,4	0,04	—	—	—	
Total/weighted average	70 287,1	66 188,1	9 973	66,8	75,6			82,3	2,79	37 257 351	0,579	21,87	12,66

*Station load factors A = $\frac{\text{kWh s.o.} \times 100}{\text{(assigned s.o. rating)} \times \text{hours in year}}$ Station load factors B = $\frac{\text{kWh s.o.} \times 100}{\text{(station M.D. s.o.)} \times \text{hours in year}}$

Availability = $\frac{\text{Capacity hours available} \times 100}{\text{Total capacity hours in year}}$ †Production before date of commercial operation excluded from load factor calculations

Statement showing the price or rent of land or rights or interests in or over land or any other property acquired or hired by the Commission during the year ending 31 December 1976

Statement No. 5

Central Generating Undertaking	
Immovable property acquired for considerations amounting to	R2 179 261,29
Servitudes and other interest in or over land or other property acquired or hired	R839 013,73
Cape Western Undertaking	
Immovable property acquired for considerations amounting to	R99 217,80
Servitudes and other interest in or over land or other property acquired or hired	R641 559,00
Cape Northern Undertaking	
Immovable property acquired for considerations amounting to	R135 419,00
Servitudes and other interest in or over land or other property acquired or hired	R140 432,64
Orange River Undertaking	
Immovable property acquired for considerations amounting to	R175 674,20
Servitudes and other interest in or over land or other property acquired or hired	R87 353,48
Border Undertaking	
Immovable property acquired for considerations amounting to	R27 000,00
Servitudes and other interest in or over land or other property acquired or hired	R258 738,14
Natal Undertaking	
Immovable property acquired for considerations amounting to	R236 388,00
Servitudes and other interest in or over land or other property acquired or hired	R504 359,00
Eastern Transvaal Undertaking	
Immovable property acquired for considerations amounting to	R55 181,30
Servitudes and other interest in or over land or other property acquired or hired	R265 006,52
Rand and O.F.S. Undertaking	
Immovable property acquired for considerations amounting to	R1 622 725,40
Servitudes and other interest in or over land or other property acquired or hired	R865 068,57
Education Department	
Immovable property acquired for considerations amounting to	R205 450,00
Servitudes and other interest in or over land or other property acquired or hired	NIL
Cape Eastern Undertaking	
Immovable property acquired for considerations amounting to	R22 001,00
Servitudes and other interest in or over land or other property acquired or hired	R10 200,06

GWh sold by undertakings to all consumers

Statement No. 6

Year	Border	Cape Eastern	Cape Northern	Cape Western	Eastern Transvaal	Natal	Orange River	Rand and O.F.S.	Total	Per cent growth for the year
1950	79,9	—	53,9	271,9	384,8	968,3	—	5 151,8	6 910,6	
1951	88,1	—	58,5	303,5	392,9	1 050,4	—	5 563,2	7 456,5	7,9
1952	97,7	—	61,3	341,2	431,1	1 109,6	—	6 039,6	8 080,6	8,4
1953	107,8	—	67,1	375,5	416,3	1 205,5	—	6 559,9	8 732,2	8,1
1954	118,2	—	70,7	436,2	276,1	1 310,2	—	7 465,2	9 676,6	10,8
1955	130,8	—	73,2	527,1	400,3	1 417,2	—	8 416,3	10 964,0	13,3
1956	139,1	—	78,7	585,1	511,9	1 553,1	—	9 151,6	12 019,5	9,6
1957	143,1	—	86,1	698,6	542,5	1 640,4	—	9 652,5	12 763,1	6,2
1958	152,9	—	115,2	826,0	587,1	1 720,2	—	10 200,6	13 602,2	6,6
1959	165,0	—	171,4	861,8	633,3	1 858,0	—	11 034,8	14 724,5	8,3
1960	172,3	—	185,2	871,6	762,0	2 058,3	—	12 044,8	16 094,1	9,3
1961	178,8	—	191,3	860,0	901,5	2 181,5	—	12 700,0	17 013,2	5,7
1962	188,6	—	224,9	945,0	1 012,2	2 320,5	—	13 429,8	18 121,0	6,5
1963	204,9	—	264,9	1 051,4	1 212,1	2 543,6	—	14 223,1	19 500,0	7,6
1964	228,8	0,4	311,4	1 163,9	1 553,6	2 922,1	—	15 067,3	21 247,5	9,0
1965	250,5	1,6	393,2	1 267,4	1 936,8	3 182,5	—	16 111,3	23 143,3	8,9
1966	272,4	2,5	442,4	1 367,0	2 408,2	3 498,5	—	16 563,4	24 554,3	6,1
1967	294,2	3,2	519,9	1 533,1	2 829,6	3 720,6	1,1	17 755,4	26 657,1	8,6
1968	310,5	4,1	609,6	1 666,2	3 191,4	4 121,5	2,4	18 979,3	28 885,0	8,4
1969	330,5	5,7	657,9	1 824,3	3 824,4	4 636,7	8,0	20 218,1	31 505,6	9,1
1970	360,4	6,1	714,9	2 101,0	4 294,1	5 073,5	47,3	22 293,4	34 890,6	10,7
1971	399,9	7,1	789,7	2 494,5	4 551,5	6 072,3	95,0	23 620,0	38 040,0	9,0
1972	448,1	8,4	895,8	2 771,3	5 234,6	6 938,0	144,5	25 208,2	41 648,9	9,5
1973	504,6	9,6	1 060,1	3 148,8	6 097,5	7 581,3	238,8	27 937,7	46 578,4	11,8
1974	551,5	11,5	1 210,5	3 851,6	6 527,4	8 499,9	786,2	31 146,5	52 585,1	12,9
1975	597,7	13,5	1 340,4	4 655,5	7 266,8	9 165,8	915,4	33 914,1	57 869,2	10,0
1976	674,8	14,1	1 506,7	4 930,4	8 028,3	9 931,1	1 034,8	37 235,4	63 355,7	9,5

Note:
Sabie Undertaking incorporated in Eastern Transvaal Undertaking since 1 July 1958, in terms of the Amended Licence.
De-commissioned November 1964. GWh sold in Sabie prior to incorporation included
in Eastern Transvaal Undertaking.

Total GWh sold

Statement No. 7

Year	GWh sold							Overall average selling price cents/kWh	Escom employees		Capital expenditure at cost		GWh sent out*	Ratio: GWh sold / GWh sent out
	Traction	Bulk supplies	Mining	Air and steam	Industrial and commercial	Domestic and street lighting	Total sold		Total number as at 31 December	Number/GWh sold	R000 Total as at 31 December	R000 per GWh sold		
1950	524,0	1 106,5	3 898,6	276,9	990,7	113,9	6 910,6	0,274 1	9 352	1,353	115 129	16,66	7 417,8	0,932
1951	539,4	1 260,7	4 104,6	267,5	1 149,9	134,4	7 456,5	0,292 2	10 336	1,386	137 283	18,41	8 001,3	0,932
1952	554,8	1 459,5	4 332,9	264,7	1 337,7	131,0	8 080,6	0,311 5	10 889	1,348	176 559	21,85	8 651,3	0,934
1953	584,5	1 640,0	4 736,5	234,2	1 402,1	134,9	8 732,2	0,354 2	11 518	1,319	218 739	25,05	9 395,8	0,929
1954	619,2	1 839,0	5 316,8	219,5	1 539,9	142,2	9 676,6	0,380 8	12 317	1,273	270 621	27,97	10 414,7	0,929
1955	689,7	2 047,6	5 977,4	212,2	1 880,5	156,6	10 964,0	0,413 9	12 490	1,139	304 342	26,76	11 764,4	0,932
1956	739,7	2 282,2	6 445,3	191,2	2 187,1	174,0	12 019,5	0,428 5	12 977	1,080	342 068	28,46	12 927,0	0,930
1957	752,7	2 540,1	6 789,7	159,7	2 331,2	189,7	12 763,1	0,447 8	13 421	1,052	377 265	29,56	13 802,9	0,925
1958	789,0	2 837,8	7 136,2	153,6	2 479,8	205,8	13 602,1	0,473 3	14 312	1,052	417 701	30,71	14 679,9	0,927
1959	887,4	3 057,7	7 676,4	138,2	2 736,5	228,3	14 724,5	0,495 1	13 947	0,947	453 130	30,77	15 870,7	0,928
1960	1 045,2	3 242,8	8 258,7	125,6	3 168,7	253,1	16 094,1	0,507 9	14 654	0,911	491 471	30,54	17 322,8	0,929
1961	1 178,3	3 368,2	8 625,9	123,8	3 437,5	279,5	17 013,2	0,515 5	15 441	0,908	529 565	31,13	18 292,4	0,930
1962	1 296,4	3 570,4	9 143,4	115,7	3 691,8	303,3	18 121,0	0,516 4	16 467	0,909	581 579	32,09	19 416,7	0,933
1963	1 389,0	3 997,5	9 416,3	115,1	4 253,0	329,1	19 500,0	0,517 7	16 804	0,862	637 076	32,67	20 812,2	0,937
1964	1 558,6	4 494,0	9 847,2	93,9	4 873,1	380,7	21 247,5	0,510 1	17 172	0,808	679 193	31,97	22 679,6	0,937
1965	1 762,7	4 920,5	10 270,8	87,2	5 663,1	439,0	23 143,3	0,507 6	17 851	0,771	741 109	32,02	24 709,3	0,937
1966	1 835,8	5 343,6	10 775,1	39,5	6 068,6	491,7	24 554,3	0,525 4	18 579	0,757	840 782	34,24	26 134,0	0,940
1967	1 958,0	5 965,7	11 441,5	Terminated	6 729,1	562,8	26 657,1	0,546 7	19 817	0,743	950 863	35,67	28 440,5	0,937
1968	2 180,7	6 628,1	11 995,5	—	7 438,8	641,9	28 885,0	0,555 0	20 893	0,723	1 114 390	38,58	30 851,4	0,936
1969	2 307,0	7 263,5	12 641,9	—	8 573,8	719,4	31 505,6	0,556 5	21 644	0,687	1 271 785	40,37	33 606,2	0,937
1970	2 409,7	8 108,1	13 947,9	—	9 607,7	817,2	34 890,6	0,554 5	22 700	0,651	1 429 862	40,98	37 328,1	0,935
1971	2 616,3	9 264,5	14 227,1	—	11 013,8	918,3	38 040,0	0,577 2	25 050	0,659	1 604 755	42,19	40 747,7	0,934
1972	2 782,2	10 716,1	14 508,6	—	12 641,5	1 000,5	41 648,9	0,610 8	26 937	0,647	1 774 350	42,60	44 484,7	0,936
1973	2 895,5	12 751,7	15 800,0	—	14 026,0	1 105,2	46 578,4	0,648 4	28 559	0,613	1 942 949	41,71	49 770,4	0,936
1974	3 107,9	15 522,0	16 940,5	—	15 936,7	1 078,0	52 585,1	0,682 2	29 891	0,568	2 175 842	41,38	56 259,1	0,935
1975	3 307,2	18 054,9	17 444,3	—	18 049,6	1 013,2	57 869,2	0,795 0	33 999	0,588	2 569 803	44,41	61 533,3	0,940
1976	3 474,7	20 095,7	18 746,2	—	19 907,0	1 132,1	63 355,7	1,036 0	36 915	0,583	3 211 261	50,69	67 413,7	0,940

*Including purchased GWh.

Summary of consolidated revenue and expenditure account

Statement No. 8

Year	Total Escom GWh sold		Total Escom costs: Interest	Redemption and other provision for loan repayment	Reserve Fund	Capital Development Fund	Sub-total capital related costs	Purchase of electricity	Fuel	Other power station operating and maintenance costs	Distribution, operation and maintenance costs	General expenses	Total costs	Total revenue
1967	26 657,1	R(000)	37 312	24 536	9 912	—	71 760	313	42 488	14 618	7 146	10 603	146 928	146 783
		C/kWh sold	0,140 0	0,092 0	0,037 2	—	0,269 2	0,001 2	0,159 4	0,054 8	0,026 8	0,039 8	0,551 2	0,550 6
		% of total cost	25,39	16,70	6,75	—	48,84	0,21	28,92	9,95	4,86	7,22	100,00	99,90
1968	28 885,0	R(000)	43 282	23 884	12 300	—	79 466	121	45 117	17 016	8 097	12 176	161 993	161 475
		C/kWh sold	0,149 8	0,082 7	0,042 6	—	0,275 1	0,000 4	0,156 2	0,058 9	0,028 0	0,042 2	0,560 8	0,559 0
		% of total cost	26,72	14,74	7,59	—	49,06	0,07	27,85	10,50	5,00	7,52	100,00	99,68
1969	31 505,6	R(000)	50 943	20 809	13 605	—	85 357	102	48 035	19 038	9 264	13 578	175 374	176 106
		C/kWh sold	0,161 7	0,066 0	0,043 2	—	0,270 9	0,000 3	0,152 5	0,060 4	0,029 4	0,043 1	0,556 6	0,559 0
		% of total cost	29,05	11,87	7,76	—	48,67	0,06	27,39	10,86	5,28	7,74	100,00	100,42
1970	34 890,6	R(000)	59 484	23 654	15 202	—	98 340	89	49 440	21 955	10 594	15 448	195 866	193 475
		C/kWh sold	0,170 5	0,067 8	0,043 6	—	0,281 9	0,000 3	0,141 7	0,062 9	0,030 4	0,044 3	0,561 4	0,554 5
		% of total cost	30,37	12,08	7,76	—	50,21	0,05	25,24	11,21	5,41	7,89	100,00	98,78
1971	38 040,0	R(000)	70 266	30 928	8 568	—	109 762	82	53 587	26 276	11 492	18 440	219 639	219 584
		C/kWh sold	0,184 7	0,081 3	0,022 5	—	0,288 5	0,000 2	0,140 9	0,069 1	0,030 2	0,048 5	0,577 4	0,577 2
		% of total cost	31,99	14,08	3,90	—	49,97	0,04	24,40	11,96	5,23	8,40	100,00	99,97
1972	41 648,9	R(000)	86 631	30 575	3 056	13 596	133 858	95	57 259	31 586	13 486	21 737	258 021	254 394
		C/kWh sold	0,208 0	0,073 4	0,007 3	0,032 6	0,321 4	0,000 2	0,137 5	0,075 8	0,032 4	0,052 2	0,619 5	0,610 8
		% of total cost	33,58	11,85	1,18	5,27	51,88	0,04	22,19	12,24	5,23	8,42	100,00	98,59
1973	46 578,4	R(000)	101 858	34 200	3 760	15 366	155 184	117	68 634	38 685	17 082	26 460	306 162	302 034
		C/kWh sold	0,218 7	0,073 4	0,008 1	0,033 0	0,333 2	0,000 3	0,147 4	0,083 1	0,036 7	0,056 8	0,657 3	0,648 4
		% of total cost	33,27	11,17	1,23	5,02	50,69	0,04	22,42	12,64	5,58	8,64	100,00	98,65
1974	52 585,1	R(000)	114 308	27 151	66	28 114	169 639	86	92 530	48 572	20 617	32 611	364 055	358 768
		C/kWh sold	0,217 4	0,051 6	0,000 1	0,053 5	0,322 6	0,000 2	0,176 0	0,092 4	0,039 2	0,062 0	0,692 3	0,682 2
		% of total cost	31,40	7,46	0,02	7,72	46,60	0,02	25,42	13,34	5,66	8,96	100,00	98,55
1975	57 869,2	R(000)	136 963	30 814	1 400	40 730	209 907	114	141 913	44 980*	18 477*	71 758*	487 149	460 073
		C/kWh sold	0,236 7	0,053 2	0,002 4	0,070 4	0,362 7	0,000 2	0,245 2	0,077 7	0,031 9	0,124 0	0,841 8	0,795 0
		% of total cost	28,12	6,33	0,29	8,36	43,09	0,02	29,13	9,23	3,79	14,73	100,00	94,44
1976	63 355,7	R(000)	173 829	41 470	1 700	53 584	270 583	2 399	208 316	62 477	19 712	92 835	656 322	656 381
		C/kWh sold	0,274 4	0,065 5	0,002 7	0,084 6	0,427 1	0,003 8	0,328 8	0,098 6	0,031 1	0,146 5	1,036 0	1,036 0
		% of total cost	26,49	6,32	0,26	8,16	41,23	0,37	31,74	9,52	3,00	14,14	100,00	100,01

*Basis of allocation changed in 1975.

The integrated generation and transmission system

Statement 9

Year	Electrical energy generated			Electrical energy sent out to Escom's transmission system, GWh				Escom generating capacity as at 31 December		*Power station plant load factor (sent-out basis), per cent	Peak demand on integrated Escom system MW	**Integrated Escom system load factor (sent-out basis), per cent	Republic of S.A. total electrical energy sent-out, GWh	Escom electrical energy sent out, as percentage of Republic
	+Escom power stations, GWh	Total for Republic of of S.A. GWh	Escom as percentage of Republic	+From Escom power stations	Purchased by Escom within Republic of S.A.	Imported by Escom from neighbouring territories	Total sent out	Installed rating, MW	Assigned sent-out rating, MW					
1950	7 773,7	11 186,6	69,5	7 286,5	131,4	—	7 417,9	1 440,0	1 290	64,7	†1 182	71,6	†10 437	71,1
1951	8 326,7	11 895,4	70,0	7 806,8	194,6	—	8 001,4	1 520,6	1 361	66,1	†1 212	75,4	†11 098	72,1
1952	8 778,1	12 517,3	70,1	8 227,3	423,9	—	8 651,3	1 624,6	1 454	66,9	†1 265	77,9	†11 678	74,1
1953	9 442,0	13 744,0	68,7	8 845,4	550,4	—	9 395,8	1 825,1	1 635	65,5	†1 394	76,9	†12 823	73,3
1954	10 651,9	15 183,8	70,2	9 977,4	437,3	—	10 414,8	2 052,0	1 846	66,4	†1 570	75,7	†14 167	73,5
1955	12 214,4	17 172,4	71,1	11 425,1	339,3	—	11 764,4	2 378,6	2 145	65,9	†1 806	74,4	†16 021	73,4
1956	13 578,4	18 535,3	73,3	12 669,9	257,2	—	12 927,0	2 764,9	2 498	61,2	†2 001	73,5	†17 293	74,8
1957	14 639,1	20 043,0	73,0	13 640,0	162,8	—	13 802,9	2 826,9	2 555	61,1	†2 151	73,3	18 720	73,7
1958	15 582,6	21 087,3	73,9	14 515,8	164,1	—	14 679,9	3 036,6	2 748	62,0	†2 249	74,5	19 765	74,3
1959	16 926,6	22 488,2	75,3	15 777,1	93,6	—	15 870,7	3 297,0	2 983	62,6	†2 429	74,6	21 021	75,5
1960	18 543,3	24 298,9	76,3	17 307,5	15,3	—	17 322,8	3 416,5	3 091	65,2	†2 605	75,7	22 717	76,3
1961	19 575,4	25 699,7	76,2	18 284,0	8,4	—	18 292,4	3 659,0	3 226	66,2	†2 733	76,4	23 761	77,0
1962	20 805,5	27 457,1	75,8	19 404,1	12,6	—	19 416,7	3 759,0	3 406	65,8	†2 925	75,3	25 599	75,8
1963	22 312,4	29 397,4	75,9	20 793,6	18,6	—	20 812,2	4 176,0	3 788	65,7	†3 183	74,6	27 333	76,1
1964	24 298,5	32 020,0	75,9	22 638,6	41,0	—	22 679,6	4 501,0	4 077	65,2	†3 460	74,6	†29 779	76,2
1965	26 388,2	34 423,2	76,7	24 582,7	126,6	—	24 709,3	4 624,8	4 181	67,4	3 669	76,9	31 939	77,4
1966	27 371,5	36 481,0	75,0	25 504,1	‡629,9	—	26 134,0	4 836,4	4 377	67,1	3 906	76,4	†33 927	77,0
1967	30 421,7	39 636,1	76,8	28 370,9	69,6	—	28 440,5	5 845,4	5 328	66,8	4 227	76,8	36 897	77,1
1968	33 061,2	42 971,0	76,9	30 843,5	7,9	—	30 851,4	6 344,7	5 800	62,9	4 658	75,4	†39 963	77,2
1969	35 966,9	45 968,5	78,2	33 598,2	8,0	—	33 606,2	6 984,7	6 441	62,1	5 055	75,9	42 854	78,4
1970	39 796,2	50 791,0	78,4	37 320,8	7,3	—	37 328,1	7 583,3	7 060	62,9	5 622	75,8	†47 388	78,8
1971	43 472,6	54 647,2	79,6	40 739,4	8,3	—	40 747,7	9 013,3	8 373	61,3	6 115	76,1	51 095	79,7
1972	47 411,1	59 142,0	80,2	44 475,1	9,7	—	44 484,8	9 551,3	8 849	59,6	6 630	76,4	55 330	80,4
1973	53 039,8	64 390,4	82,4	49 759,1	11,3	—	49 770,4	10 141,5	9 482	62,5	7 350	77,3	60 274	82,6
1974	59 797,5	70 159,0	85,2	56 251,2	7,9	—	56 259,1	10 691,5	10 002	66,3	8 552	75,1	65 764	85,5
1975	65 479,2	74 888,0	87,4	61 498,4	9,7	25,2	61 533,3	11 241,5	10 522	68,6	9 185	76,5	70 122	87,8
1976	70,287,1	79 087,0	88,9	66 188,1	11,2	1 214,3	67 413,6	12 443,5	11 688	66,8	10 085	76,1	75 277	89,6

‡Includes substantial purchases of GWh from City of Johannesburg during serious drought.
†Estimates based on limited information.
+For detailed derivation of this column, see Statement 11, page 70.

*Power station plant load factor = $\frac{\text{GWh s.o. from all Escom stations}}{\text{aggregate of assigned sent-out capacity hours in year.}}$

**System load factor = $\frac{\text{GWh s.o. on all Escom systems}}{\text{(peak demand on integrated Escom system) × hours in year.}}$

Operation of Escom's coal-fired power stations

Statement No. 10

Year	Generated in coal-fired stations GWh	Sent out from coal-fired stations GWh	Ratio sent out / generated in coal-fired stations	Coal used, thousands of tons	Coal used, kg per kWh sent out	Calorific value of coal, MJ/kg	Station heat rate MJ/kWh sent out	Overall thermal efficiency sent out basis, per cent	Coal cost			Water used by coal-fired power stations Litre/kWhS.O.*
									Total R000	Rand per metric ton	Cents per kWh sent out	
1950	7 763,2	7 276,3	0,937	6 323,4	0,869	22,72	19,74	18,2	5 302,0	0,84	0,072 9	na
1951	8 316,7	7 797,1	0,938	6 662,9	0,855	22,72	19,43	18,5	6 553,0	0,98	0,084 0	na
1952	8 770,0	8 219,8	0,937	7 113,4	0,865	22,75	19,68	18,3	8 520,0	1,20	0,103 7	na
1953	9 434,6	8 838,2	0,937	7 393,9	0,837	23,08	19,32	18,6	9 862,0	1,33	0,111 6	na
1954	10 645,9	9 971,6	0,937	8 024,9	0,805	23,06	18,56	19,4	11 329,0	1,41	0,113 6	na
1955	12 208,2	11 419,1	0,935	8 999,7	0,788	22,89	18,04	20,0	13 709,0	1,52	0,120 1	na
1956	13 571,6	12 663,2	0,933	9 688,5	0,765	22,96	17,56	20,5	13 653,0	1,62	0,123 6	na
1957	14 632,1	13 633,6	0,932	10 220,6	0,750	22,79	17,09	21,1	17 256,0	1,69	0,126 6	na
1958	15 577,1	14 510,5	0,932	10 784,1	0,743	22,73	16,89	21,3	19 039,0	1,77	0,131 2	na
1959	16 923,7	15 774,6	0,932	11 548,7	0,732	22,44	16,43	21,9	20 970,0	1,82	0,132 9	na
1960	18 541,1	17 305,5	0,933	12 512,6	0,723	22,52	16,28	22,1	25 373,0	2,03	0,146 6	na
1961	19 573,4	18 282,2	0,934	13 194,9	0,722	22,39	16,17	22,3	27 713,0	2,10	0,151 6	na
1962	20 802,5	19 401,1	0,933	13 955,5	0,719	22,22	15,98	22,5	29 230,0	2,09	0,150 7	na
1963	22 307,9	20 789,2	0,932	14 721,1	0,708	22,15	15,68	23,0	31 009,0	2,11	0,149 2	na
1964	24 293,8	22 634,1	0,932	15 654,7	0,692	22,15	15,33	23,5	32 367,0	2,07	0,143 0	na
1965	26 388,1	24 582,6	0,932	16 726,7	0,680	22,39	15,23	23,6	34 986,0	2,09	0,142 3	na
1966	27 371,5	25 504,1	0,932	16 982,3	0,666	22,20	14,79	24,4	37 901,0	2,23	0,148 6	na
1967	30 421,7	28 370,9	0,933	18 307,7	0,645	22,44	14,47	24,9	42 053,0	2,30	0,148 2	na
1968	33 061,2	30 843,5	0,933	19 133,9	0,620	22,63	14,03	25,6	44 604,0	2,33	0,144 6	na
1969	35 966,9	33 598,2	0,934	19 982,9	0,595	22,73	13,52	26,6	47 453,0	2,37	0,141 2	3,49
1970	39 796,2	37 320,8	0,938	21 630,6	0,580	22,97	13,32	27,0	48 807,0	2,26	0,130 8	3,25
1971	43 378,8	40 645,8	0,937	23 416,2	0,576	23,30	13,42	26,8	52 705,0	2,25	0,129 7	3,13
1972	46 597,3	43 662,2	0,937	24 952,8	0,571	22,89	13,07	27,5	56 113,0	2,25	0,128 5	2,97
1973	52 849,3	49 569,9	0,938	27 907,9	0,563	22,47	12,65	28,5	66 837,4	2,39	0,134 8	2,86
1974	58 685,5	55 140,9	0,940	30 891,4	0,560	22,42	12,56	28,7	90 268,8	2,92	0,163 7	2,91
1975	64 378,8	60 399,7	0,938	34 231,7	0,567	22,21	12,59	28,6	137 691,7	4,02	0,223 9	2,85
1976	68 405,2	64 309,2	0,940	37 257,4	0,579	21,87	12,66	28,4	202 201,8	5,43	0,314 4	2,87

*Excludes colliery and construction usage.

na = not available.

Electrical energy produced in Escom's power stations

Statement No. 11

Year	Coal-fired steam-electric power stations *GWh		Hydro-electric power stations (conventional dam storage) GWh		Diesel-electric power stations GWh		Gas-turbine electric power stations GWh		Total all Escom generating plant GWh	
	Generated	Sent out	Generated	Sent out	Generated	Sent out	Generated	Sent out	Generated	Sent out
1950	7 763,3	7 276,4	6,7	6,6	3,7	3,5	—	—	7 773,7	7 286,5
1951	8 316,9	7 797,2	6,4	6,3	3,4	3,3	—	—	8 326,7	7 806,8
1952	8 770,1	8 219,7	6,6	6,4	1,4	1,2	—	—	8 778,1	8 227,3
1953	9 434,6	8 838,2	6,7	6,6	0,7	0,6	—	—	9 442,0	8 845,4
1954	10 645,9	9 971,5	5,8	5,7	0,2	0,2	—	—	10 651,9	9 977,4
1955	12 208,2	11 419,1	6,0	5,8	0,2	0,2	—	—	12 214,4	11 425,1
1956	13 571,6	12 663,2	6,5	6,4	0,3	0,3	—	—	13 578,4	12 669,9
1957	14 632,4	13 633,5	6,5	6,3	0,2	0,2	—	—	14 639,1	13 640,0
1958	15 577,1	14 510,5	5,0	4,8	0,5	0,5	—	—	15 582,6	14 515,8
1959	16 923,8	15 774,5	2,7	2,5	0,1	0,1	—	—	16 926,6	15 777,1
1960	18 541,1	17 305,5	2,2	2,0	—	—	—	—	18 543,3	17 307,5
1961	19 573,5	18 282,2	1,9	1,8	—	—	—	—	19 575,4	18 284,0
1962	20 802,5	19 401,2	2,9	2,8	0,1	0,1	—	—	20 805,5	19 404,1
1963	22 307,8	20 789,2	4,5	4,3	0,1	0,1	—	—	22 312,4	20 793,6
1964	24 293,8	22 634,1	4,7	4,5	—	—	—	—	24 298,5	22 638,6
1965	26 388,1	24 582,6	—	—	0,1	0,1	—	—	26 388,2	24 582,7
1966	27 371,5	25 504,1	—	—	—	—	—	—	27 371,5	25 504,1
1967	30 421,7	28 370,9	—	—	—	—	—	—	30 421,7	28 370,9
1968	33 061,2	30,843,5	—	—	—	—	—	—	33 061,2	30 843,5
1969	35 966,9	33 598,2	—	—	—	—	—	—	35 966,9	33 598,2
1970	39 796,2	37 320,8	—	—	—	—	—	—	39 796,2	37 320,8
1971	43 378,8	40 645,8	93,8	93,6	—	—	—	—	43 472,6	40 739,4
1972	46 597,3	43 662,2	813,8	812,9	—	—	—	—	47 411,1	44 475,1
1973	52 849,5	49 569,8	190,3	189,3	—	—	—	—	53 039,8	49 759,1
1974	58 685,6	55 140,9	1 111,9	1 110,3	—	—	—	—	59 797,5	56 251,2
1975	64 378,8	60 399,7	1 100,4	1 098,7	—	—	—	—	65 479,2	61 498,4
1976	68 405,2	64 309,2	1 855,7	1 853,0	—	—	26,2	25,9	70 287,1	66 188,1

*Includes electricity equivalent of compressed air produced by steam-driven compressors, and steam supplied for direct sale (1950 to 1966 inclusive).

Expansion of Escom's transmission and distribution system

Statement No. 12

Year	Transmission/Distribution lines: circuit kilometres (excluding service connections on reticulation systems)							Transformers, capacity in service, MVA
	533 kV D.C. (Monopolar)	400 kV	275 kV	220 kV	132 kV (including underground cables)	88 kV and below (including underground cables)	Total	
1950		—	—	—	203	10 414	10 617	6 137
1951		—	—	—	203	11 658	11 861	6 613
1952		—	—	—	427	11 880	12 307	7 023
1953		—	—	—	734	12 821	13 555	8 374
1954		—	—	—	1 051	13 085	14 136	9 663
1955		—	—	—	1 437	14 236	15 673	10 931
1956		—	—	—	1 727	15 234	16 961	11 997
1957		—	—	—	1 838	16 539	18 377	12 104
1958		—	—	—	2 274	18 393	20 667	14 346
1959		—	315	—	2 689	20 114	23 118	15 665
1960		—	315	—	2 778	21 926	25 019	15 987
1961		—	315	—	3 782	23 840	27 937	18 730
1962		—	648	—	3 853	26 114	30 615	19 265
1963		—	875	—	4 052	28 911	33 838	20 059
1964		—	1 490	—	4 375	31 898	37 763	22 981
1965		—	2 049	—	4 886	34 692	41 627	26 651
1966		—	2 194	—	5 387	37 592	45 173	26 814
1967		597	2 194	—	5 486	41 258	49 535	28 928
1968		597	2 412	—	6 080	44 928	54 017	32 191
1969		1 480	2 552	—	6 898	48 922	59 852	39 400
1970		1 916	2 599	—	7 063	52 318	63 896	43 007
1971		2 503	3 176	—	7 601	55 850	69 130	47 811
1972		3 275	3 826	—	8 352	59 860	75 313	52 025
1973		4 197	4 255	639	8 942	64 628	82 661	60 581
1974		5 040	4 417	639	9 429	68 700	88 225	65 900
1975	1 030	5 099	4 701	639	9 855	72 586	93 910	72 445
1976	1 030	5 861	4 804	761	10 855	77 152	100 463	78 966

Farm supplies increased by 2 614 to 34 661 in 1976

The distribution undertakings

The development and operation of the separate distribution undertakings are reviewed on the following pages.

BORDER UNDERTAKING

AREA OF SUPPLY ..... 55 400 SQUARE KILOMETRES

REFERENCE

- Area of Supply .....
- E.S.C. Power Stations ..... WEST BANK
- Transmission Lines .....
- Transmission Lines Under Construction .....
- Ducat's Outspan Substation .....
- International Boundary .....

Border Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

The sales in this Undertaking during 1976, as indicated in the accompanying table, amounted to 675 GWh, an increase of 12,9 per cent on the sales in the previous year (8,4 per cent in 1975).

In this Undertaking, bulk municipal sales constitute some 88 per cent of the total sales, the supplies to East London Municipality alone having accounted for 63,3 per cent of the total sales in 1976.

Bulk supplies to East London increased during the year by 8,6 per cent, compared with an increase of 3,7 per cent recorded in 1975. Total bulk sales to all municipalities in the Undertaking increased during 1976 by 14,0 per cent, which is appreciably above the rate of 8,4 per cent recorded for this category in 1975. The sales figures show therefore, that apart from vigorous growth in East London Municipality, there has also been rapid growth in other bulk supplies to towns like Umtata and Queenstown.

Development of the Undertaking

The erection of a 132 kV transmission line from Kubusi substation to Queenstown, a distance of some 100 km, was completed during the year. The construction of a 132 kV busbar was completed at Kubusi, and Queenstown was supplied from the local Komani substation, initially at 66 kV, in July 1976.

The construction of the first stage of Albany substation near Grahamstown and a 66 kV line, 40 km long, to Kariega, with a 66/22 kV substation, was completed in May, and has improved the reliability of supplies to the Port Alfred – Alexandria area. A 22 kV line to Kwaaihoek substation near Alexandria should be completed by mid-1977. To provide a substantial new supply to Grahamstown, work has been completed on obtaining the necessary servitude for the construction of 118 km of 132 kV line from Pembroke substation near Berlin to the Albany substation.

The initial supply to Dimbaza substation near King William's Town was increased by the installation of a larger transformer.

To cater for increasing demand at Butterworth, the existing transformers were replaced by two 10 MVA 66/22 kV units, and two 5 MVAR 22 kV capacitor banks were commissioned.

A total of 59 new farming supplies were connected during the year, requiring the erection of 127 km of new transmission lines.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 2,079 8 cents per kWh sold during 1976 is 24,9 per cent higher than the figure for the preceding year (13,8 per cent in 1975). Total sales revenue for the year amounted to R14 035 195 and exceeded the corresponding figure for the preceding year by 41,0 per cent (23,3 per cent in 1975).

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	18	**19**	87,65	**88,52**	523 852 797	**597 339 680**	+8,39	**+14,03**	8 107 078	**11 527 089**	1,547 6	**1,929 7**
Direct supplies:												
Domestic and street lighting	3 964	**4 146**	5,23	**4,57**	31 230 071	**30 858 017**	+12,40	**−1,19**	820 401	**1 126 056**	2,627 0	**3,649 2**
Industrial	472	**507**	7,12	**6,91**	42 568 213	**46 652 263**	+5,35	**+9,59**	1 027 985	**1 382 050**	2,414 9	**2,962 5**
Mining	—	—	—	—	—	—	—	—	—	—	—	—
Traction	—	—	—	—	—	—	—	—	—	—	—	—
Total	4 454	**4 672**	100,00	**100,00**	597 651 081	**674 849 960**	+8,37	**+12,92**	9 955 464	**14 035 195**	1,665 8	**2,079 8**

	1975	**1976**	
	R	**R**	
Expenditure charged	11 431 753	**14 608 725**	
Surplus	—	—	**Border**
Deficit	1 476 289	**573 530**	**Undertaking**
Accumulated to 31 December:			
Surplus	—	—	
Deficit	1 462 949	**2 036 479**	

Cape Eastern Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

Electricity sales in this Undertaking amounted to 14 GWh in 1976, 4,8 per cent more than in the preceding year (17,5 per cent in 1975). The diminished rate of growth was due mainly to a much reduced rate of increase of sales to industrial consumers. In contrast to the 1975 surge of growth in the domestic and street-lighting category, this category showed negative growth in 1976.

Development of the Undertaking

To provide supplies to Humansdorp Municipality with a target date of May 1977, the construction of 24 km of 132 kV transmission line from Apex substation near Summit to a terminal near Jeffreys Bay has commenced.

The development of the rural network in this Undertaking continued in a similar manner as in 1975, with the connection of 14 new farming supplies.

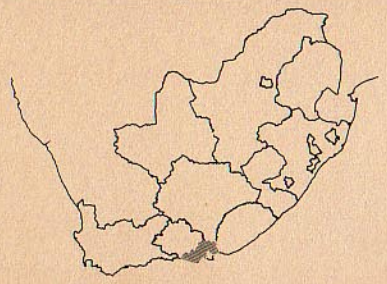
Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 4,412 8 cents per kWh sold during 1976 is 23,1 per cent higher than the figure for the preceding year (5,2 per cent in 1975). Total sales revenue for the year amounted to R623 573 and exceeded the corresponding figure for the preceding year by 29,9 per cent (23,5 per cent in 1975).

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	1	**1**	17,21	**18,33**	2 320 440	**2 590 320**	+2,12	**+11,63**	53 999	**61 800**	2,327 1	**2,385 8**
Direct supplies:												
Domestic and street lighting	628	**658**	28,54	**26,34**	3 847 128	**3 722 642**	+12,81	**−3,24**	144 903	**199 176**	3,766 5	**5,350 4**
Industrial	248	**292**	54,25	**55,33**	7 314 200	**7 817 969**	+26,24	**+6,89**	284 334	**362 597**	3,887 4	**4,638 0**
Mining	—	—	—	—	—	—	—	—	—	—	—	—
Traction	—	—	—	—	—	—	—	—	—	—	—	—
Total	877	**951**	100,00	**100,00**	13 481 768	**14 130 931**	+17,47	**+4,82**	483 236	**623 573**	3,584 4	**4,412 8**

	1975	**1976**	
	R	**R**	
Expenditure charged	517 755	**631 212**	
Surplus	—	—	**Cape**
Deficit	34 519	**7 639**	**Eastern**
Accumulated to 31 December:			**Undertaking**
Surplus	—	—	
Deficit	341 204	**348 843**	

CAPE EASTERN UNDERTAKING



AREA OF SUPPLY.....8 000 SQUARE KILOMETRES

POSEIDON

BORDER UNDERTAKING

Sundays

Groot River

RIRKWOOD

Bushmans River

DUNBRODY S/S

ADDO

Bavianskloof River

Swartkops River

Coega River

Kouga River

S/S KOUGA

PATENSIE

Gamtoos River

HANKEY

LOERIE

APEX S/S

GRASSRIDGE

UITENHAGE

DESPATCH

ALOES S/S

CHATTY

REDHOUSE

SWARTKOPS

ALGOA BAY

PORT ELIZABETH

Kouga River

Krom River

STORMSRIVIER

KAREEDOUW

KAREEDOUW MOUNTAINS (S.A.B.C./ G.P.O.)

KRUISFONTEIN

HUMANSDORP

JEFFREYS BAY

ST FRANCIS BAY

I N D I A N O C E A N

N

REFERENCE

Area of Supply

Border Undertaking

Transmission Lines

Transmission Lines Under Construction

Substation Site ○ S/S

10 5 0 10 20 30 40 50 Kilometres

Cape Northern Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

The sales in this Undertaking during 1976, as indicated in the accompanying table, were 1 507 GWh, an increase of 12,4 per cent on the sales in the previous year (10,7 per cent in 1975).

The mining sector continued to increase its dominance of the total sales, and the biggest share in this sector went to diamond mining (26,1 per cent) followed by copper (23,9 per cent), iron (19,9 per cent), asbestos (16,8 per cent), manganese (6,8 per cent), and gypsum and lime (6,5 per cent). The total mining sales increased by 16,5 per cent in 1976, somewhat more than the growth of 13,3 per cent recorded in 1975.

The two other major categories after mining – bulk municipal and traction – achieved rates of growth in 1976 slightly above the rates recorded in 1975.

The industrial sector, accounting for less than 9 per cent of the total sales, showed a rate of growth of 3,6 per cent in 1976 – well below the rate of 10,1 per cent achieved in 1975.

Development of the Undertaking

The work started in 1975 on the strengthening of the transmission system for supplying the Sishen and Danielskuil areas continued in 1976. The 275 kV Boundary substation near Kimberley was completed during the year; completion of the Olien substation near Silverstreams and the Ferrum substation near Sishen was delayed and is now scheduled for early 1977. The 275 kV transmission line 226 km long interconnecting these new substations has been completed. During July and August 1976, the 275 kV transmission lines from Perseus distribution station near Dealesville to Kimberley distribution station were re-routed and turned into Boundary substation.

The Union Lime Company's new cement works near Danielskuil was connected in May 1976 to the completed Ouplaas substation which is being supplied temporarily from the 132 kV traction system, awaiting the completion of Olien substation in 1977. A 132 kV transmission line 17 km in length was constructed during the year between Ouplaas and Olien.

A second 132 kV transmission line from Kimberley distribution station via Jacobsdal to the De Beers diamond mine at Koffiefontein was commissioned in July 1976, together with the necessary 132 kV feeder bays in both stations.

A 132 kV switching station, Brakbos, was established in April at the "tee-off" point to Fibre substation near Marydale, on the Cuprum-Gordonia line.

A 66 kV transmission line 67 km in length was completed in October from Nama substation near Springbok to the Doringwater pumping station of the Department of Water Affairs. Construction is in progress of the 66/11 kV Kathu substation near Sishen to provide supplies to the Iscor residential township. Completion is planned by the end of February 1977. A 66 kV transmission line is under construction from Hotazel substation, a distance of some 18 km, to the farm Middelplaats, where a new mine developed by Anglo American is planned to go into production in 1978.

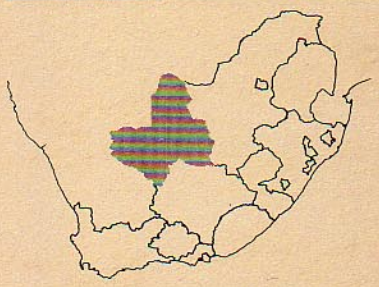
To reinforce traction supplies to the South African Railways between Kimberley and Wildhoen, a 132 kV transmission line 40 km in length was constructed from Bloemheuwel substation near Christiana to Ganspan substation. Bloemheuwel substation was completed in October, and the existing 132 kV Honesty-Kimberley traction line was turned into this substation.

During the year this Undertaking provided a total of 161 new farming supplies, requiring the construction of 43 km of additional transmission lines. Eight additional rural schemes, involving some 800 potential consumers, are in the course of planning. Most of the applications for new supplies are from the Orange River valley below Upington, between Keimoes and the Aughrabies Falls.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 1,444 0 cents per kWh sold during 1976 is 25,0 per cent higher than the figure for the preceding year (17,0 per cent in 1975). Total sales revenue for the year amounted to R21 756 339 and exceeded the corresponding figure for the preceding year by 40,6 per cent (29,6 per cent in 1975).

CAPE NORTHERN UNDERTAKING



AREA OF SUPPLY..... 147 400 SQUARE KILOMETRES

REFERENCE

AREA OF SUPPLY .....

TRANSMISSION LINES .....

TRANSMISSION LINES UNDER CONSTRUCTION .....

BOTSWANA

N

Molopo

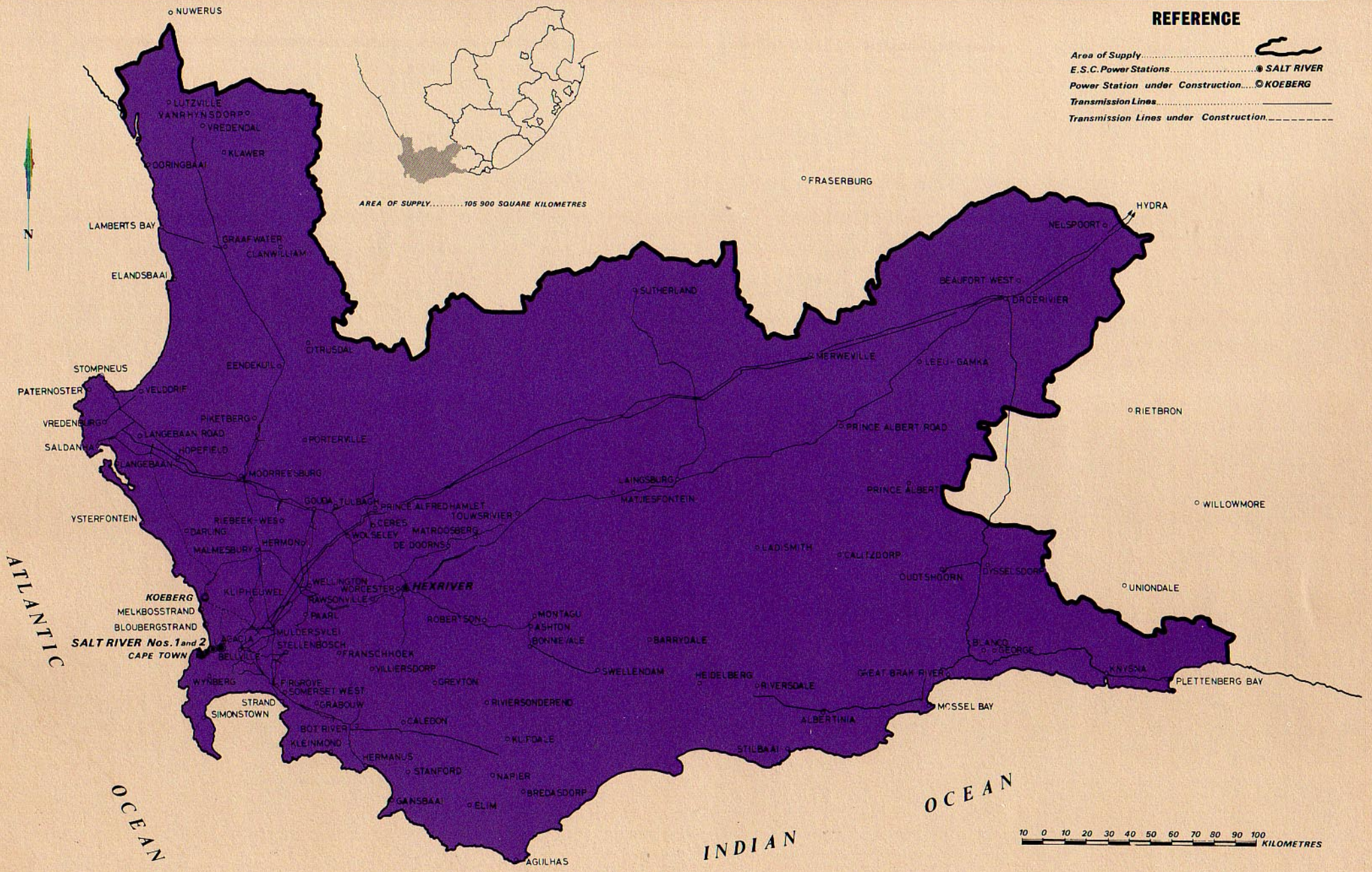
POMFRET
VESEL
VRYBURG
WESSELS
BLACK ROCK
KLIPKOP
CORETSI
ELDORET
HOTAZEL
DEVONIA
MIDDELPLAATS
ADAMS
RIRIES
MAMATWAN
ASSES
MOTHIBISTAT
KURUMAN
CORHEIM
STRELLEY
VALLEY
DIBENG
KATHU
BOSRAND
SISHEN
FERRUM
LYLYVELD
OLIFANTSHOEK
BRETBY
GAKAROSA F.M. STATION
GREYLING
GRYPPOORT
KLIPFONTEIN
NOORDHOEK
LOHATLHA
MANGANORE
DANIELSKUIL
OUPLAAS
WELCOME WOOD
LIME ACRES
OLIEN
SILVERSTREAMS
BEESHOEK
POSTMASBURG
HILLSIDE
VAALBOS
FINSCH MINE
REIVILO
NORLIM
TAUNGS
MAGOGONG
HARTSWATER
TADCASTER
JANKEMP
GANSPAN
GROOTPLAAS F.M. STATION
BOETSAP
CHRISTIANA
BLOEMHEUWEL
VIERFONTEIN
BELLSBANK
KOOPMANSFONTEIN
KNEUKEL
ULCO
DELPORTSHOOP
WINDSORTON
HOLPAN
BORRELSKOP
WARRENTON
WINTERSHOEK MIC.
GROOTKOP
WINDSORTON ROAD MIC.
GANNAVLAKTE
BARKLY WEST
RIVERTON
DAMPLAAS
BOSHOF
NEW ELANDS
BOSPLAAT
LOXTON MINE
PERSEUS
DE ALESVILLE
KIMBERLEY
BOUNDARY
KLAARWATER MIC
OLIFANTSKOP F.M. STATION
Modder
PAARDEBERG
RITCHIE
DOUGLAS
JACOBSDAL
PETRUSBURG
BERGDAM F.M. STATION
SALT LAKE
KOFFIEFONTEIN
HOPETOWN
LUCKHOFF
FAURESMITH
JAGERSFONTEIN
PETRUSVILLE
HYDRA
HYDRA
Vaal
Riet
Riet
Orange
Orange
UPINGTON
ZANDDAM MIC.
AUGRABIES
KEIMOES
KAKAMAS
GARIEP
PADKLOOF MIC
ROOISAND MIC.
KLEINBEGIN F.M.
KLEINBEGIN
LOCKSHOEK MIC
GRIQUATOWN
KAALKOL MIC.
KENHARDT
FIBRE
KOEGAS
MARYDALE
BRAKBOS
AGGENEIS
ARIES
F.M. STATION No C 46
PRIESKA
CUPRUM
KRONOS

10 0 10 20 30 40 50 60 70 80 90 100 KILOMETRES

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	30	**29**	22,29	**22,32**	298 703 500	**336 310 505**	+12,30	**+12,59**	3 273 031	**4 528 223**	1,095 7	**1,346 4**
Direct supplies:												
Domestic and street lighting	2 867	**3 099**	1,95	**1,77**	26 195 825	**26 734 896**	−1,21	**+2,06**	497 947	**636 115**	1,900 9	**2,379 3**
Industrial	873	**966**	8,89	**8,20**	119 173 894	**123 487 541**	+10,06	**+3,62**	1 691 222	**2 333 573**	1,419 1	**1,889 7**
Mining	76	**77**	46,44	**48,14**	622 392 551	**725 268 485**	+13,31	**+16,53**	6 922 684	**10 013 096**	1,112 3	**1,380 6**
Traction	3	**3**	20,43	**19,57**	273 898 436	**294 895 030**	+4,86	**+7,67**	3 094 046	**4 245 332**	1,129 6	**1,439 6**
Total	3 849	**4 174**	100,00	**100,00**	1 340 364 206	**1 506 696 457**	+10,73	**+12,41**	15 478 930	**21 756 339**	1,154 8	**1,444 0**

	1975	**1976**	
	R	**R**	
Expenditure charged	16 538 834	**22 517 374**	
Surplus	—	—	**Cape Northern Undertaking**
Deficit	1 059 904	**761 035**	
Accumulated to 31 December:			
Surplus	—	—	
Deficit	1 273 501	**2 034 536**	

CAPE WESTERN UNDERTAKING



Cape Western Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

Total sales in the Undertaking, as indicated by the accompanying table, increased by 5,9 per cent from 4 655 GWh in 1975 to 4 930 GWh in 1976. This increase was appreciably less than the high rate of 20,9 per cent attained in 1975 which was due largely to a sustained increase in bulk sales to the Municipality of Cape Town. The bulk sales to Cape Town increased in 1976 by 4,6 per cent—a modest rate of growth compared with the annual surges of 53 per cent and 80 per cent experienced in 1975 and 1974 respectively. On the sales for 1976, Cape Town alone accounted for 34,4 per cent of Escom's total in this Undertaking. The bulk supplies to all municipalities in this Undertaking comprised 51,5 per cent of the total sales. Bulk sales, excluding sales to Cape Town, reached 844 GWh in 1976, 10,6 per cent more than the sales in the preceding year (12,5 per cent in 1975).

Sales to the industrial sector showed virtually the same percentage rate of increase in 1976 as was recorded in 1975. The contribution of this sector to total sales in the Undertaking remained virtually unchanged at 28,8 per cent.

Development of the Undertaking

To supply power to the Iscor ore loading facility at Saldanha Bay, a 132 kV transmission line, 52 km in length, from Moorreesburg substation to the future Aurora distribution station, and two 132 kV lines, each 23 km in length, from Aurora to Blouwater substation in the Vredenburg-Saldanha area, were completed during the year. The ultimate installation at Aurora will comprise two 250 MVA 400/132 kV and two 40 MVA 400/50 kV transformers. Blouwater substation will ultimately have two 80 MVA 132/66 kV and two 20 MVA 66/11 kV transformers, and will constitute the major supply point for all the development envisaged in the Vredenburg-Saldanha area. For voltage control purposes, two 66 kV 21 MVA shunt capacitors were commissioned at Moorreesburg substation.

At Acacia distribution station, the 132 kV section was extended to accept the infeed from the adjoining new gas turbine power station. Good progress was made with the construction of the 400 kV section of this distribution station which will have two 500 MVA transformers to cater for future supplies to the City of Cape Town.

A 132 kV transmission line, 45 km in length, from Malmesbury substation to Koeberg substation via the future Dassenberg substation was completed during the year. Koeberg substation was completed, and the construction of Dassenberg substation is in progress. The strengthening of the transmission system in this area is required to cater for industrial development at Atlantis near Mamre and for the construction of the Koeberg nuclear power station.

Two 120 MVA 132/66 kV transformers were commissioned at Windmill substation and connected into the existing Muldersvlei-Hex River 132 kV line. Uprating of this substation was required to provide for increased demands in the Paarl district.

A 132 kV transmission system has been planned from Stikland substation to Sarepta substation in the Bellville industrial area and to Belhar substation near Parow. Construction commenced during the year at these three substations, and design work is in progress on extensions to the scheme.

By the end of the year, construction work was in progress on major extensions to the reticulation network in the Durbanville, Kraaifontein, Table View, Bloubergstrand, Melkbos, Brackenfell, Scottsdene, Kleinvlei, Elsies River, Belhar, Macassar, Scottsville, Louw's Bush, Owen Road and Avonwood districts.

To provide 50 kV single phase alternating current traction supplies to the Sishen-Saldanha railway, work commenced during the year at Juno distribution station which will have two 40 MVA 400/50 kV transformers. Two 33 kV cables were in the process of installation from Acacia distribution station to a new traction infeed point at Windermere on the new Kensington-Bellville railway line.

A total of 426 new farming supplies were connected during the year, requiring the erection of 245 km of new transmission lines. The large rural scheme in the Vredendal area was extended further to provide 150 more supplies, bringing the total under this scheme to 410.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 1,484 6 cents per kWh sold during 1976 is 23,7 per cent higher than the figure for the preceding year (4,0 per cent in 1975). Total sales revenue for the year amounted to R73 195 144 and exceeded the corresponding figure for the preceding year by 31,0 per cent (25,7 per cent in 1975).

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	56	**56**	51,19	**51,49**	2 383 297 159	**2 538 896 006**	+37,27	**+6,53**	22 027 476	**29 033 474**	0,924 2	**1,143 5**
Direct supplies:												
Domestic and street lighting	59 291	**59 474**	9,71	**9,78**	452 237 205	**482 012 267**	+10,56	**+6,58**	8 131 936	**10 928 622**	1,798 2	**2,267 3**
Industrial	8 780	**16 542**	28,23	**28,85**	1 314 126 367	**1 422 540 958**	+8,14	**+8,25**	19 049 849	**25 306 756**	1,449 6	**1,779 0**
Mining	—	—	—	—	—	—	—	—	—	—	—	—
Traction	6	**6**	10,87	**9,88**	505 894 900	**486 928 120**	+3,00	**−3,75**	6 650 599	**7 926 292**	1,314 6	**1,627 8**
Total	68 133	**76 078**	100,00	**100,00**	4 655 555 631	**4 930 377 351**	+20,87	**+5,90**	55 859 860	**73 195 144**	1,199 9	**1,484 6**

	1975	**1976**	
	R	**R**	
Expenditure charged	59 982 583	**73 102 300**	
Surplus	—	**92 844**	**Cape**
Deficit	4 122 723	—	**Western**
Accumulated to 31 December:			**Undertaking**
Surplus	—	—	
Deficit	5 628 036	**5 535 192**	

Eastern Transvaal Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

Sales of electricity in this Undertaking, as indicated by the accompanying table, increased by 10,5 per cent from 7 266 GWh in 1975 to 8 028 GWh in 1976, a rate of growth slightly below the 11,3 per cent achieved in 1975.

Sales to the industrial category increased by 12,2 per cent (15,2 per cent in 1975). This vigorous growth enabled the industrial category to increase its share of the Undertaking's total sales from 60,1 per cent in 1975 to 61,1 per cent in 1976. Mining sales showed a growth of 8,2 per cent, almost double the rate of 4,6 per cent recorded in 1975. The reason for this is the high growth rate of 18,2 per cent reached in sales to coal mines (12,6 per cent in 1975) and the increase of 8,9 per cent in sales to copper mining (5,8 per cent in 1975). As a result, the coal mining share of total mining sales increased from 22,3 per cent in 1975 to 24,3 per cent in 1976. The copper category's share of total mining sales in 1976 was 26,5 per cent.

The bulk and traction categories made a much smaller contribution towards the total sales than the dominant industrial and mining categories. Traction supplies increased by a much lower percentage in 1976 than was recorded in 1975.

Development of the Undertaking

At Marathon substation near Nelspruit, the 125 MVA and 75 MVA transformers previously in use were replaced by two 250 MVA 275/132 kV transformers. The 75 MVA 275/132 kV transformer removed from Marathon was installed at Komatipoort substation to supplement the 75 MVA unit already in service there.

A second 132 kV transmission line, spanning a distance of 16 km from Marathon to Delta substation, was commissioned to provide 33 kV supplies to Delta Manganese and to Nelspruit Municipality.

A substation for Consolidated Metallurgical Industries near Lydenburg was completed, with two 80 MVA 132/33 kV transformers installed. Two 132 kV lines 4 km long were completed between this substation and Lydenburg substation. Tubatse substation near Steelpoort was commissioned towards the end of the year. An interim 132 kV supply to the first 40 MVA 132/33 kV transformer in service was obtained by teeing into the Lydenburg-Steelpoort 132 kV transmission line. A start was made on the construction of Merensky substation near Steelpoort, and the erection of a 275 kV transmission line from Arnot power station direct to Merensky.

A 132 kV interconnector line 47 km in length from Hendrina power station to Wonderfontein substation was completed in December. Some 130 km of 132 kV transmission line was also completed from Pan substation near Middelburg via Mapoch substation near Roossenekal to Lydenburg.

Two additional 45 MVA 132/33 kV transformers were installed at Churchill substation near Witbank to accommodate the increased demand from Ferrometals. To provide Matla power station and colliery with 21 kV construction supplies, a temporary 132/22 kV substation was commissioned. To provide the Phalaborwa Mining Company with a second 11 kV point of supply, Palamin substation near Phalaborwa was taken into service, with two 40 MVA 132/11 kV transformers installed.

Construction commenced during the year of the 132 kV lines intended to connect Matla and Duvha power stations and the future Sasol II complex with the national transmission system.

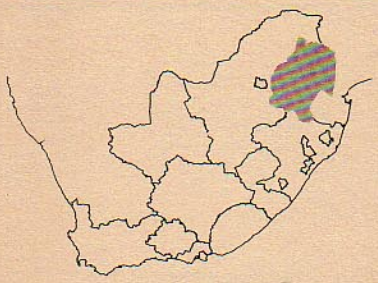
The Undertaking continued with the provision of traction supplies to the South African Railways. Five additional traction tee substations were commissioned for the Machadodorp-Marathon 132 kV section; and three traction tee substations for the Rockdale-Machadodorp section. In the last quarter of the year, the section from the Highveld Steel and Vanadium substation near Witbank to Bronkhorstspruit was provided with 50 km of 88 kV transmission line and three substations. A 30 MVA 132/88 kV transformer was commissioned at the Highveld Steel and Vanadium substation to supply this traction line. A start was made on the erection of the Kaapmuiden-Phalaborwa 132 kV traction line.

During the year, 390 new farming supplies were provided, requiring the erection of 428 km of new transmission lines. In addition to the extension of existing schemes, construction is in progress on new schemes in the Bronkhorstspruit, Witbank, Morgenzon and Piet Retief districts.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 0,975 8 cents per kWh sold during 1976 is 28,0 per cent higher than the figure for the preceding year (16,7 per cent in 1975). Total sales revenue for the year amounted to R78 337 062 and exceeded the corresponding figure for the preceding year by 41,4 per cent (30,0 per cent in 1975).

EASTERN TRANSVAAL UNDERTAKING



AREA OF SUPPLY ..... 97 600 SQUARE KILOMETRES

REFERENCE

Area of Supply

E.S.C. Power Stations ◉ HENDRINA ◎ MATLA (Under Construction)

Transmission Lines

Transmission Lines Under Construction

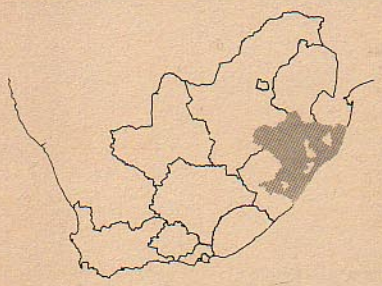
CABORA BASSA
SOEKMEKAAR
MUNNIK
DUIWELSKLOOF
PIETERSBURG
TZANEEN
HAENERTSBURG
LETABA
SELATI
GRAVELOTTE
LEYDSDORP
PHALABORWA
FOSKOR
OFCOLACO
OLIFANTSKAMP
MICA
WITKOP
MIDDELPUNT
PENGE
HOEDSPRUIT
KLASERIE
SATARA
STEELPOORT
SEKHUKUNE
BURGERSFORT
MERENSKY
ACORNHOEK
Kruger
KENNEDYSVALE
NEBO
GRASKOP
MARBLE HALL
LYDENBURG
GORGE
SKUKUZA
GROBLERSDAL
ROOSSENEKAL
MAPOCH
SABIE
KIEPERSOL
LOWER SABIE
DENNILTON
BOSOORD
PRETORIUSKOP
BRONDAL
PLASTON
Park
LOSKOPDAM
DULLSTROOM
STOFFBERG
ROOIKOP
MARATHON
KOMATIPOORT
SAMOZ
BAMBI
MALELANE
PALMER
NELSPRUIT
WAPAD
BOULDERS
KAAPSCHE HOOP
SAPPI
BELFAST
NASARET
PAN
MACHADODORP
NOORDKAAP
LOUWS CREEK
LOMATI
BRONKHORSTSPRUIT
APOLLO
VULCAN
MIDDELBURG
ROCKDALE
PRAIRIE
BOSLOOP
BARBERTON
H S V
TRANSALLOYS
WITBANK
WONDERFONTEIN
KAFFERSKRAAL
DUVHA
WITKLOOF
WILGE
ARNOT
BLACKHILL
WINTERSHOEK
STERKSPRUIT
ARBOR
BADPLAAS
HENDRINA
CAROLINA
KENDAL
OGIES
KOMATI
MZAULI
LOCHIEL
HENDRINA
MIDDELDRIFT
KRUISPUNT
NEVIS
KRIEL
MATLA
BREYTEN
JESSIEVALE
OSHOEK
DEVON
LESLIE
LAKE CHRISSIE
ESTANCIA
KINROSS
MBABANE
EENDRACHT
WILDEBEES
DAVEL
LOTHAIR
TRICHARDT
BETHAL
ERMELO
BRANDSPRUIT
ROODEBANK
ZEUS
CHARLCILLIERS
AMSTERDAM
ATLAS
CAMDEN
JERICHO
SWAZILAND
MORGENZON
PANBULT
ISWEPE
KEMP
CHIVELSTON
PIET RETIEF
NORMANDIE
UMFOLOZI
MOÇAMBIQUE

10 0 10 20 30 40 50 60 70 80 90 100 KILOMETRES

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	31	**32**	10,57	**10,49**	768 066 090	**842 466 967**	+9,08	**+9,69**	6 216 099	**8 486 180**	0,809 3	**1,007 3**
Direct supplies:												
Domestic and street lighting	2 922	**2 975**	0,41	**0,45**	29 794 796	**36 438 634**	+20,74	**+22,30**	541 432	**678 354**	1,817 2	**1,861 6**
Industrial	5 848	**6 319**	60,10	**61,05**	4 367 202 972	**4 901 397 250**	+15,17	**+12,23**	31 865 309	**46 036 443**	0,729 7	**0,938 6**
Mining	110	**119**	23,79	**23,29**	1 728 481 179	**1 869 415 811**	+4,57	**+8,15**	13 022 298	**18 223 742**	0,753 4	**0,974 8**
Traction	7	**8**	5,13	**4,72**	373 301 452	**378 630 299**	+5,56	**+1,43**	3 737 559	**4 912 343**	1,001 2	**1,297 4**
Total	8 918	**9 453**	100,00	**100,00**	7 266 846 489	**8 028 348 961**	+11,33	**+10,48**	55 382 697	**78 337 062**	0,762 1	**0,975 8**

	1975	**1976**	
	R	**R**	
Expenditure charged	55 565 863	**77 433 472**	
Surplus	—	**903 590**	**Eastern**
Deficit	183 166	—	**Transvaal**
Accumulated to 31 December:			**Undertaking**
Surplus	—	—	
Deficit	1 963 585	**1 059 995**	

NATAL UNDERTAKING



AREA OF SUPPLY..... 106 700 SQUARE KILOMETRES

REFERENCE

Area of Supply.....

E.S.C. Power Stations..... INGAGANE

E.S.C. Power Station under Construction..... DRAKENSBERG

Transmission Lines.....

Transmission Lines under Construction.....

Provincial Boundaries.....

International Boundaries.....

Transvaal

MOCAMBIQUE

SWAZILAND

Orange Free State

LESOTHO

TRANSKEI

INDIAN OCEAN

Natal

CAMDEN
AMERSFOORT
PIET RETIEF
STANDERTON
PLATRAND
PERDEKOP
HEILBRON
FRANKFORT
SANDSPRUIT
VOLKSRUST
VREDE
WAKKERSTROOM
PAULPIETERSBURG
PONGOLA
LOUWSBURG
PETRUS STEYN
MEMEL
INCANDU
UTRECHT
CORONATION
HLOBANE
MKUZE
REITZ
NEWCASTLE
VRYHEID
NGWIBI
LINDLEY
WARDEN
KOMSPRUIT
ARLINGTON
INGAGANE
CHIVELSTON
BLOEDRIVIER
RUSTON
BETHLEHEM
AFRIKASKOP
HLUMLUWE
SENEKAL
PAUL ROUX
KESTELL
HARRISMITH
GLENCOE
DUNDEE
STERKFONTEIN
ULUNDI
CLARENS
VAN REENEN
WITZIESHOEK
DANSKRAAL
ST. LUCIA
FOURIESBURG
GOLDEN GATE
DRAKENSBERG
TUGELA
LADYSMITH
MTUBATUBA
LESOTHO
MELMOTH
KWAMBONAMBI
BERGVILLE
COLENSO
BLOUKRANS
MHLATUZE
NKWALENI
RABBIT
WINTERTON
EMPANGENI
IMPALA
RICHARD'S BAY
CATHEDRAL PEAK
PWEENEN
ALUSAF
ESHOWE
MUDEN
KRANSKOP
NGOYE
ESTCOURT
GREYTOWN
MBONYOLWANA
MTUNZINI
CHAMPAGNE CASTLE
AHRENS
GINGINDLOVU
AMATIKULU
RIETVLEI
SEVEN OAKS
SAPPHI
MOOI RIVER
DALTON
MANDINI
GLENDALE
GLENSIDE
STANGER
MERSEY
HOWICK
WARTBURG
DRIEFONTEIN
SHAKASKRAAL
IMPENDHLE
PIETERMARITZBURG
TONGAAT
THORNVILLE
CATO RIDGE
VERULAM
UNDERBERG
GEORGEDALE
UMGENI
DURBAN
BULWER
RICHMOND
ESTONI
CONGELLA
DONNYBROOK
KLAARWATER
CREIGHTON
UMLAZI
Cape Province
Transkei
UMBUMBULU
WINKELSPRUIT
TRANSKEI
IXOPO
ILLOVO
MATATIELE
HIGHFLATS
UMKOMAAS
UMZIMKULU
UMZINTO
CEDARVILLE
KELSO
KOKSTAD
RIETVLEI
HARDING
HIBBERDENE
MOUNT FLETCHER
WEZA
MOUNT AYLIFF
MARBURG
PORT SHEPSTONE
MOUNT FRERE
BIZANA
MARGATE
SOUTHBROOM
PORT EDWARD

N

10 0 10 50 100 KILOMETRES

Natal Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

Total sales in this Undertaking increased by 8,3 per cent, from 9 166 GWh in 1975 to 9 931 GWh in 1976. In 1975 the corresponding increase over the preceding year was 7,8 per cent. The higher rate of overall growth in 1976, compared with that achieved in the previous year, was due largely to more vigorous growth of bulk municipal supplies, the category which still dominates sales with a share in 1976 of 54,2 per cent.

The vigorous growth of total bulk supplies referred to is to some extent due to a higher rate of growth in 1976 of recorded sales to the City of Durban. But high rates of growth were also recorded in the 1976 bulk supplies to Pietermaritzburg (11,5 per cent), Newcastle (47,9 per cent), and Richards Bay-Empangeni (40,6 per cent).

The accompanying table shows that the industrial category is slowly increasing its share of the Undertaking's total sales, at the expense of the bulk category. However, the rate of increase of industrial sales in 1976 was 9,9 per cent, a rate somewhat below the figure of 11,9 per cent recorded in the preceding year. The reason for the diminished rate of growth during 1976 is that, with the exception of Iscor at Newcastle, the development programmes of the large industrial consumers generally did not involve substantially increased demands for electricity.

The Natal Undertaking became for the first time in its history an exporter of electricity, with the commencement in September 1976 of a bulk supply to Lesotho.

Development of the Undertaking

To provide a future 275 kV supply to Durban Municipality, the transmission system south of the city was strengthened during the year by commissioning of the Illovo 275/132 kV substation. To handle the increased demands of the Stanger Municipality, the Shakaskraal 132/33 kV substation has been uprated. An additional 40 MVA 132/33 kV transformer will be installed shortly.

A 33 kV supply was made available to a titanium mine in the Richards Bay area for construction purposes. Construction of a permanent 275 kV supply is due to commence early in 1977.

The construction of a new 132/11 kV substation, and a 6 km 132 kV double-circuit transmission line, to supply the new abattoir at Cato Ridge, is in progress and should be completed during 1977. An additional 40 MVA transformer is being installed to provide an increased supply to Feralloys. To cater for rapid growth of demand at Hammarsdale, an industrial township in the Cato Ridge district, a new 132/11 kV substation is planned for completion in mid-1978.

By the end of 1976, the erection of an 88 kV transmission line, 77 km in length, from Cedara via Elandskop to Bulwer was nearing completion. The two substations for supplying the local area are under construction.

A double-circuit 88 kV line is being erected from Dundee substation to energise the future Talana 88/11 kV substation which is planned to provide for additional demand from a local glass factory. Provision is being made for increasing the supply to a carbide factory from Ballengeich substation south of Newcastle. A second 80 MVA transformer is to be installed and an additional 88 kV line will be erected to link this substation with the transmission network at Ingagane power station. The capacity of Kilbarchan substation near Ingagane power station is being doubled and a second 88 kV line 3 km in length is being erected to handle increasing demand from the colliery.

The provision of ten substations is planned by this Undertaking for 25 kV single-phase alternating current traction supplies to the South African Railways for the Richards Bay-Ermelo railway line. Three of these substations are to be supplied by a new 88 kV transmission line 110 km in length from the future Normandie 400/88 kV substation near Moolman in the Eastern Transvaal Undertaking to the existing Bloedrivier substation in Natal. The remaining substations in Natal are to be supplied by the existing transmission network. For testing purposes, a temporary 25 kV supply was provided during the year at Skume near Vryheid.

Planning is in hand to comply with the South African Railways' request for supplies at their two proposed reverse pumping stations, Dorothea near Vryheid and Tugela near Mandini on the existing crude oil pipeline.

A total of 602 new farming supplies were provided during the year, requiring the erection of 534 km of new transmission lines.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 1,223 4 cents per kWh sold during 1976 is 34,0 per cent higher than the figure for the preceding year (15,0 per cent in 1975). Total sales revenue for the year amounted to R121 499 018 and exceeded the corresponding figure for the preceding year by 45,1 per cent (24,0 per cent in 1975).

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	35	**37**	54,38	**54,19**	4 984 675 849	**5 381 512 614**	+6,13	**+7,96**	42 356 949	**62 026 913**	0,849 7	**1,152 6**
Direct supplies:												
Domestic and street lighting	22 287	**16 506**	1,89	**2,12**	173 353 253	**171 858 304**	+11,86	**−0,86**	3 140 650	**3 777 680**	1,811 7	**2,198 1**
Industrial	5 937	**12 948**	30,41	**30,84**	2 786 878 593	**3 101 864 766**	+11,89	**+11,30**	25 587 487	**37 763 054**	0,918 1	**1,217 4**
Mining	36	**35**	2,03	**2,17**	185 941 570	**215 035 264**	+5,70	**+15,65**	1 947 045	**3 091 729**	1,047 1	**1,437 8**
Traction	14	**14**	11,29	**10,68**	1 034 944 416	**1 060 792 232**	+5,43	**+2,50**	10 674 632	**14 839 642**	1,031 4	**1,398 9**
Total	28 309	**29 540**	100,00	**100,00**	9 165 793 681	**9 931 063 180**	+7,83	**+8,35**	83 706 763	**121 499 018**	0,913 3	**1,223 4**

	1975	**1976**	
	R	**R**	
Expenditure charged	90 212 584	**113 309 005**	
Surplus	—	**8 190 013**	**Natal**
Deficit	6 505 821	—	**Undertaking**
Accumulated to 31 December:			
Surplus	—	**239 432**	
Deficit	7 950 581	—	

Orange River Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

Total sales in the Undertaking, as indicated by the accompanying table, increased by 13,0 per cent from 915 GWh in 1975 to 1 035 GWh in 1976. Following upon the rate of increase of 16,4 per cent recorded in 1975, the percentage growth for the year 1976 is a further illustration of the settling down of sales in this Undertaking since November 1973 when the first bulk supplies commenced to the City of Port Elizabeth.

The sales for 1976 indicate that bulk municipal supplies accounted for 96,4 per cent of the total sales (94,3 per cent in 1975). Since the City of Port Elizabeth alone accounted for some 90 per cent of the total bulk municipal category, it can be expected that this Undertaking's overall rate of growth will be largely determined by Port Elizabeth's growth of electricity demand.

The negative growth rates experienced in the industrial category during the past two years in this Undertaking were due to a continuing decrease of the substantial temporary supplies for construction purposes under the Orange River Project. In 1976 the temporary supplies for construction at P.K. le Roux Dam accounted for some 69 per cent of the total industrial category. As the major construction phases under the Orange River Project come to an end, a sharp drop of industrial sales must be expected.

Development of the Undertaking

The erection of a 66 kV yard at Poseidon distribution station near Cookhouse, and the installation of two 40 MVA 220/66 kV transformers, were completed towards the end of the year, enabling the provision of supplies to Somerset East, Cradock and Graaff-Reinet.

A 66 kV transmission line 110 km in length from Poseidon to Spandau substation near Graaff-Reinet was completed during the last quarter of 1976. Spandau substation and Zebra substation near Cradock were commissioned before the end of the year.

A supply was provided to Despatch Municipality in September, following the completion of extensions to the 132 kV yard at Grassridge substation near Coega, the erection of 20 km of 132 kV transmission line from Grassridge to Kudu substation near Despatch, and the completion of the Kudu 132/11 kV substation itself.

The first stage of a project to reinforce the transmission system in the Britstown area is in progress with the erection of a section of 22 kV transmission line from Hydra to a point near De Aar to provide for pumping demands. Increased regulator capacity will be required at Britstown, and is planned to be installed during 1977.

A total of 24 new farming supplies were provided during the year, requiring the erection of 22 km of new transmission lines. Farmers are becoming interested in supplies for pumping purposes in irrigable areas; applications have been received from the Fish River valley, the Kaffir River valley and from Ramah near the P.K. le Roux Dam.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 0,942 1 cents per kWh sold during 1976 is 23,2 per cent higher than the figure for the preceding year (9,8 per cent in 1975). Total sales revenue for the year amounted to R9 748 729 and exceeded the corresponding figure for the preceding year by 39,3 per cent (27,8 per cent in 1975).

ORANGE RIVER UNDERTAKING

AREA OF SUPPLY.....137 000 SQUARE KILOMETRES

REFERENCE

AREA OF SUPPLY

TRANSMISSION LINES

TRANSMISSION LINES UNDER CONSTRUCTION

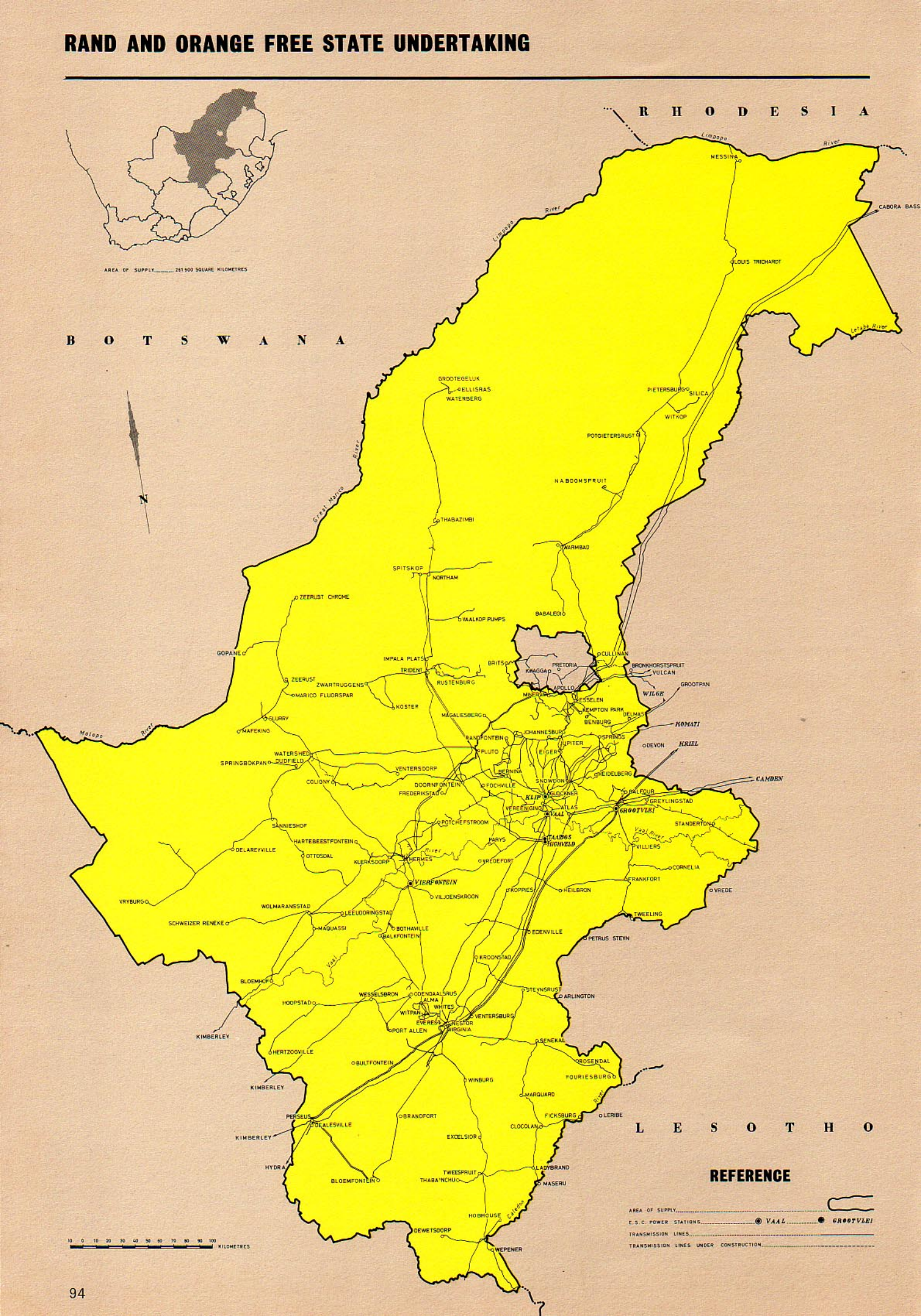
E.S.C. POWER STATIONS ◉ *HENDRIK VERWOERD* ◎ *VANDERKLOOF* (UNDER CONSTRUCTION)

INTERNATIONAL BOUNDARIES

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	32	**37**	94,32	**96,41**	863 359 380	**997 612 534**	+25,71	**+15,55**	6 019 911	**8 832 142**	0,697 3	**0,885 3**
Direct supplies:												
Domestic and street lighting	109	**121**	0,09	**0,09**	866 891	**1 011 210**	+69,90	**+16,65**	33 532	**48 681**	3,868 0	**4,814 1**
Industrial	111	**138**	5,59	**3,50**	51 171 866	**36 185 677**	−48,30	**−29,29**	946 497	**867 906**	1,849 6	**2,398 5**
Mining	—	—	—	—	—	—	—	—	—	—	—	—
Traction	—	—	—	—	—	—	—	—	—	—	—	—
Total	252	**296**	100,00	**100,00**	915 398 137	**1 034 809 421**	+16,43	**+13,04**	6 999 940	**9 748 729**	0,764 7	**0,942 1**

	1975	**1976**	
	R	**R**	
Expenditure charged	8 169 703	**12 242 741**	
Surplus (on network taken over)	136 486	**16 000**	**Orange**
Deficit	1 169 763	**2 494 012**	**River**
Accumulated to 31 December:			**Undertaking**
Surplus	—	—	
Deficit	1 189 972	**3 667 984**	

RAND AND ORANGE FREE STATE UNDERTAKING



Rand and O.F.S. Undertaking

The map shows the licensed area of supply of this Undertaking at 31 December 1976.

Sales of electricity

Total sales for 1976 were 37 235 GWh, reflecting an increase of 9,8 per cent over the sales for the preceding year. The corresponding growth rate recorded in 1975 was 8,9 per cent.

The higher rate of growth during the year under review, compared with the preceding year, was due largely to a revival of gold mining activity, the sales to gold mines having increased by 6,6 per cent (2,6 per cent in 1975). The rate of growth of gold mining sales has an important effect on the overall rate of growth, the sales to gold mines in 1976 having accounted for 83,2 per cent of total mining sales and 35,6 per cent of the Undertaking's overall total sales.

Vigorous growth also occurred in the industrial category, the sales having increased during 1976 by 10,1 per cent. Although somewhat below the rate of 12,1 per cent recorded for the previous year, the 1976 growth is indicative of continuing industrial expansion. In the category of bulk sales, the very high rate of increase of 18,4 per cent recorded for 1975 diminished in 1976 to a level of 14,2 per cent – an annual percentage growth rate which must still be looked upon as vigorous. With annual rates of growth of this magnitude, it is not surprising that the year under review reinforces the trend observed in recent years for the mining sector to lose its dominant position in the pattern of sales to the industrial and bulk sectors.

Development of the Undertaking

The Spitskop distribution station, intended for increased supplies to the platinum mines in the Northam area, was equipped with a second 180 MVA 275/88 kV transformer. At Esselen distribution station near Kaalfontein, a fourth 240 MVA 275/132 kV transformer and three 275 kV feeder bays were installed. To cater for Iscor's increased demand, two additional transformers were installed at Olympus distribution station near Vanderbijlpark: one 250 MVA 275/132 kV and one 90 MVA 275/33 kV. A 275 kV transmission line 26,5 km in length was erected between Olympus and Glockner distribution station near Meyerton. At Bernina distribution station near Westonaria a fourth 240 MVA 275/132 kV transformer was installed.

Two 40 MVA 132/66 kV transformers were installed in the Pietersburg municipal substation to cater for increased demand. A new substation was commissioned at Krugersdorp with two 80 MVA 132/33 kV transformers and associated equipment. Two 132 kV transmission lines 5 km in length were erected between this substation and Westgate distribution station. A new substation was commissioned in Klerksdorp North, with two 20 MVA 132/11 kV transformers and associated equipment. Two 80 MVA 132/88 kV transformers were installed in the Potchefstroom distribution station. A 132 kV transmission line 136 km in length was erected between Thabazimbi and the Grootgeluk substation for Iscor near Ellisras. This line is to provide a temporary supply at 88 kV to the Iscor complex and will also be used for subsequent railway electrification when operating at 132 kV.

To provide for an increased supply to Roodepoort Municipality, two 88 kV transmission lines 10 km in length were erected between Princess distribution station and the Roodepoort municipal substation. A double-circuit 88 kV line 49 km in length was erected between Snowdon distribution station and Sallies substation to provide for increased supplies to Brakpan and Boksburg. The new Eiger substation intended for supplying Alberton Municipality was equipped with two 80 MVA 88/33 kV transformers. The new substation for Potchefstroom Municipality was equipped with two 40 MVA 88/6,6 kV transformers. The installed transformer capacity was increased in the substation supplying Edenvale Municipality. A new 42/6,6 kV substation with two 10 MVA transformers installed was commissioned for supplying the reduction works of the St. Helena Gold Mine in the Orange Free State. A double-circuit 88 kV line 32 km long was erected between Esselen distribution station and Clevebank substation to the north of Randburg, and looped into the new Megawatt Park substation where four 10 MVA 88/11 kV transformers were installed.

To provide traction supplies to the South African Railways, a 132 kV transmission line 50 km in length was erected from Harvard distribution station to the Van Tonder traction substation for the Gunhill-Hamilton section. A 132 kV line was erected from Lichtenburg to Welverdiend to supply traction substations at Hardeklip, Buckingham, Gromofont, Ventersdorp, Ratsagal, Makokskraal, Gatiep, Tatodi, Coligny and Halfpad. Traction supplies were also provided at Balfour North, Rooikop, Kraal and Driemanskap on the Union-Volksrust line. On the Witbank-Eerste Fabrieke line, traction supplies were provided at Van der Merwe and Forfar.

By the end of the year, a number of major projects were in progress, but had not yet been completed. Among these are the installation of a third 500 MVA 400/132 kV transformer at Hermes distribution station near Stilfontein, a third 750 MVA 400/275 kV transformer at Atlas distribution station near Vereeniging and a third 1 000 MVA 400/275 kV transformer at Apollo distribution station near Pretoria. 275 kV Transmission lines are being erected to the new Makulu substation near Sasolburg over distances of 25 km from Atlas and 23 km from Highveld power station. Makulu is to be equipped with three 160 MVA 275/88 kV transformers and is scheduled for completion during 1977. The new Benburg substation north of Benoni is being equipped with two 250 MVA 275/132 kV transformers, for the provision of supplies to Benoni and Boksburg. It is scheduled for

completion during 1977. A 275 kV transmission line, 57 km in length, is being erected from Pluto distribution station near Tarlton to Marikana substation near Brits, to complete the 275 kV ring from Pluto to Trident distribution station near Rustenburg. It is scheduled for completion during 1977.

Witpan substation near Welkom was approaching completion by the end of the year. It will have two 80 MVA 132/42 kV transformers. Two 132 kV cable circuits are being installed from Benoni substation to the Dunswart Iron & Steel Works to provide for increased furnace capacity. Two 88 kV 90 MVA cable circuits are being installed between Bordeaux substation in Randburg and Bryanston substation in Sandton. These cables are intended to form part of the 88 kV cable network based on the new Craighall substation.

The total of 938 new farming supplies provided in this Undertaking during the year was slightly above the total for the previous year. A total of 1 158 km of additional transmission lines were required. Most of the new supplies were provided by extending established schemes. The largest of the new schemes which received supplies during the year are the Bultfontein and Ottosdal schemes, the Gumtree scheme north of Clocolan and a scheme to the north-west of Rustenburg.

Financial

The Undertaking's financial results for 1976 are shown in the table. The average price of 0,905 6 cents per kWh sold during 1976 is 32,3 per cent higher than the figure for the preceding year (19,6 per cent in 1975). Total sales revenue for the year amounted to R337 186 104 and exceeded the corresponding figure for the preceding year by 45,2 per cent (30,2 per cent in 1975).

Consumer details			Sales of electricity						Revenue from sales, in Rand		Average price in cents per kWh sold	
Category	Number		Per cent of total		kWh sold		Per cent change					
	1975	**1976**	1975	**1976**	1975	**1976**	75/74	**76/75**	1975	**1976**	1975	**1976**
Bulk supplies	150	**154**	24,27	**25,24**	8 230 666 294	**9 399 028 127**	+18,47	**+14,20**	57 809 887	**87 099 668**	0,702 4	**0,926 7**
Direct supplies:												
Domestic and street lighting	16 961	**18 503**	0,87	**0,92**	295 549 248	**340 551 014**	+12,67	**+15,23**	3 990 603	**5 468 797**	1,350 5	**1,605 9**
Industrial	21 329	**23 430**	27,60	**27,68**	9 361 189 424	**10 305 907 728**	+12,05	**+10,09**	67 895 494	**98 200 784**	0,725 3	**0,952 9**
Mining	103	**102**	43,96	**42,80**	14 907 526 596	**15 936 509 918**	+2,37	**+6,90**	93 059 562	**132 251 646**	0,624 2	**0,829 9**
Traction	2	**2**	3,30	**3,36**	1 119 137 608	**1 253 443 993**	+9,69	**+12,00**	9 450 332	**14 165 209**	0,844 4	**1,130 1**
Total	38 545	**42 191**	100,00	**100,00**	33 914 069 170	**37 235 440 780**	+8,89	**+9,79**	232 205 878	**337 186 104**	0,684 7	**0,905 6**

	1975	**1976**	
	R	**R**	
Expenditure charged	244 730 493	**342 476 737**	
Surplus	—	—	**Rand and O.F.S. Undertaking**
Deficit	12 524 615	**5 290 633**	
Accumulated to 31 December:			
Surplus	—	—	
Deficit	19 267 407	**24 558 040**	