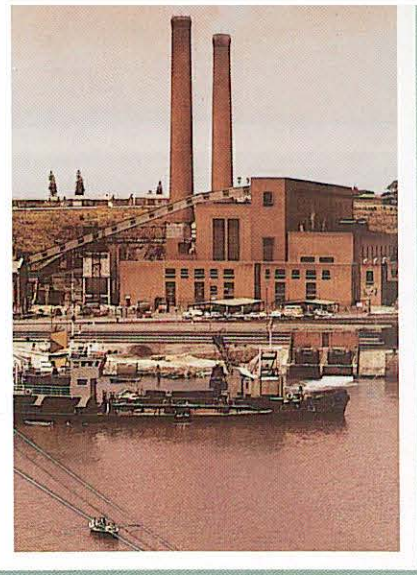
# Historical overview



**1882** South Africa was one of the first countries in the world to use electricity on a commercial basis. As elsewhere, the supply of electricity began under the auspices of various municipalities. Kimberley was the first to introduce electric street lights in 1882, before London had electric lights. Kimberley's first reticulation system was commissioned in 1890, followed by Johannesburg in 1891, Pretoria in 1892, Cape Town in 1895, East London in 1899, Bloemfontein in 1900 and Port Elizabeth in 1906.

**1906** In the 1890s, mining groups combined to erect power stations to supply their own needs. The Victoria Falls Power Company Limited (VFP) was registered to harness the Victoria Falls and supply electricity to industries on the Witwatersrand and in Southern Rhodesia, now Zimbabwe. For technical and financial reasons the project was abandoned and the VFP concentrated on the exploitation of Transvaal coal. By 1915 it had four power stations and at one stage was the largest utility in the British Empire.

**1923** The need for a national power system which could meet the demands of the entire country led to the Electricity Act of 1922 and the establishment of the Electricity Supply Commission in 1923. The Commission's first chairman was Dr H.J. van der Bijl, an internationally recognised scientist who also founded Iscor and the IDC. Eskom began generating power in 1925 and soon became South Africa's leading electricity supplier.

**1948** Eskom took over the VFP in 1948, a further step towards a national supply system. By the end of 1988, Eskom was supplying more than 97% of South Africa's electricity. It now ranks among the largest electricity utilities in the world.

**1962** Eskom's first power stations were far advanced for their time, but small by today's standards with sets of 33 MW and later 60 MW. In 1962, the first "big" sets, 100 MW and 125 MW, were commissioned. This led to the present 600 MW sets which are among the largest and technologically most advanced in the world.

**1973** The idea of an integrated transmission system, linking all major cities in the country, was first raised in the 1920s. By 1973 this had become a reality when all Eskom undertakings had been connected. The transmission system today has more than 200 000 km of lines of which 21 000 km are part of the national grid. In 1987, the first 765 kV lines were energised.

**1984** With vast deposits of coal available Eskom's base-load stations are mainly coal fired. It has also harnessed South Africa's meagre hydro potential. In addition, in 1984, South Africa's first nuclear power station was operational.

**1985** Eskom was restructured in 1985 to meet the electricity demands of a changing South Africa. The Electricity Supply Commission was replaced by a body corporate known as Escom (Eskom since 1987), controlled and managed by the Electricity Council and Management Board in terms of the Eskom Act.

**1988** Eskom re-enforces the 80-year old VFP vision of harnessing the hydro potential of southern Africa.

## CONTENTS


| | |
|---|---|
| Highlights of the year | 1 |
| Electricity Council and Management Board | 2 |
| Profile of Eskom | 3 |
| Chairman's review | 4 |
| Chief Executive's report on operations | 7 |
| How Eskom performed | 10 |
| Financial statements | 12 |
| Eskom in action 1988 | 22 |
| Tables | 40 |
| Organisation structure | 44 |


## HEAD OFFICE


Megawatt Park, Maxwell Drive, Sandton
Telephone (011) 800-8111


## POSTAL ADDRESS

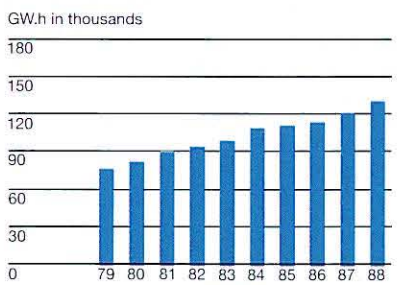

P.O. Box 1091
2000 Johannesburg


Copies of this report, as well as Eskom's Statistical Yearbook, may be obtained from the Communication Manager at the above address. These publications are also available in Afrikaans.

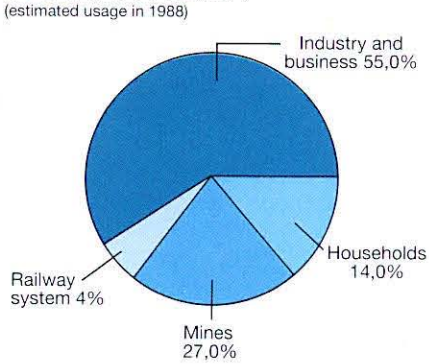
# Highlights of the year

| | 1988 | 1987 | % Change 1987-88 | % Average yearly increase 1984-88 |
|---|---|---|---|---|
| **FINANCIAL** | | | | |
| Revenue (R million) | **8 159** | 7 046 | 15,8 | 19,8 |
| Net income (R million) | **816** | 702 | 16,2 | 1,9 |
| Fixed assets in commission, at cost (R million) | **28 680** | 24 986 | 14,8 | 25,5 |
| Works under construction (R million) | **5 512** | 6 075 | –9,3 | –3,0 |
| Net capital expenditure (R million) | **3 969** | 3 895 | 1,9 | 7,6 |
| Total net borrowings (R million) | **24 334** | 21 475 | 13,3 | 17,9 |
| Average price per kW.h sold (cents) | **6,30** | 5,75 | 9,6 | 13,4 |
| Average coal cost per ton (rand) | **18,67** | 17,11 | 9,1 | 8,5 |
| **OPERATIONS** | | | | |
| Electricity sold (million kW.h) | **129 493** | 122 524 | 5,7 | 5,7 |
| Coal burnt in power stations (Mt) | **64,5** | 65,8 | –2,0 | 3,2 |
| Water consumed by power stations (Mℓ) | **262 804** | 274 804 | –4,4 | 0,6 |
| Peak demand on integrated system (MW) | **20 589** | 20 001 | 2,9 | 5,7 |
| | **(24.06.88)** | (26.06.87) | | |
| **ASSETS IN COMMISSION** | | | | |
| at 31 December | | | | |
| Installed capacity (MW) | **33 176** | 31 261 | 6,1 | 7,6 |
| Assigned sent-out rating (MW) | **31 465** | 29 618 | 6,2 | 7,7 |
| Transmission lines (km) | **201 802** | 187 317 | 7,7 | 7,8 |
| **STAFF EMPLOYED** | | | | |
| at 31 December | **56 726** | 56 830 | –0,2 | –1,9 |

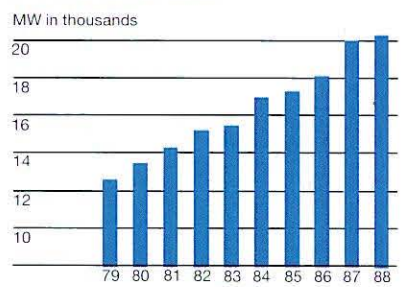
GROWTH IN ELECTRICITY SALES
(from 1979 to 1988)




ELECTRICITY CONSUMPTION IN SOUTH AFRICA
(estimated usage in 1988)




PEAK DEMAND
(on integrated Eskom system)




- ***Growth in kW.h sales highest in four years***
- ***Total cost increase contained to below rise in Producer Price Index***
- ***Electricity price increase still below inflation rate***

- ***Works under construction significantly reduced***
- ***Plant availability, reliability and thermal efficiency increase and technical performance ranks among best in world***

- ***Number of customers increases by 6,3%***
- ***Joint ventures to accelerate rural and urban electrification***
- ***Advice centres for customers on effective use of electricity opened***

# Electricity Council

**Dr J.B. Maree SSAS (64)**
**Chairman**
D. Com. (Honoris causa) (Stell.), B. Com. (Witwatersrand). Appointed to the Electricity Council in 1985.

**P.J. Botes (59)**
Pr. Eng., B.Sc. (Heavy current) (Stell.). City electrical and mechanical engineer of Roodepoort. Member of the Executive Council of the Association of Municipal Electricity Undertakings and convenor of its Electricity Supply Committee. Appointed to the Electricity Council in 1985.

**Dr J.W.L. de Villiers OMSG (59)**
Pr. Eng., D.Sc. (Stell). Chief executive of the Atomic Energy Corporation. Appointed to the Electricity Council in 1985.

**A.B. Dickman (58)**
B. Com. (Hons.) (Witwatersrand), FIBSA. Senior economic consultant and alternate director of Anglo American Corporation of S.A. Limited. Chairman of the Joint ASSOCOM/WCCI standing Committee on Energy, Water and Conservation Affairs. Appointed to the Electricity Council in 1985.

**Dr R.A.P. Fockema (65)**
Ph.D. (Geol.) (Witwatersrand), M.Sc. (Pret.). Director of companies. Chairman of the Subcommittee for Energy of the S.A. Federated Chamber of Industries. Appointed to the Electricity Council in 1985.

**J.F.W. Haak (71)**
B.A., LL.B. (Stell.). Attorney, businessman and member of the President's Council. Appointed to the Electricity Council in 1985.

**Prof. D. Konar (35)**
M.A.S. (Illinois, USA), B. Com. (UDW), C.A. (S.A.). Associate professor of accountancy at University of Durban Westville and director of companies. Appointed to the Electricity Council in 1985.

**Prof. I.J. Lambrechts (46)**
D. Com. (Stell.), MBA (Stell.). Professor of business economics at the University of Stellenbosch. Appointed to the Electricity Council in 1985.

**B.J. Lessing (51)**
B.Sc., B. Eng. (Stell.). Deputy general manager of railways at S.A. Transport Services. Appointed to the Electricity Council in 1988.

**F.J. Malan (60)**
M.Sc. (Agric.) (Stell.). Wine farmer and director of the K.W.V. Chairman of the S.A. Agricultural Union's Electricity Committee. Appointed to the Electricity Council in 1985.

**I.C. McRae (59)**
Pr. Eng., B.Sc. (Mech. Eng.) (Witwatersrand). Chief executive of Eskom and chairman of the Management Board. Appointed to the Council in 1985.

**Dr D.C. Neethling (55)**
Sci. Nat., Ph.D. (Natal), B.Sc. (Hons.) (Pret), B.Sc. (Stell.). Chief executive of the National Energy Council and chairman of the Electricity Control Board. Appointed to the Electricity Council in 1985.

**R.B. Savage (45)**
M.Com. (Witwatersrand), C.A. (S.A.). Deputy chairman of Altron Limited, chief executive of Altech Limited and deputy chairman of Fintech Limited. Vice president of the S.A. Federation of Steel and Engineering Industries. Appointed to the Electricity Council in 1985.

**A.A. Sealey (56)**
B.Sc. (Eng.) (Witwatersrand). Deputy chairman of Rand Mines Limited and chairman of the Coal and Base Minerals Division. Executive director of Barlow Rand Limited. Appointed to the Electricity Council in 1988.

**Dr C.L. Stals (53)**
D. Com. (Pret). Director general of the Department of Finance. Appointed to the Electricity Council in 1985.

**Prof. H.C. Viljoen (51)**
Pr. Eng., Ph.D. (Eng.) (Stell.). Dean of the faculty of engineering at the University of Stellenbosch and chairman of the SABC Control Board. Appointed to the Electricity Council in 1986.

**R.C. Webb (58)**
Director of companies. Involved with the Small Business Development Corporation. Appointed to the Electricity Council in 1985.

**Prof. J.L. Weyers (58)**
D. Litt. et Phil. (SA). Vice-principal Planning of Unisa. Appointed to the Electricity Council in 1986.

# Management Board

**I.C. McRae (59)**
**Chairman**
Pr. Eng., B.Sc. (Mech. Eng.) (Witwatersrand). Chief Executive. Joined Eskom in 1947. Appointed to the Management Board in 1985.

**J.L. Rothman (62)**
Pr. Eng., B.Sc. (Elec. Eng.) (Stell.), Senior General Manager. Joined Eskom in 1955. Appointed to the Management Board in 1985.

**M.L. Davis (31)**
B.Com. (Hons.) (Rhodes), C.A. (S.A.). General Manager (Finance). Joined Eskom in 1986. Appointed to the Management Board in 1988.

**J.S. Els (60)**
Pr. Eng., B.Sc. (Elec. Eng.) (Stell.), B.Sc. (Hons.) (SA), GDE (Witwatersrand). General Manager (Strategic Planning). Joined Eskom in 1953. Appointed to the Management Board in 1985.

**R.A. Forbes (56)**
Pr. Eng., MBL (SA), B.Sc. (Elec. Eng.) (Witwatersrand). General Manager (Distribution and Marketing). Joined Eskom in 1949. Appointed to the Management Board in 1985.

**A.J. Ham (51)**
Pr. Eng., B.Sc. (Mech. Eng.) (Natal). General Manager (Engineering). Joined Eskom in 1966. Appointed to the Management Board in 1987.

**Dr G.F. Lindeque (47)**
D.Phil. (PU vir CHO). General Manager (Human Resources). Joined Eskom in 1975. Appointed to the Management Board in 1987.

**P.J.T. Oosthuizen (59)**
B.A. LL.B (UOVS). General Manager (Privatisation and Legal). Joined Eskom in 1959. Appointed to the Management Board in 1985.

**E.H. Ralph (60)**
Pr. Eng., B.Sc. (Elec. Eng.) Natal. General Manager (Strategic Technology). Joined Eskom in 1955. Appointed to the Management Board in 1985.

**P.M. Semark (44)**
Pr. Eng., B.Sc. (Mech. Eng.) (Cape Town), B.A. (SA). General Manager (Generation). Joined Eskom in 1972. Appointed to the Management Board in 1987.

**J.P. van den Bergh (42)**
Pr. Eng., B.Sc. (Mech. Eng.) (Pret), B. Com. (SA). General Manager (Management Services). Joined Eskom in 1970. Appointed to the Management Board in 1988.

# Profile of Eskom

Eskom supplies more than 97% of the electricity used in South Africa, which is as large as the combined areas of West Germany, the Netherlands, Belgium, France and Italy. Although this is only 4% of the surface area of Africa, Eskom's generation represents about 60% of the electricity used on the entire African continent. It is the western world's fifth largest utility in terms of installed capacity.

At the end of 1988, Eskom's total assets stood at R34 940 million. Revenue for the year was R8 159 million and operating expenditure, including depreciation, was R4 858 million. Net interest and finance charges were R2 964 million before capitalisation. Capital expenditure including interest capitalised during the year amounted to R3 969 million.

Revenue is expected to exceed R9 200 million in 1989.

Eskom's 27 power stations have an installed capacity of 33 176 MW. These include 19 coal-fired, three gas-turbine, two hydro-electric, one nuclear power and two pumped-storage stations. The distribution system has more than 200 000 km of high-voltage power lines.

Eskom is a leader in power station and transmission technology. It operates some of the world's largest coal-fired power stations, and has recently commissioned the first sets of the world's largest direct and indirect dry-cooled stations. It is also a recognised authority on the use of coal of an extremely low grade for power generation and leads research into the effects of lightning on power supply systems.

Eskom operates one of the most sophisticated distribution networks in the world, which now includes 765 kV lines, the first to operate successfully at this voltage at high altitude. Electricity can be distributed anywhere in South Africa and is exported to neighbouring countries such as Botswana, Lesotho, Mozambique, SWA/Namibia, Swaziland and Zimbabwe. Eskom imports surplus power from SWA/Namibia when available and it is under contract to buy power from Mozambique's Cahora Bassa hydro-electric scheme once it is recommissioned.

## HUMAN RESOURCES

Eskom employs some 56 000 people who are engaged in hundreds of job categories, from unskilled labourers to highly qualified engineers and financial specialists.

Eskom is an equal opportunity employer and a meritocracy. Advancement and remuneration are linked to performance, without reference to race, creed or sex. All employees are encouraged to develop their potential through education, training and participative management. The number of women and black persons in senior positions is increasing, and this is supported by staff.

## STRUCTURE

Eskom operates under the Eskom Act 1987 and the Electricity Act 1987. It is an independent self-financing undertaking. It has no shareholders and is funded entirely from debt and retained earnings. It is not a government corporation.

Its activities are planned and directed by the Electricity Council, appointed by the government, and the Management Board, which is responsible for the day-to-day running of Eskom.

The Council, whose chairman is Dr John Maree, also appoints the Management Board, whose chairman is Eskom chief executive Ian McRae. Eskom is divided into six functional groups which are further divided into strategic business units. This ensures a high degree of decentralisation and closer contact with customers.

## MAIN CUSTOMERS

About 61% of Eskom's electricity is sold directly to mines, industry, commerce, rural and domestic customers and the railway system. The rest is supplied to municipalities and neighbouring countries which resell the electricity to end users in their areas.

Electricity demand is expected to grow at between 4% and 5% per year until at least the turn of the century. Much of this growth will come from the formal sector of the economy, but with the accelerated electrification of black towns and rural areas, the informal economy is expanding rapidly. This will spur further growth in electricity demand.

## ESKOM'S VISION

Eskom has a vision of providing an excellent product and service to all in South Africa. It further supports a southern African distribution network which will encourage development in the entire subcontinent.

"Electricity for all" will expand the electricity market considerably. There are 33 million people in South Africa, and at the moment only 13 million of them have access to electricity. Electricity improves the quality of life at home, creates additional demand for products, and enables people to participate more actively in the economy. A regional electricity network will not only bring electricity to people, but help create a basis for co-operation and mobilise the natural resources to turn the subcontinent into a growth area.

Electricity supply is capital intensive and few countries have the funds or the expertise to upgrade their present, often inadequate, supply systems. Eskom has the expertise and the capacity to provide much of their initial needs. Once they are able to expand their own electricity infrastructures, they can export electricity to South Africa by exploiting abundant and relatively inexpensive hydro resources, such as at Cahora Bassa.

In this way, regional co-operation on energy affairs, similar to that found in Europe, is becoming a distinct possibility.

This vision is being turned into a reality. Major cities and towns have been electrified in recent years and the process is being accelerated. Valuable and very encouraging contact is maintained with most utilities in southern Africa.

# Chairman's review

***"The year's results are showing the effects of an organisation which is customer driven, decentralised, leaner, more effective and is operating under tight financial control."***

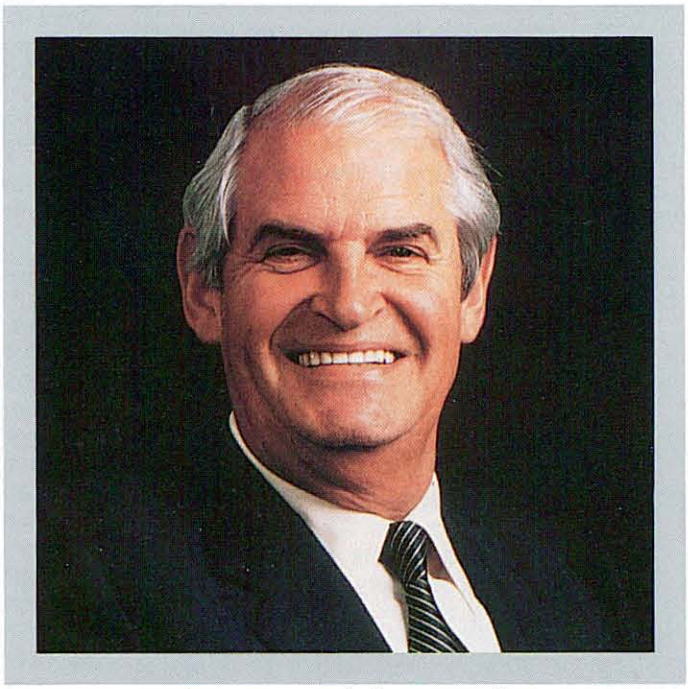
Last year I reported that Eskom was a business in transition, one which was changing from a bureaucracy to a professionally managed business undertaking. During 1988, Eskom moved further down this road, and the year's results are showing the effects of an organisation which is customer driven, decentralised, leaner, more effective and is operating under tight financial control.

In 1988, electricity sales were far better than anticipated and we saw the highest growth rate in four years. While this was partly attributable to the upturn in the economy during the year and to an unusually long winter, a concerted marketing drive to identify and meet customers' electricity needs more effectively was a major contributing factor.

Total costs were well within the target which we set at 2% below the increase in the Producer Price Index. It is a considerable achievement that, in an environment heavily exposed to rising costs, Eskom has managed to keep a tight grip on expenditure. This is the result of improved budgeting, strict financial control and improved management information systems introduced in the organisation three years ago. Consequently, we are now able to identify problem areas earlier and take corrective action timeously.

An overall cost consciousness is steadily working its way through the organisation. Improved people productivity, money management, inventory control and standardisation have led to the more effective use of resources. Fuel costs were well contained and we are burning less coal to generate more electricity at coal-fired stations. The focus of our treasury operations has moved from borrowing funds for new power stations to the management of risk exposures with a resultant containment in the average cost of borrowings.

The same cost consciousness applies to capital expenditure. Three years ago, when it became evident that the growth in electricity demand would be slower than originally forecast in the 1970s, strict financial discipline was introduced and the capital expansion programme was reviewed. Certain projects were delayed or deferred and some were cancelled. In the process, we initially planned a reduction of R1 000 million in our spending for the five-year period to the end of 1989. The actual saving is going to be much bigger at R2 700 million.



As a result of the steps taken to manage our business better, our borrowing requirements declined drastically. In 1983, Eskom took up 47% of the prescribed assets on the local capital market; by 1988 this had been reduced to 5%. We believe that in the foreseeable future our funding needs can quite comfortably be sourced through the local market.

***"The biggest contribution that Eskom can make to South Africa's economy is to keep electricity costs down."***

We believe the biggest contribution Eskom can make to South Africa's economy is to keep electricity costs down and these achievements, therefore, are encouraging. It is heartening to see how Eskom's performance continues to improve, which of course benefits the customer.

In the inflationary climate in which the South African economy operates, it is impossible to avoid price increases. We did, however, give the undertaking in 1986 that we would keep increases in the price of electricity for the following three years to at least 2% below the ruling inflation rate, as measured by the Producer Price Index.

We have kept that promise. In 1987 the increase was 12% against an inflation rate of 13,9%, and in 1988 it was 10% against 13,1%. The increase for 1989 is 10% against an inflation rate which is likely to be 15%.

While we are gratified that we could contain costs, we do operate in a capital-intensive industry subject to high input costs over which we have limited control. It is, therefore, obviously not possible to keep our price rises so far below the inflation rate indefinitely.

***"The only sure way to meet the challenges of electricity supply in South Africa is to run Eskom as a professionally managed business undertaking."***

Eskom is increasingly thinking and acting like a business under-

taking, and I believe that this is improving our ability to combat the effects of inflation. Indeed, the only sure way to meet the challenges of electricity supply in South Africa is to run Eskom as a professionally managed business undertaking.

The customer has become the main focus. We decentralised our organisation so that we can be closer to our customers and meet their electricity requirements more effectively.

We are also fully aware that if we are to become a professionally managed business undertaking, we need good people. Fortunately, Eskom has a pool of very good people. I am constantly surprised by the wealth of talent and potential that is being uncovered in the organisation by encouraging a culture based on participative management, personal development and performance. From time to time it is necessary to go outside and actively look for people who can make a contribution in specialised areas. We have been fortunate to attract such additional talent. We further reinforce our human resources by involving respected local and foreign consultants, which helps to keep us in touch with external expertise and developments.

***"A top business undertaking is driven by managers and employees who have a common vision, common values and the energy to turn their vision into reality."***

A top business undertaking is driven by managers and employees who have a common vision, common values and the energy to turn their vision into reality. This is the thread that links all successful companies.

Eskom has such a vision. It aims to provide an excellent product and service to its customers, make electricity available to all the people in South Africa, support the development of neighbouring states by the development of a regional network and it strives to be recognised internationally as a top utility.

We have a strong management team which shares this vision and is slowly but surely turning Eskom into a professionally managed organisation. We treat our employees fairly and with respect, and provide them with an equal-opportunities environment in which they can develop and perform optimally. We are encouraging a value system which recognises that we have customers to serve who demand a superior product and service.

If one is to meet this requirement, a higher standard of performance is needed in everything we do. Reward is now more closely linked to performance. We are encouraging team work and an open-door policy. By the introduction of the Chairman's and Managers' awards, recognition is given to outstanding achievements. Most of our employees are happy to work in an environment in which high performance is stressed.

We spend a great deal of time communicating with our people on all levels and we see this as an important and ongoing process. We also endeavour to maintain positive relations with the bodies representing our employees.

Eskom had a year of industrial peace, and our relationship with the 15 trade unions representing our employees was also well tested during 1988. With sound industrial relations practices and processes in place we have been able to negotiate with each other to arrive at solutions that are in the best long-term interest of both the organisation and the employees.

The progress towards a leaner and more businesslike organisation has not been without difficulties. Slower long-term growth, reduced capital expenditure and overstaffing in certain areas have meant that we have had to reduce staff. Unfortunately we have not been able to achieve this by natural attrition alone, but where we had to separate ourselves from people, we have tried to do so fairly.

As a business organisation, Eskom cannot carry superfluous staff. We now have a staff complement of about 56 000, compared with 66 000 in 1985. If it is borne in mind that we are generating 13,8% more electricity today than then, it clearly indicates that an increase in productivity has taken place.

As far as our technical performance is concerned, Eskom has always been outstanding. The consistent efforts of employees over many years have contributed to our plant and distribution network being among the most effective in the world. Our power stations burn low-grade coal which would elsewhere in the world be regarded as unusable. The organisation is a leader in dry cooling, important in a country with limited water resources. We also operate a distribution system under some of the world's worst lightning conditions – and our expertise in this field is sought internationally. By being innovative in using appropriate technology, Eskom has been able to reduce the cost of reticulation substantially .

***"The prospects for consistent long-term growth of between 4% and 5% per year in electricity demand in South Africa are good."***

The prospects for consistent long-term growth of between 4% and 5% per year in electricity demand in South Africa are good. The electricity market in South Africa is changing and different customer needs will have to be satisfied in future. This presents an opportunity to us and our approach to the supply of electricity is being adjusted to serve these developing markets.

In the past, most of the growth came from large industrial and mining activities in the formal sector. While it is likely that this sector will continue to provide a basis for growth, most of its basic infrastructure is in place and growth will probably be slower in future. By

contrast, the informal economy, with its numerous existing and potential small electricity users, is developing rapidly and their electricity needs are increasing. The fact that electricity is unavailable to a large part of our population, however, is severely hampering its development and that of small business undertakings.

The major obstacle in bringing electricity to as many urban and rural people in the country as possible has always been the sheer magnitude of the task, both in terms of its technical scope and of funding. This has to be further seen in the context of a developing country with many people still economically subactive.

We are trying to create successful models of how this task can be facilitated. This means using distribution and reticulation technology which will make electricity more affordable to the small user, as well as involving the local private sector, local community and the local authority. Various such schemes are in operation and the experience gained will facilitate the process of bringing electricity to the homes of millions of people during the next few years.

The opportunities for electricity supply in neighbouring countries and the rest of southern Africa are promising. Here, too, a large number of people do not have electricity. This inhibits growth, economic development and a better quality of life. There are also hydro and fossil-fuel generating opportunities which could be developed on a regional co-operative basis.

Maintaining positive electricity links with neighbouring countries can promote growth in the entire region. During the past year, Ian McRae spent a considerable amount of time promoting regional co-operation, with encouraging results.

***"Eskom's possible privatisation needs to be addressed in terms of what is in the best long-term interest of the country, the consumer, employees and potential investors."***

The government has committed itself to privatisation, and Eskom is one of the undertakings that has been identified as a potential candidate. It is, of course, for the government to decide whether Eskom should be privatised or not, and when.

We have completed an in-depth investigation and a preliminary report was prepared examining how Eskom could best be privatised should the decision be made to proceed down this road. Because electricity supply is both complex and in the national interest, Eskom's possible privatisation needs to be addressed in terms of what is in the best long-term interest of the country, the consumer, employees and potential investors.

***"Much of our progress is due to the positive interaction between the Electricity Council and the Management Board."***

While we have made progress, we still have some way to go. Considering the quality of our management team, its enthusiasm, sound values and the large pool of talent at our disposal, I am confident that we can build the kind of organisation that we will all be proud of.

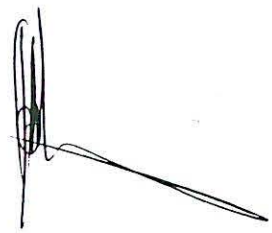
Much of our progress is due to the positive interaction between the Electricity Council and the Management Board. My sincere thanks to the members of the Council and the Management Board for their dedication and support.

During the year, Mr G.Y. Nisbet and Mr B.J. Groenewald retired from the Council. I extend our appreciation to them for their valuable contribution over the years. I am pleased to welcome Mr Allan Sealey and Mr Barry Lessing, who were appointed in their place. We were sad to lose Mr Richard Castle, who passed away in the latter part of 1988.

The Management Board, under the able leadership of Mr Ian McRae, has developed into a strong and committed team of professionals.

I also want to thank our employees for the enthusiasm with which they are pursuing the vision of an effective and efficient organisation.

In 1988, the Minister of Administration and Privatisation, Dr Dawie de Villiers, took over the responsibility for Eskom affairs from the Minister of Economic Affairs and Technology, Mr Danie Steyn. I wish to thank both ministers for their keen interest and much valued guidance.



Dr John Maree
8 March 1989

# Chief Executive's report on operations

## SALES EXCEED EXPECTATIONS AND COSTS ARE HELD FIRMLY DOWN

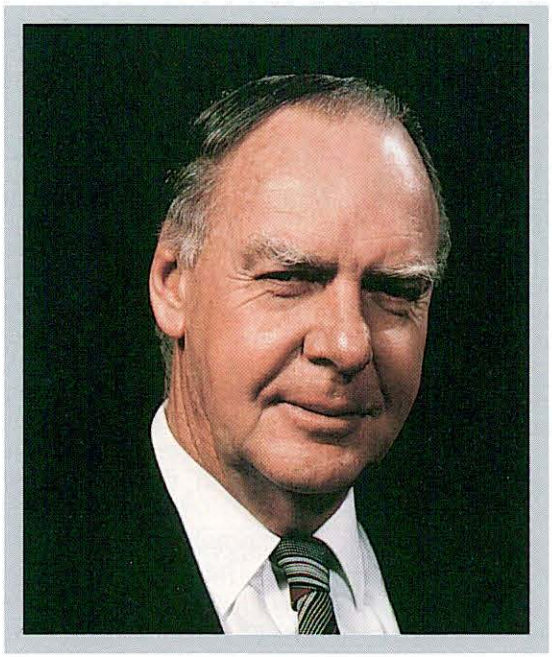
Electricity sales grew by a remarkable 5,7%, from 122 524 million kW.h in 1987 to 129 493 million kW.h in 1988. Revenue from electricity sales amounted to R8 159 million and total costs were R7 343 million, leaving a surplus of R816 million, which brings the accumulated reserve to R8 127 million.

Eskom set itself the target of keeping increases in costs per kW.h to 2% below the increase in the Producer Price Index for 1988. We met this target with a modest net increase of 9,3% which is much lower than the PPI of 13,1% for the year. This was the lowest increase in costs per kW.h in four years, and is the result of the tight financial discipline now applied in the organisation.

Higher kilowatt hour sales were recorded in all of Eskom's main supply categories. Most of the growth occurred during the second half of the year and corresponds to the upsurge in high-level economic activity during this period. The highest growth rates, however, were in supplies to black towns and cities which show the effects of increasing urbanisation and the electrification of residential areas.

Bulk sales to municipalities and neighbouring utilities rose by 8,8%. Special contracts with self-generating municipalities, in terms of which they use Eskom supplies instead of generating their own, contributed to this increase. Kilowatt hours sold to industries supplied direct by Eskom – mainly large, electricity-intensive undertakings – rose by 3,7%. This was higher than expected and was mainly attributable to increased activity in the ferro alloys, beneficiation and chemical sectors. Eskom entered into special growth incentive contracts with a number of industries, which encouraged higher output and enhanced the competitiveness of their goods overseas.

Sales to mines rose by 4,5%. Unlike 1987, there were no major production disruptions in this sector and the world demand for South African minerals would appear to be back to normal. The



demand from the agricultural sector increased by 4,7%, notwithstanding flooding in the Orange Free State, Northern Cape, Natal and the eastern Transvaal. More than 11 000 additional rural supplies were provided, which far exceeded the 1987 figure of 10 055 and the target of 8 436 set for 1988.

The railway transport sector – consisting mainly of supplies for the electrified railway system of South African Transport Services – used 1,7% more electricity than in 1987. Sales to this sector, which represent about 3% of Eskom's total sales, have been declining during the past few years because of slower economic growth and a drop in traffic, but are expected to increase again in the future.

## COSTS CAREFULLY MANAGED AND CAPITAL EXPENDITURE CONTAINED

Total costs were within 1% of budget, despite the increased generating costs associated with the higher than expected electricity sales.

The various components of total costs – generation, primary energy, distribution and the cost of borrowings – were carefully managed and increases were mostly contained.

Generation and distribution costs were 2% higher than budgeted, mainly because of the higher sales. Primary energy costs, however, were 3% below budget, which is mainly attributable to greater than planned availability of hydro resources, the use of more effective plant and the effective control over costs. The cost of manpower was 5% over budget, mainly as a result of the settlement reached between Eskom and the trade unions on higher salary and wage increases. The cost of the separation package, announced during the year after a further downscaling became necessary, contributed to this expenditure.

Eskom's capital expansion programme, although much reduced, is still formidable. Generating plant with a total rating of 11 374 MW is under construction. This will be phased into commercial operation during the next 10 years.

During 1988, R2 380 million was spent on constructing generating plant, 16,5% less than the target. This was the result of deferrals negotiated in 1988 and the tight management of contracts.

Five generating units with a total rating of 2 360 MW were put into service in 1988 at a total capitalised cost of R3 063 million. These are Unit 5 at Tutuka, both units of the Palmiet pumped-stor-

Continued

age scheme, Unit 3 at Matimba and Unit 1 at Kendal.

Although growth in electricity sales in 1988 was unusually high, it is not expected to continue at this rate. The high-growth years during which the demand for electricity grew naturally as South Africa's economic and industrial infrastructure was being established, probably belong to the past. However, positive political change will stimulate the economy and such growth may again be possible. At this stage, we see a long-term growth rate averaging at between 4% and 5% per year.

The 1988 figure does underline the fact that unexpected surges in growth may occur in some years and that sufficient capacity reserves have to be on standby to meet them. As explained in the 1987 Annual Report, growth in the 1980s was slower than forecast and, as a result, Eskom has excess capacity which according to present forecasts will be wiped out by the late 1990s. Should growth be faster than forecast, the surplus will be reduced sooner and new capacity will be required earlier. The long lead times needed before plant comes into production increase the risk in decision making. We are, therefore, continually monitoring the economy and environment to update our forecasts.

Based on a growth rate in electricity sales of between 4% and 5%, new plant will have to be brought into service by the year 2000. A decision on such plant will have to be taken within the next two to three years.

## EMPHASIS MOVES FROM FUNDING TO INTEGRATED RISK MANAGEMENT

In the meantime, with a lower funding requirement, the emphasis in Eskom's treasury has changed from the raising of funds to the management of the various forms of risks. These include risks associated with foreign exchange exposure, interest rates, liquidity and credit exposures.

During 1988, internal control procedures in our treasury operations were further improved and now compare with international standards.

The application of risk management principles were felt in 1988. Despite a 13% rise in debt and an increase in the cost of funds, interest and financing charges before capitalisation rose only by 8,5%. The average annual cost of Eskom's borrowings for 1988 was 13,6%.

Eskom's gross funding requirement, including loan repayments, was R2 291 million in 1988. This was raised without undue difficulty in the local market and, to a lesser extent, from foreign sources.

In real terms, Eskom's net borrowing requirement, excluding loan repayments, has been declining steadily in recent years and should continue to reduce until new plant is ordered, probably in the mid-1990s.

The level of internal financing remained at 26%. This was considered necessary in order to reduce gearing and Eskom's risk exposure to upward movements in interest rates. Interest and finance charges represent 33,8% of the total costs charged against revenue.

At the end of 1988, Eskom's total debt stood at R24 334 million, of which 63% has a debt maturity beyond five years and 70% was in fixed-rate loans. Foreign loan redemptions will be relatively high during the period 1989 to 1991. Eskom has taken adequate steps to meet these commitments.

Eskom, as a borrower on the international capital markets and an importer of foreign goods and services, has built up a significant foreign currency commitment.

It is Eskom policy to cover these commitments forward where forward cover facilities are available. Because of the large volumes involved, it is not always possible to obtain such cover at the right price and for the right period. At times, therefore, it is considered prudent to leave a very small proportion of our commitments temporarily uncovered. Our profits and losses on foreign exchange, however, are insignificant. It is also Eskom policy to consider the cost of forward cover as part of our interest and finance charges. These costs are provided for over the period of the commitment.

Eskom's practice regarding insurance includes an annual assessment of the risk exposures relative to assets and possible liabilities. Risk awareness and self-insurance programmes have been instituted. However, with regard to political riot insurance, as much cover as is reasonably available has been arranged. Separate cover is taken out in respect of contract works and public liability for all major projects. Self-insurance programmes have been instituted in situations where the cost benefit relationship is considered to exceed the risk.

## ESKOM IS CLOSER TO ITS CUSTOMERS AND THEIR NEEDS ARE BETTER SERVED

Eskom recognises that in a slower growth environment, electricity has to be marketed more aggressively than in the past. We are, therefore, increasingly focusing on our customers – present and potential – and their needs.

As a starting point, the organisation was decentralised so that decision making could take place closer to the customer interface. This, together with market research studies covering numerous aspects of electricity supply, is enabling us to understand customer needs better.

Our new marketing approach to electricity supply has resulted in a number of major policy changes. Our pricing policy, for example, now includes special growth incen-

tives for municipalities and industries which in 1988 alone resulted in the contracting of an additional 1 041 MW of capacity. Another example is the establishment of demonstration centres where customers can learn how to use electricity efficiently and cost effectively. The first centre, Agrelek at Glen near Bloemfontein, is devoted to the agricultural sector. The industrial sector is provided for by Industrelek at Rosherville near Germiston, while the Alexelec centre in Alexandra, near Johannesburg, focuses on the domestic use of electricity, particularly for new black customers.

Perhaps the most significant development stemming from our marketing approach is the acceleration of the electrification of black towns and rural areas. We are here in direct competition for customers who still use the traditional forms of energy, such as wood, coal, candles and paraffin.

We believe that a fair percentage of the growth in electricity demand will come from the areas now being electrified – and from the stimulus this will give to the economy as the quality of life of more and more people improves and their ability to participate in the economy increases.

## TECHNICAL PERFORMANCE IS CONSTANTLY IMPROVING

Eskom now has an installed capacity of 33 176 MW and 201 802 km of high-voltage lines which serve the whole of South Africa and link into the neighbouring countries of Mozambique, Zimbabwe, Botswana, SWA/Namibia, Lesotho and Swaziland.

Peak demand on the Eskom system in 1988 was 20 589 MW, 2,9% higher than in 1987. A total of 139 197 million kW.h of electricity was sent out on the Eskom system during the year. Of this, 4 020 million kW.h was exported to neighbouring countries.

The quality of supply on the main interconnected transmission and distribution system was generally good, but on eight occasions a number of large transformers were lost, causing power interruptions.

The average availability of our large reheat coal-fired units improved to 82,7%. The overall thermal efficiency of Eskom power stations improved to 33,6%. Tutuka has the highest sent-out efficiency of 35,8%.

Eskom burnt 64,48 million tons of coal in 1988, about one million tons less than in 1987, even though coal-fired stations sent out 0,7% more energy. This is a clear vindication of our policy to shut down older, less efficient plant. Water consumption was 4,4% lower than in 1987, a saving of 12 000 M$\ell$ which was mainly brought about by the increased use of Eskom's dry-cooled generating units.

## STAFF RESPONDING WELL TO PERFORMANCE MANAGEMENT

Real productivity gains do not stop with technical improvements. Eskom is committed to creating an environment in which the potential of employees can be developed and used to the full. This environment we see as one of equal opportunity in which performance is the measure for reward. In addition, we provide training inhouse or with external institutions.

On all counts we have done well in 1988. There is no discrimination on race, creed or sex in Eskom and parity has been achieved in all jobs. About 19 500 employees attended courses during the year. A number of students from other countries joined the Eskom programmes. There were 820 Eskom bursars at universities and technikons in 1988.

Performance management was a top priority in 1988. The programme allows for employees to set objectives in terms of customer focused outputs, which they contract with their supervisors. This means that employees have a clearer understanding of what their customers' needs are. Focus is not only on performance, but on a plan for personal development based on required competencies.

The response to the programme is very good and Eskom's top 650 managers rate it as one of the most positive changes introduced in the organisation.

## ACKNOWLEDGEMENTS

During the year, Ters Oosthuizen, general manager (services) took over a new portfolio, general manager (legal services and privatisation). Johan van den Bergh, assistant general manager (engineering) was appointed general manager (management services). Mick Davis was appointed general manager (finance) late in 1988 in the place of Larry Harper, who has joined an American firm of management consultants. Herman Edeling, general manager (commercial and estates) retired in March 1989.

On behalf of the Management Board, I extend our sincere appreciation to the Electricity Council for their invaluable guidance and support. I am grateful to be able to draw on the experience and knowledge of its chairman, Dr John Maree, and I thank him for his leadership.

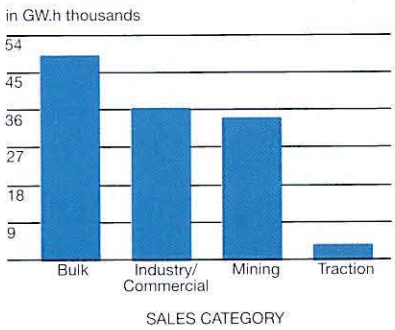
My thanks also to the Management Board for their support and commitment. It is a team of which I am tremendously proud. Finally, I want to thank our staff. It was their co-operation and dedication which made Eskom's achievements in 1988 possible.

I.C. McRae
Chief Executive
8 March 1989

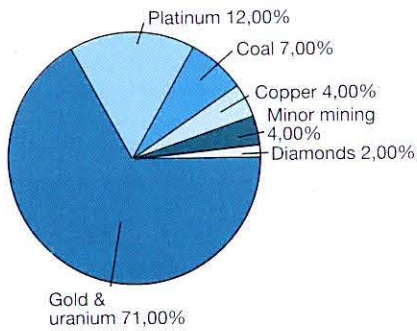
# How Eskom performed in 1988

| Performance measure | Target for 1988 | Actual achieved |
|---|---|---|
| Increase in total costs per kW.h compared with increase in Producer Price Index | Not more than 98% of the increase in the PPI | 96,8% |
| Increase in total generation cost per k.Wh compared with increase in Producer Price Index | Not more than 98% of the increase in the PPI | 95,2% |
| Increase in primary energy cost per kW.h compared with increase in Producer Price Index | Not more than 98% of the increase in the PPI | 87,6% |
| Increase in distribution cost per kW.h compared with increase in Producer Price Index | Not more than 98% of the increase in the PPI | 96,7% |
| Capital expenditure | R4 180 million | R3 969 million |

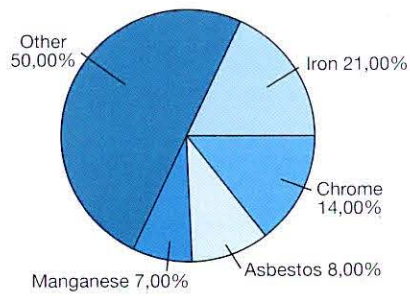
## ELECTRICITY SALES, 1988
(Eskom categories)



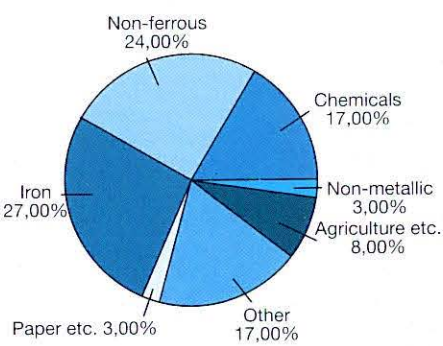

## MAJOR MINING SALES



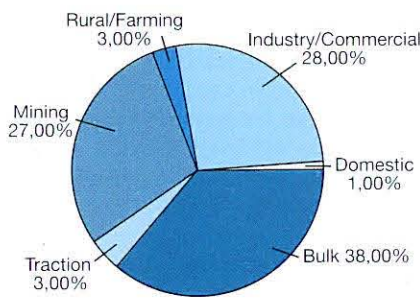

## MINOR MINING SALES



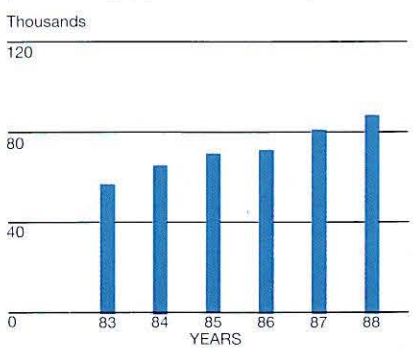

## SALES TO INDUSTRY




## SALES PER CATEGORY

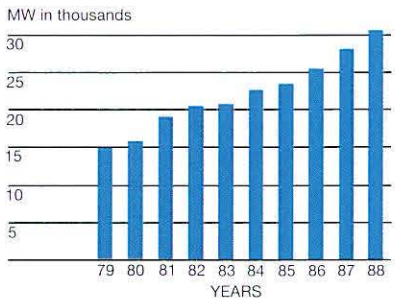



## RURAL SUPPLIES
(Number of supply points at 31 December)

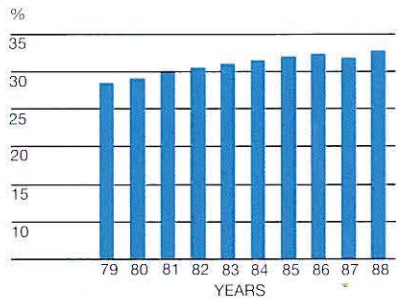


| Performance measure | Target for 1988 | Actual achieved |
|---|---|---|
| Number of rural supply points provided | 8 436 | 11 014 |
| Plant availability | 78,3% | 79,1% (1987: 79,2%) |
| Planned outages | 11,1% | 12,8% (1987: 11,7%) |
| Forced outages | 10,8% | 8,1% (1987: 9,1%) |
| Plant reliability | 550 hours | 510 hours (1987: 400 hours) |
| Plant efficiency for coal-fired power stations | 33,4% | 33,6% (1987: 32,8%) |
| Number of low-frequency incidents (less than 49,2 Hz) | 8 | 1 (1987: 3) |
| Hours without operating reserve | 135 | 67 (1987: 84) |
| Coal burnt in Eskom power stations | 66,73 million tons | 64,48 million tons |

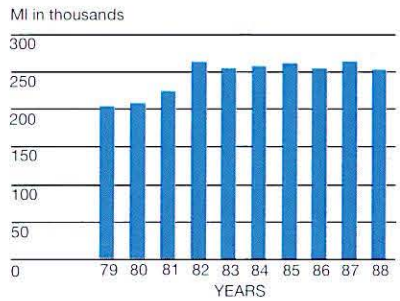
## SENT-OUT CAPACITY



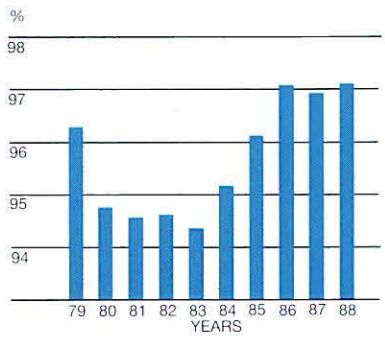

## THERMAL EFFICIENCY



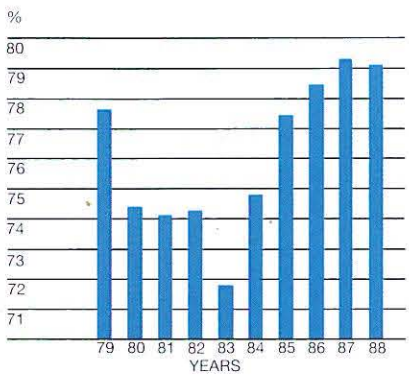

## WATER CONSUMPTION



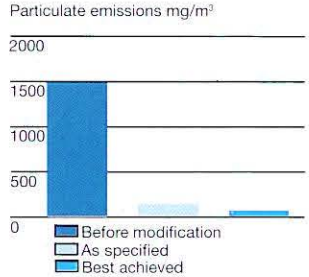

## RELIABILITY




## PLANT AVAILABILITY




## SMOKE EMISSION AT KRIEL POWER STATION

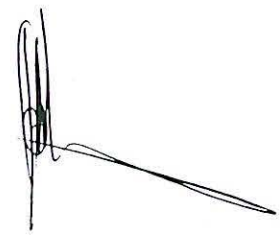



Smoke emissions from chimneys at Kriel power station before and after installation of $SO_3$ gas conditioning equipment. Emissions as low as 50 mg/m³ are being achieved.

# Annual financial statements

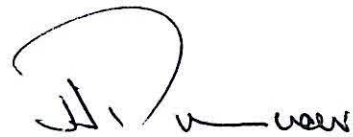
for the year ended 31 December 1988

The annual financial statements set out on pages 13 to 21 have been approved by the Electricity Council and were signed on its behalf on 8 March 1989 by



**Dr J. B. Maree**
Chairman of the
Electricity Council

**I. C. McRae**
Chief Executive
of Eskom



**H. J. Pienaar**
Accounting Manager
of Eskom

**Contents**

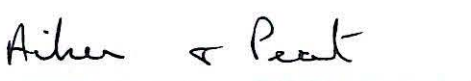
13 Accounting policies
14 Cash flow statement
15 Notes to the cash flow statement
16 Balance sheet
17 Income statement
18 Notes to the financial statements
21 Local registered stock (schedule 1)

## Report of the auditors

The members of the Electricity Council

We have examined the annual financial statements set out on pages 13 to 21. Our examination included such auditing procedures as we considered necessary.

In our opinion these statements fairly present the financial position of Eskom at 31 December 1988 and the results of its operations for the year then ended, in the manner required by the Eskom Act of 1987 and in conformity with generally accepted accounting practice.



**Aiken & Peat**
Chartered Accountants (S.A.), Auditors

**Deloitte Haskins & Sells**

Johannesburg
8 March 1989

# Accounting policies

**Basis of preparation**
The financial statements are prepared on the historical cost basis in conformity with generally accepted accounting practice and incorporate the following principal accounting policies, which are consistent in all material respects with those applied during the previous year, except as detailed in note 1.7. Certain 1987 figures have been reclassified to present appropriate comparisons.

**Loan discount**
Discounts and premiums on local registered stock in issue are amortised over the period of each loan using the yield to redemption method.

**Foreign currencies**
Transactions in foreign currencies are recorded at the spot rates when the forward cover contracts were established or at the spot rates ruling at transaction date.

Assets, liabilities and commitments in foreign currencies are translated to South African Rand at the spot rates of the underlying forward cover contracts or at the rates of exchange ruling at year end.

Forward cover contracts not relating to specific assets, liabilities or commitments are valued using the forward rates to maturity ruling at year end.

Forward cover costs for specific assets, liabilities and commitments are recognised over the periods of the forward cover contracts and are included under interest and finance charges in the income statement.

Gains and losses on foreign exchange are included under interest and finance charges in the income statement.

**Fixed assets and depreciation**
Fixed assets in commission are stated at cost of acquisition or construction.

Land is not depreciated.

Rights are fully depreciated on purchase.

Other fixed assets in commission, equipment and vehicles are depreciated on the straight line basis over their estimated useful lives.

Works under construction are stated at cost, which includes all activities necessarily incurred to bring the plant to the condition and location essential for its intended use. Interest and finance charges and related overheads are capitalised during the period of construction. Research and development costs relating to specific projects are capitalised.

Construction materials are valued at weighted average cost.

**Decommissioning**
Provision is made for the estimated costs of decommissioning nuclear plant over its estimated useful life.

Provision is not made for the costs of decommissioning other plant unless it is expected that decommissioning costs will exceed the proceeds on sale of associated land and the salvage value of the plant.

**Future fuel supplies**
Certain long-term supply contracts require advance payments to suppliers of fuel for pre-production costs. These payments, together with interest capitalised thereon, are deferred and amortised on the basis of quantities of fuel purchased.

**Stores and fuel**
Nuclear fuel is valued at cost on the first-in-first-out basis.

Stores and other fuel are valued at weighted average cost. Provision for obsolescence is made where appropriate.

**Investments**
Securities held for investment are stated at cost and profits or losses are recognised on realisation.

Securities held for trading are stated at market value and profits or losses are accounted for on revaluation.

**Electricity revenue**
Revenue is recognised at the time customers are billed. Revenue from supplies between the date of the last bill and the year end is not accrued whereas operating expenditure is recognised as incurred.

**Leased assets**
Lease charges are recognised in the income statement when due. Assets subject to finance leases are not capitalised.

**Interest capitalisation**
Interest and finance charges incurred to finance works under construction and expenditure to secure future fuel supplies are capitalised.

**Retirement benefits**
Contributions to the Eskom Pension and Provident Fund are based on a percentage of salaries and are expensed in the period in which they are incurred.

Gratuities paid to retiring employees are expensed in the period in which they are paid.

# Cash flow statement

for the year ended 31 December 1988

*(Figures in R million)*

| | Notes | 1988 | 1987 |
|---|---|---|---|
| **Cash generated from operations** | | | |
| Net operating income | | **3 301** | 2 839 |
| Non-cash items | A | **1 328** | 1 045 |
| | | **4 629** | 3 884 |
| Cash released from working capital | B | **304** | 192 |
| | | **4 933** | 4 076 |
| Net financing charges | C | **(2 392)** | (1 771) |
| **Net cash flow from operations** | | **2 541** | 2 305 |
| Capital expenditure | D | **(3 969)** | (3 895) |
| Investments and deposits | | **(1 315)** | (48) |
| **Financing requirements** | | **(2 743)** | (1 638) |
| **Financing activities** | | **2 768** | 1 647 |
| Loans and facilities raised | | | |
| Local | | **1 210** | 1 761 |
| Foreign | | **1 011** | 1 391 |
| Net proceeds on maturity of forward cover contracts | | **1 348** | 366 |
| Total raised | | **3 569** | 3 518 |
| Loans and facilities repaid | | | |
| Local | | **(112)** | (1 276) |
| Foreign | | **(689)** | (595) |
| Total repaid | | **(801)** | (1 871) |
| **Increase in cash** | | **25** | 9 |

# Notes to the cash flow statement

for the year ended 31 December 1988

*(Figures in R million)*

| | 1988 | 1987 |
|---|---|---|
| **A. Non-cash items** | | |
| Depreciation | **1 150** | 963 |
| Other | **178** | 82 |
| | **1 328** | 1 045 |
| **B. Cash released from working capital** | | |
| Stores and fuel | **(160)** | 25 |
| Debtors | **(136)** | (109) |
| Creditors | **601** | 290 |
| Interest payable | **(1)** | (14) |
| | **304** | 192 |
| **C. Net financing charges** | | |
| Interest and finance charges | **(2 485)** | (2 137) |
| Loan discount amortised | **61** | 139 |
| Other | **32** | 227 |
| | **(2 392)** | (1 771) |
| **D. Capital expenditure** | | |
| Expenditure on land, buildings and plant | **(3 560)** | (3 475) |
| Expenditure on equipment and vehicles | **(120)** | (97) |
| Housing loans granted to employees | **(10)** | (105) |
| Expenditure on future fuel supplies | **(279)** | (218) |
| | **(3 969)** | (3 895) |

# Balance sheet

at 31 December 1988

*(Figures in R million)*

| | Notes | 1988 | 1987 |
|---|---|---|---|
| **Capital employed** | | | |
| **Accumulated reserves** | | **8 127** | 7 311 |
| **Provision for decommissioning costs** | | **177** | 155 |
| **Loans and other debt** | 1 | **22 757** | 20 802 |
| | | **31 061** | 28 268 |
| **Employment of capital** | | | |
| **Fixed assets** | 2 | **29 169** | 26 970 |
| **Investments** | 3.1 | **724** | — |
| **Other non-current assets** | 4 | **2 219** | 2 068 |
| **Current assets** | | **2 828** | 1 605 |
| Stores and fuel | 5 | **1 176** | 705 |
| Debtors | | **865** | 729 |
| Short-term investments | 3.2 | **729** | 138 |
| Cash | | **58** | 33 |
| **Total assets** | | **34 940** | 30 643 |
| **Current liabilities** | | **3 879** | 2 375 |
| Creditors | | **1 886** | 1 285 |
| Short-term debt | 1 | **1 577** | 673 |
| Interest payable | | **416** | 417 |
| | | **31 061** | 28 268 |

# Income statement

for the year ended 31 December 1988

*(Figures in R million)*

| | Notes | 1988 | 1987 |
|---|---|---|---|
| **Electricity revenue** | | **8 159** | 7 046 |
| Industrial | | **2 566** | 2 243 |
| Bulk | | **3 025** | 2 535 |
| Mining | | **2 072** | 1 820 |
| Traction | | **337** | 308 |
| Domestic and lighting | | **159** | 140 |
| **Operating expenditure** | 6 | **4 858** | 4 207 |
| **Operating income** | | **3 301** | 2 839 |
| **Net interest and finance charges** | 7 | **2 485** | 2 137 |
| **Net income** | | **816** | 702 |
| **Accumulated reserves at beginning of year** | | **7 311** | 6 609 |
| **Accumulated reserves at end of year** | | **8 127** | 7 311 |

# Notes to the financial statements

for the year ended 31 December 1988

*(Figures in R million)*

| | | 1988 | 1987 |
|---|---|---|---|
| **1.** | **Loans and other debt** | | |
| 1.1 | Authorised local registered stock. Nominal value of stock available for issue (Schedule 1) | **24 443** | 24 532 |

| 1.2 Borrowings | Local registered stock | Foreign and other debt | Total |
|---|---|---|---|
| **1988** | | | |
| **Long-term (over 5 years)** | **13 337** | **2 128** | **15 465** |
| **Other** | **1 544** | **9 882** | **11 426** |
| | **14 881** | **12 010** | **26 891** |
| **Short-term transferred to current liabilities** | **(249)** | **(1 328)** | **(1 577)** |
| | **14 632** | **10 682** | **25 314** |
| **Loan discount** | **(2 557)** | | **(2 557)** |
| **Total** | **12 075** | **10 682** | **22 757** |
| 1987 | | | |
| Long-term (over 5 years) | 12 335 | 1 324 | 13 659 |
| Other | 1 100 | 8 754 | 9 854 |
| | 13 435 | 10 078 | 23 513 |
| Short-term transferred to current liabilities | (51) | (622) | (673) |
| | 13 384 | 9 456 | 22 840 |
| Loan discount | (2 038) | | (2 038) |
| Total | 11 346 | 9 456 | 20 802 |

1.3 All foreign currency exposures were hedged by forward cover contracts at year end.

1.4 Included in foreign and other debt is R1 798 million which is due for repayment in 1990 in terms of the second interim debt standstill agreement. Of this R1 559 million will be subject to renegotiation in 1990.

1.5 Average rate of interest and finance charges amounted to 13,6 per cent per annum during the year (1987: 13,5 per cent per annum)

1.6 Other borrowings include credits and short-term advances totalling R1 900 million (1987: R1 732 million) which are of a revolving nature.

1.7 With effect from 1 January 1988 the method of amortising loan discount was changed from straight line to yield to redemption in order to reflect the charge in the income statement at a constant rate. The effect of this change is a decrease of R107 million (1987: R89 million) in interest and finance charges. Comparative figures have not been restated.

# Notes to the financial statements

for the year ended 31 December 1988

*(Figures in R million)*

## 2. Fixed assets

| | Cost | Accumulated Depreciation | Book Value |
|---|---|---|---|
| **1988** | | | |
| Land and rights | **287** | **65** | **222** |
| Buildings and facilities | **2 299** | **515** | **1 784** |
| Plant – Generation | **19 735** | **3 211** | **16 524** |
| – Transmission | **2 784** | **601** | **2 183** |
| – Distribution | **3 415** | **793** | **2 622** |
| Test and telecommunication equipment | **160** | **111** | **49** |
| Total in commission | **28 680** | **5 296** | **23 384** |
| Works under construction | **5 359** | | **5 359** |
| Construction materials | **153** | | **153** |
| Equipment and vehicles | **643** | **370** | **273** |
| | **34 835** | **5 666** | **29 169** |
| 1987 | | | |
| Land and rights | 268 | 68 | 200 |
| Buildings and facilities | 2 317 | 431 | 1 886 |
| Plant – Generation | 16 832 | 2 487 | 14 345 |
| – Transmission | 2 406 | 470 | 1 936 |
| – Distribution | 3 014 | 790 | 2 224 |
| Test and telecommunication equipment | 149 | 91 | 58 |
| Total in commission | 24 986 | 4 337 | 20 649 |
| Works under construction | 5 889 | | 5 889 |
| Construction materials | 186 | | 186 |
| Equipment and vehicles | 542 | 296 | 246 |
| | 31 603 | 4 633 | 26 970 |

| | **1988** | 1987 |
|---|---|---|
| **3. Investments** | | |
| 3.1 Long-term | | |
| Republic of South Africa, Municipal and other stock – at cost (Market value R717 million) | **721** | — |
| Ash Resources (Proprietary) Limited | **3** | — |
| | **724** | — |
| 3.2 Short-term | | |
| Eskom local registered stock held for market making purposes – at market value | **37** | — |
| Deposits | **692** | 138 |
| | **729** | 138 |
| Maturity of forward cover contracts resulted in a net cash inflow of R1 348 million (1987 R366 million), of which R1 278 million (1987 R48 million) has been invested to provide liquidity for the ultimate settlement of liabilities. | | |
| **4. Other non-current assets** | | |
| Housing loans to employees | **411** | 401 |
| Future fuel supplies | **1 808** | 1 667 |
| | **2 219** | 2 068 |
| Housing loans to employees are secured by first mortgages. Certain mortgages have been ceded to financial institutions as security for loans included in foreign loans and other debt | **190** | 222 |

# Notes to the financial statements

for the year ended 31 December 1988

*(Figures in R million)*

| | | 1988 | 1987 |
|---|---|---|---|
| **5.** | **Stores and fuel** | | |
| | Maintenance and consumable stores | **399** | 347 |
| | Fuel | **777** | 358 |
| | | **1 176** | 705 |
| **6.** | **Operating expenditure** | | |
| | Operating expenditure includes: | | |
| | Depreciation | | |
| | Assets in commission | **1 065** | 899 |
| | Equipment and vehicles | **85** | 64 |
| | Lease charges on equipment | | |
| | Operating leases | **9** | 15 |
| | Finance leases | **32** | 14 |
| | Net loss on disposal of fixed assets | **25** | 2 |
| **7.** | **Net interest and finance charges** | | |
| | Interest paid | **2 568** | 2 302 |
| | Forward cover cost | **441** | 349 |
| | Discount amortised | **61** | 139 |
| | Other | **37** | 11 |
| | | **3 107** | 2 801 |
| | Interest received | **(143)** | (70) |
| | | **2 964** | 2 731 |
| | Amounts capitalised | **(479)** | (594) |
| | | **2 485** | 2 137 |
| **8.** | **Commitments** | | |
| | 8.1 Capital expenditure contracted for, excluding contract price adjustments and general sales tax | **3 655** | 4 625 |
| | This expenditure will be financed from borrowings and internally generated funds and is expected to be incurred as follows: | | |
| | 1989 1 084 | | |
| | 1990 779 | | |
| | 1991 470 | | |
| | 1992 361 | | |
| | 1993 311 | | |
| | thereafter 650 | | |
| | 8.2 Undrawn amounts in respect of housing loans granted to employees | **35** | 47 |
| | 8.3 Lease commitments | | |
| | Finance leases in respect of computer equipment | **116** | 85 |
| | Payable in 1989 29 | | |
| | Payable in 1990 – 1993 87 | | |

**9. Contingent liabilities**

9.1 An Appeal Court hearing is pending regarding the raising of assessments for general sales tax on certain capital expenditure contracts. Provision has not been made as Management is of the opinion that the General Sales Tax Act has been complied with and has objected to the assessments raised.

9.2 Guarantees issued to financial institutions as security for housing loans granted to employees amounting to R27 million (1987 R Nil).

9.3 Eskom has indemnified the Eskom Pension and Provident Fund against any loss resulting from the negligence, dishonesty or fraud of the Fund's officers or trustees.

**10. Retirement benefits**

Eskom employees are members of the Eskom Pension and Provident Fund which is a defined contribution plan governed by the Pension Funds Act. The Fund is valued at intervals of not more than three years. Any deficit will be funded by the payment of actuarially determined lump sums or by future contributions. The last actuarial valuation was performed as at 31 December 1987 and the actuaries reported that the Fund was in a sound financial position. No events have taken place since this valuation which have had a significant effect on the Fund.

# Local registered stock

at 31 December 1988

*(Figures in R million)*

| Loan | Authorised Nominal Value 1988 | % | Repayment Date/s | Issued Nominal Value 1988 | 1987 |
|---|---|---|---|---|---|
| 51 | | 5 | 1983/88 | | 6 |
| 58 | 30 | 6,5 | 1989/91 | 13 | 21 |
| 60 | 35 | 6,75 | 1991 | 13 | 22 |
| 61 | 35 | 6,875 | 1992 | 14 | 16 |
| 64 | 12 | 6,5 | 1992 | 7 | 8 |
| 65 | 37 | 6,875 | 1992 | 19 | 20 |
| 70 | 10 | 6,5 | 1993 | 7 | 5 |
| 71 | 70 | 6,875 | 1993 | 29 | 31 |
| 75 | 22 | 6,5 | 1993 | 17 | 15 |
| 76 | 48 | 6,875 | 1993 | 25 | 25 |
| 78 | 20 | 6,5 | 1994 | 16 | 12 |
| 79 | 30 | 6,875 | 1994 | 21 | 12 |
| 81 | 10 | 6,5 | 1994 | 9 | 8 |
| 82 | 25 | 6,875 | 1994 | 14 | 9 |
| 83 | 18 | 7,5 | 1995 | 14 | 13 |
| 84 | 3 | 7 | 1995 | 1 | 1 |
| 85 | 35 | 8,75 | 1995 | 10 | 10 |
| 86 | 10 | 8,5 | 1995 | 1 | 1 |
| 87 | 45 | 9,25 | 1996 | 23 | 26 |
| 88 | 10 | 8,75 | 1996 | 5 | 5 |
| 89 | 20 | 9,25 | 1996 | 7 | 9 |
| 90 | 30 | 9,25 | 1996 | 11 | 14 |
| 91 | 10 | 8,75 | 1996 | 3 | 3 |
| 92 | 20 | 9,25 | 1997 | 15 | 15 |
| 93 | 22 | 9,125 | 1997 | 5 | 5 |
| 94 | 5 | 8,75 | 1997 | 1 | 2 |
| 95 | 25 | 8,5 | 1997 | 6 | 6 |
| 96 | 28 | 8,25 | 1997 | 14 | 16 |
| 97 | 7 | 8 | 1997 | 3 | 3 |
| 98 | 45 | 8,25 | 1997 | 30 | 32 |
| 99 | 30 | 8,25 | 1998 | 10 | 15 |
| 100 | 20 | 8,375 | 1998 | 8 | 8 |
| 101 | 5 | 8 | 1998 | 1 | 2 |
| 103 | 24 | 8 | 1998 | 19 | 19 |
| 104 | 6 | 7,625 | 1998 | 2 | 2 |
| 106 | 45 | 8 | 1998 | 5 | 7 |
| 107 | 27 | 9 | 1999 | 14 | 15 |
| 108 | 3 | 8,5 | 1999 | 0 | 0 |
| 110 | 30 | 9,5 | 1999 | 10 | 10 |
| 111 | 9 | 10,75 | 2000 | 2 | 2 |
| 112 | 29 | 10,75 | 2000 | 21 | 21 |
| 113 | 40 | 10,75 | 2000 | 26 | 26 |
| 114 | 25 | 10,75 | 2000 | 18 | 19 |
| C/fwd | 1 010 | | | 489 | 517 |

*(Figures in R million)*

**Schedule 1**

| Loan | Authorised Nominal Value 1988 | % | Repayment Date/s | Issued Nominal Value 1988 | 1987 |
|---|---|---|---|---|---|
| B/fwd | 1 010 | | | 489 | 517 |
| 115 | 5 | 10,25 | 2000 | 3 | 3 |
| 116 | 30 | 10,75 | 2000 | 10 | 11 |
| 118 | 55 | 11 | 2000 | 26 | 26 |
| 119 | 6 | 10,75 | 1995 | 1 | 1 |
| 121 | 40 | 11,4 | 2001 | 10 | 11 |
| 122 | 2 | 11,1 | 1986/96 | 1 | 1 |
| 123 | 40 | 12,75 | 1996 | 33 | 39 |
| 126 | 40 | 12,5 | 2001 | 38 | 33 |
| 127 | 150 | 12,6 | 1999 | 111 | 104 |
| 130 | 50 | 11,5 | 1989 | 27 | 30 |
| 131 | 250 | 11,15 | 2002 | 12 | 12 |
| 132 | 250 | 11,75 | 2002 | 72 | 73 |
| 133 | | 10,9 | 1988 | | 45 |
| 134 | 170 | 10,75 | 2003 | 12 | 13 |
| 135 | 270 | 11,3 | 2003 | 28 | 13 |
| 138 | 150 | 9,7 | 2003 | 3 | 4 |
| 139 | 340 | 10,25 | 2003 | 40 | 39 |
| 141 | 130 | 8,65 | 2004 | 18 | 18 |
| 142 | 350 | 9,15 | 2004 | 66 | 66 |
| 144 | 130 | 9,05 | 2005 | 10 | 10 |
| 145 | 270 | 9,55 | 2005 | 23 | 22 |
| 147 | 100 | 9,05 | 1992 | 40 | 48 |
| 148 | 100 | 9,05 | 2005 | 50 | 50 |
| 149 | 230 | 9,55 | 2005 | 46 | 47 |
| 150 | 150 | 10,25 | 1990 | 88 | 106 |
| 151 | 275 | 10,95 | 2004 | 9 | 3 |
| 152 | 100 | 12,8 | 1993 | 90 | 94 |
| 153 | 400 | 12,95 | 2006 | 190 | 91 |
| 154 | 220 | 10 | 2007 | 207 | 214 |
| 155 | 170 | 13,2 | 2007 | 155 | 166 |
| 157 | 415 | 14,25 | 2008 | 405 | 409 |
| 158 | 905 | 9,25 | 1994 | 601 | 542 |
| 159 | 325 | 12 | 2008 | 266 | 322 |
| 160 | 350 | 11 | 2009 | 299 | 337 |
| 161 | 500 | 14 | 1989 | 221 | 317 |
| 162 | 600 | 14,25 | 1991 | 212 | 236 |
| 163 | 125 | 10,5 | 2004 | 119 | 124 |
| 164 | 700 | 14 | 1992 | 263 | 226 |
| 165 | 1 000 | 11 | 1995 | 367 | 464 |
| 166 | 1 000 | 11 | 1993 | 457 | 514 |
| 167 | 1 000 | 12 | 1996 | 527 | 513 |
| 168 | 12 040 | 11 | 2007/09 | 9 236 | 7 521 |
| | 24 443 | | | 14 881 | 13 435 |

# Eskom in action 1988

## BETTER PERFORMANCE FROM PLANT DESPITE SOME TEETHING PROBLEMS

"The average availability of Eskom's large reheat coal-fired generating units during 1988 was better than the target figure," says chief executive Ian McRae.

Duvha, Kriel and Tutuka all exceeded the 80% availability level, with Matla achieving 91%.

"Availability at the recently commissioned units at Matimba and Kendal has already reached the 65% level. Two newly commissioned sets, one at Matimba and one at Kendal, had an adverse effect on the average. Once initial problems have been ironed out, the availability will match that of the other large stations," McRae says.

About 70% more energy was generated by Koeberg, which increased its availability to 71,2%.

The availability of the 60 MW to 200 MW units has decreased further due to extended planned outages as well as a high number of unscheduled outages, such as boiler tube leaks at Camden and Hendrina. These stations have been identified as candidates for life-extension projects.

Reliability of the mature reheat units has improved from WMTTT (weighted mean time to trip) of 400 hours during 1987 to 510 hours during 1988. Similar-sized units overseas experience an average of 15 forced shutdowns per year, whereas the Eskom figures per unit vary from a good seven at Matla to 36 at Matimba, which is still in the initial phases after commissioning.

"The overall thermal efficiency of Eskom's coal-fired power stations improved to 33,6%. Tutuka remains the leader with a sent-out efficiency of 35,8% on a gross calorific value basis," says McRae.

## LOW 1988 FUNDING REQUIREMENT LEADS TO HIGHER NEEDS IN 1989

Eskom's gross annual funding requirement has declined from R4 909 million in 1985 to R2 291 million in 1988.

"The 1988 figure was unusually low because one loan of R500 million which fell due during the year was rolled over to 1989," says Mick Davis, Eskom's general manager of finance. "As a result, the 1989 funding requirement is substantially higher at R3 814 million, but this level of funding will reduce until new plant is ordered by Eskom after the mid-1990s."

The 1989 funding requirement is, nevertheless, 22% lower than that for 1985. The long-term trend shows that this requirement has been declining by an average annual rate of about 10% in real terms.

Eskom was able to raise its 1988 funding requirement of R2 291 million with relative ease. The local capital market produced R858 million and the local money market R352 million. Foreign loans amounted to R596 million, chiefly from the Public Investment Commissioners' foreign funds already in the country and caught in the debt standstill net. The utilisation of extended credit facilities came to R415 million, while swap cash flows produced R1 348 million of which R70 million was used for funding.

Eskom's funding requirement of R3 814 million for 1989 will be obtained by way of R1 500 million from the local capital market, R981 million from the local money market, R211 million from extended credit facilities and R1 122 million from swap cash flows. No provision is made for foreign loans.

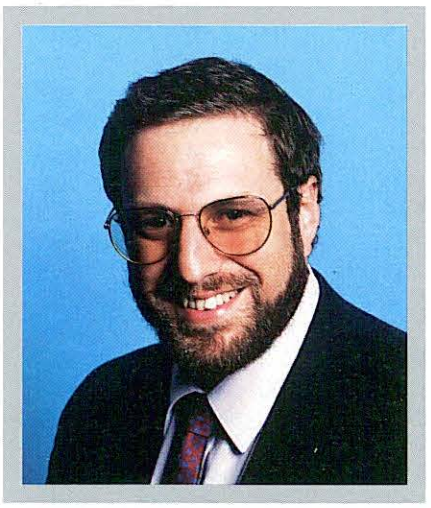
"The proportion of funds Eskom takes from the South African capital market has declined markedly during the present decade," says Davis. "The percentage that Eskom took up from prescribed assets, declined from a high of 47% in 1983 to 5% in 1988. This figure will rise to 12% in 1989 and 14% in

**Eskom cash flow and borrowing requirements**

| | R million 1988 Actual | 1987 Actual |
|---|---|---|
| Sales of electricity | **8 159** | 7 046 |
| Operating costs | **4 858** | 4 207 |
| Net operating income | **3 301** | 2 839 |
| Add non-cash items | **1 632** | 1 237 |
| | **4 933** | 4 076 |
| Finance charges | **(2 392)** | (1 771) |
| Cash surplus | **2 541** | 2 305 |
| Capex | **(3 969)** | (3 895) |
| Investments | **(1 315)** | (48) |
| | **(2 743)** | (1 638) |
| Borrowings | **2 221** | 3 152 |
| Repayments | **(801)** | (1 871) |
| | **(1 323)** | (357) |
| Total swap cash flow | **1 348** | 366 |
| Increase in cash | **25** | 9 |

**Funding sources**

| | R million Planned 1989 | Actual 1988 |
|---|---|---|
| Local capital market | 1 500 | 858 |
| Local money market | 981 | 352 |
| Foreign loans | 0 | 596 |
| Extended credit facilities | 211 | 415 |
| | 2 692 | 2 221 |
| Swap cash flows utilised | 1 122 | 70 |
| Total | 3 814 | 2 291 |



**ABOVE: Mick Davis, general manager of finance. Eskom's funding requirement for 1989 is higher than for 1988, but will reduce again until new plant is ordered after the mid-1990s. In real terms, the funding requirement has been declining during the past few years at an average annual rate of 10%.**

1990 which reflects the low funding requirements of 1988 and the financing of external loan repayments during this period. Thereafter it will decline and remain low until the ordering of new plant after the mid-1990s."

Eskom's total borrowings stood at R24 334 million at the end of 1988, of which 70% is in fixed-rate instruments, and 63% has a maturity of 5 years or longer.

"The maturity profile shows a notable amount due in 1990, for which provision has partly been made by investing surplus swap cash flows in prime financial instruments," Davis says. "Provision has also been made for the repayments due in 1989 and 1990 by depositing US dollars with the South African Reserve Bank, for application against foreign loans."

## DOWNSCALING TESTS ESKOM RELATIONS WITH TRADE UNIONS

Eskom's relations with trade unions have been tested in recent years by the scaling down of some of the organisation's activities and the subsequent need to reduce staff numbers.

"The value of good industrial relations practices and procedures, and mutual respect built up over the years, are helping us to solve a difficult problem," says Dr Gèorge Lindeque, Eskom's general manager of human resources.

It had become obvious by 1983 that the growth in electricity demand expected in the 1970s was not going to materialise in the 1980s. Slower economic growth, compounded by increased international isolation, had reduced the expected average annual growth of some 7% to between 4% and 5%. As a result, Eskom faced excess capacity and it had to manage this effectively if it was not to place an undue pressure on the cost of electricity and, ultimately, the customer.

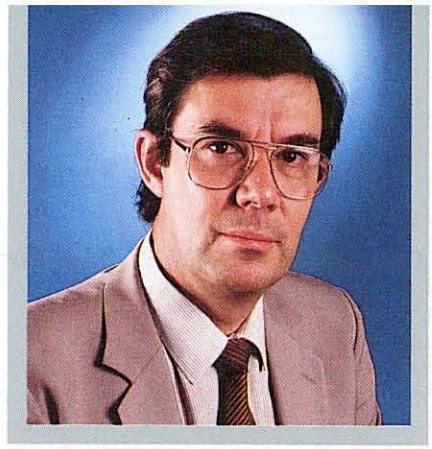
"Labour reduction is a difficult problem. We are fully aware of how it affects employees and it was with great reluctance that Eskom undertook the programme. We therefore decided to use retrenchment only as a last resort, and to use other means first to reduce numbers," Lindeque says. These include not filling positions that become vacant through natural attrition; the transfer of persons in redundant jobs to other positions in Eskom, with retraining provided where needed; an early-retirement package to older employees, and voluntary, as opposed to forced, retrenchment. Early retirement and voluntary and forced retrenchments are to be accompanied by favourable separation packages.

The first steps towards labour reduction in 1986 and 1987, were undertaken with the full co-operation of the trade unions concerned and a very favourable separation package was negotiated. During 1988, however, more jobs were identified as being redundant. Mainly employees at the older and less efficient plant, which is being mothballed, modernised or put in reserve storage, are affected. In a number of cases, plant near the end of its useful life, was decommissioned earlier.

"Negotiations with the trade unions last year were tough and protracted, and together various possibilities were explored to see how these jobs could be saved," says Lindeque. "The parties went out of their way to keep the dialogue going."

A collective agreement was concluded early in 1988 with all 15 trade unions concerned. An agreement on further downscaling was concluded in the latter part of the year with 13 trade unions.

In all, the number of employees has declined from an all-time high of 66 000 in 1985 to 56 726 at the end of December 1988. Of these, only 1 500 were actually retrenched; the rest either applied for voluntary retrenchment or took advantage of an early-retirement package while 6 500 positions that became vacant through natural attrition were not filled.

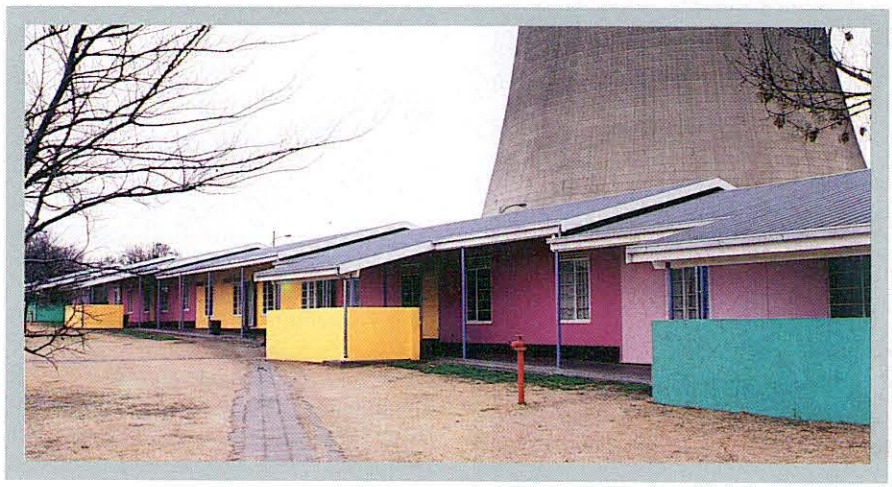


**ABOVE: George Lindeque, general manager of human resources. Labour reduction is a difficult problem and retrenchment is used only as a last resort.**

At the end of January 1989, about 3 000 employees remained in positions that will become redundant over the next three years. They have been informed when their jobs will become redundant and have been offered the various options open to them.

"Retrenchment programmes are never easy or pleasant. I do believe, however, that we are approaching it in a way which is in the best interests of all concerned," he says.

**BELOW: Old accommodation gets a facelift. Power station employees can be accommodated in Eskom living quarters, like these at one of the older stations in the eastern Transvaal. Many employees, however, take advantage of Eskom's homeownership scheme to own their homes.**



# Eskom in action 1988

Continued

## COAL CONSUMPTION DOWN AND COST ESCALATION CONTAINED

Improved cost control, the use of more efficient plant, along with the greater use of hydro and nuclear generation facilities, contributed to keeping the cost of coal well within limits in 1988.

The average price of coal rose by 9,1% from R17,11 to R18,67 per ton, compared with an increase of 13,1% in the Producer Price Index during the same period.

This was achieved with the full co-operation of the coal companies, which have gone out of their way to restrict cost escalation and have undertaken to continue improving their cost effectiveness.

Eskom buys about one third of South Africa's national coal production from the private sector, and price escalation is of great concern. Coal constitutes about 25% of Eskom's operating costs.

Eskom burnt 64,48 million tons of coal in 1988. This was more than a million tons or 2% less than in 1987, despite the fact that 0,7% more electricity was generated at coal-fired power stations.

Because of Eskom's excess generating capacity, Coalbrook, New Largo, Cornelia and Kilbarchan collieries will cease production. Production at Springfield and Usutu has been curtailed, while development at New Denmark, Majuba and Khutala collieries has been slowed down. Vierfontein colliery ceased production at the end of March 1988.

Industrial relations at Eskom's tied collieries were generally good throughout the year and there were no disruptions to supplies.

## GOOD WATER MANAGEMENT IS PAYING OFF

Despite generating more power in 1988, Eskom used 4,4% less water than in 1987.

The increased use of the recently commissioned dry-cooled sets at Kendal and Matimba, with their 60% lower specific water consumption, contributed greatly to this outstanding performance.

The cost of water was more than R92 million in 1988.

Power generation needs vast and reliable water supplies. In a country like South Africa, with limited and often erratic water resources, the optimum use of this scarce commodity is a primary consideration. To provide for South Africa's electricity needs, power stations annually use half as much water as that consumed by the entire PWV area, the country's industrial heartland.

It is a major task of Eskom to secure sufficient supplies of water, even during periods of severe drought as was experienced during the first half of the 1980s. This has led to Eskom becoming a leader in the field of dry cooling and its new dry-cooled stations are the largest in the world.

It has also, through the years, developed schemes to harness this country's water resources optimally. These are complex undertakings which are interconnected and designed to allow the transfer of water from one area to another, depending on the availability and the needs at a particular time.

The Usutu, Usutu-Vaal and Komati schemes, for example, supply most of the power stations in the eastern Transvaal, linking systems in that region with the Vaal system. The Vaal system, in turn, is supported by the transfer of water from the Tugela River in Natal, which is pumped across the mountains at the Drakensberg pumped-storage scheme into the Sterkfontein Dam and released into the Wilge River, one of the tributaries of the Vaal.

In the future, countries near South Africa may supply water to Eskom power stations. Lesotho will provide water to the Vaal River and power from Cahora Bassa could conserve South African coal resources. Much of the vast and largely untapped hydro potential of the countries further north of South Africa could be developed in a similar way, benefiting the entire subcontinent.

**LEFT: Water for power. It is a major task of Eskom to secure sufficient supplies of water for its power stations and it has developed many schemes to harness South Africa's limited water resources optimally.**

# CONTRACT AWARDED TO REPAIR LINES FROM CAHORA BASSA

The first contract for repairs to the transmission lines from Cahora Bassa, the vast hydro-electric scheme in northern Mozambique, was awarded in 1988 by Hidroeléctrica de Cahora Bassa (HCB) to the Italian firm SAE and the South African company Power Lines. Work is expected to start during 1989, and power should be available to Eskom towards the end of 1990.

The project is being financed by loans from the Italian government to Mozambique, and extended credits for the rand portion. Bussie Els, Eskom's general manager of strategic planning, says that in all about 1400 pylons must be rebuilt.

During the period that power from Cahora Bassa is unavailable, Maputo's electricity needs are being supplied by Eskom from its own sources.

"Eskom's role in the project is to advise the South African government and to maintain and operate the lines on the South African side of the border," Els says.

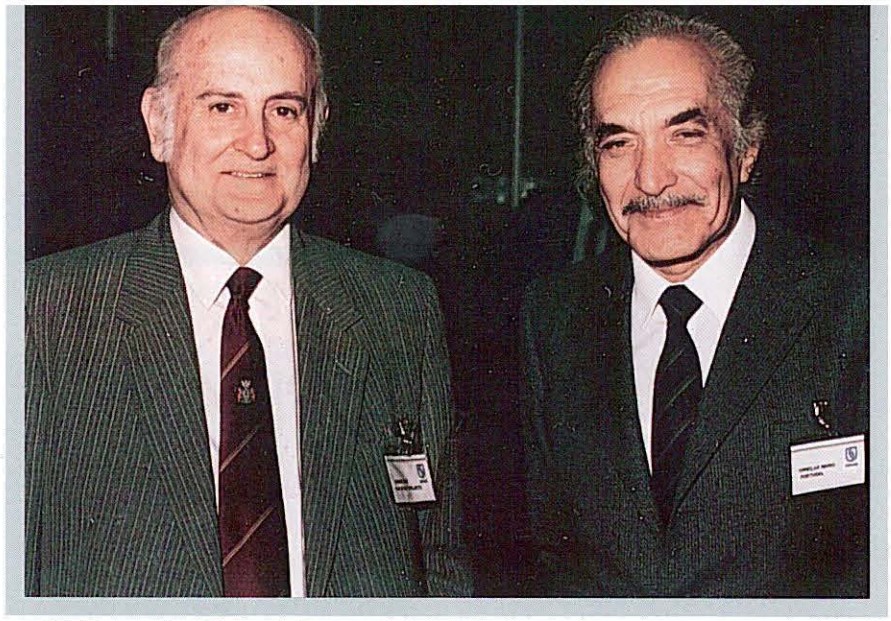
Eskom's chief executive, Ian McRae, is also chairman of the Permanent Joint Committee which was appointed by the South African, Mozambique and Portuguese governments to advise them on Cahora Bassa. The committee met several times during 1988 in Maputo, Lisbon and Johannesburg.

Because of the considerable long-term advantages, Eskom has given its full support to getting Cahora Bassa back on stream, even though it has excess capacity at the moment and has scaled down some of its operations.

"Cahora Bassa must be viewed in the light of Eskom's overall long-term vision for an integrated southern African electricity supply system and distribution network, which will bring development and an improved quality of life to the entire region," Els says.

The Cahora Bassa project was initiated in the 1960s and culminated in international agreements between Portugal, South Africa and Eskom in 1969. These contracts were revalidated in 1984 after Mozambique became independent, making Mozambique party thereto. The present repair work is being undertaken in terms of these agreements.

Cahora Bassa was first commissioned in the 1970s and provides a link with the vast hydro-electric potential in the northern parts of the southern African subcontinent. Hydro potential in South Africa itself is extremely limited, and the availability of a renewable source of energy such as Cahora Bassa will in the long term extend the life of this country's coal deposits.



**ABOVE: Cahora Bassa coming back on stream. Bussie Els, Eskom's general manager of strategic planning, and A. de Ornelas Mario, of the Portuguese delegation, during one of the meetings of the Permanent Joint Committee, appointed by the Mozambique, Portuguese and South African governments to advise them on Cahora Bassa. The committee met several times during 1988 in Lisbon, Maputo and Johannesburg. Repair work on the first few hundred pylons is expected to start in 1989.**

The cost of restoring supplies from Cahora Bassa is estimated at about R180 million. It will provide 1 355 MW to the Eskom system.

# INTERNATIONAL EXCHANGE HIGHLIGHTS MUTUAL ISSUES

Mutual electricity supply issues attracted a number of experts from abroad in 1988, and several Eskom specialists delivered lectures at various international symposiums.

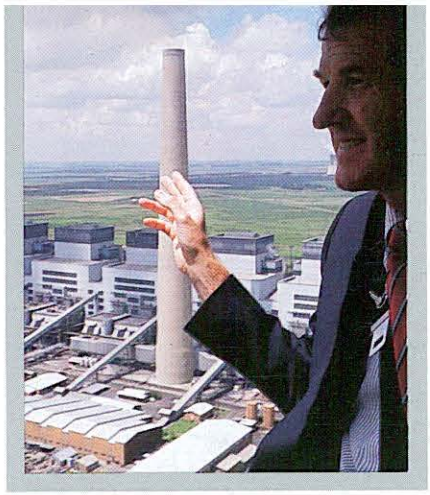
A group of Japanese experts from research organisations and utilities visited Eskom during August 1988 for an exchange of information in the field of lightning performance and insulation co-ordination of extra-high voltage transmission systems. The Engineering Group's success in the design of systems to withstand an extremely harsh lightning environment was of special interest – Eskom is a recognised authority in this field. The exchange of information with overseas bodies on thunderstorm research continues.

In view of Engineering Group's acknowledged expertise in dry cooling, Eskom has been invited to co-operate with Monash University in Australia in a study of plume dispersion from dry-cooling systems to validate the laboratory research model being developed in Australia with the results obtained from full-sized Eskom plant in operation.

In the wake of Eskom's thorough revision of its policy on environmental impact management, organisations such as the International Environmental Bureau of the International Chamber of Commerce, the International Union for the Conservation of Nature and the World Wide Fund for Nature, formerly World Wildlife Fund, were visited in Switzerland. Eskom's Wildlife Impact Advisory Committee (EWIAC) hosted visits of environmental experts from the United States, Israel, Mauritius and the United Kingdom during the year.

# Eskom in action 1988

Continued



## EXCESS CAPACITY IS MAKING ESKOM MORE EFFECTIVE

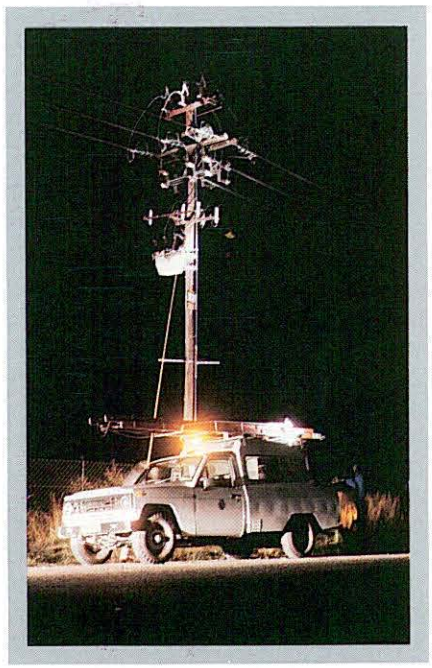
After operating with very low reserve margins in the late 1970s and early 1980s, Eskom has entered a phase of excess capacity. At present, of an installed capacity of 33 176 MW, 4 000 MW is surplus. This will peak in 1992 and 1993 at 6 500 MW, and will be eliminated gradually before the end of the decade as demand catches up.

"The excess capacity is being carefully managed to take full advantage of the unique opportunities it offers," says Paul Semark, general manager of generation.

This situation arose from the continuing drop in the growth of electricity demand since the beginning of the 1980s. Up to then demand was expected to grow at a yearly average of about 7% and extensions to capacity were based on this figure. Growth is now expected to average between 4% and 5% per year but, because of the long lead times required to build power stations, most projects had reached a stage where it would have been more costly to cancel than to complete them.

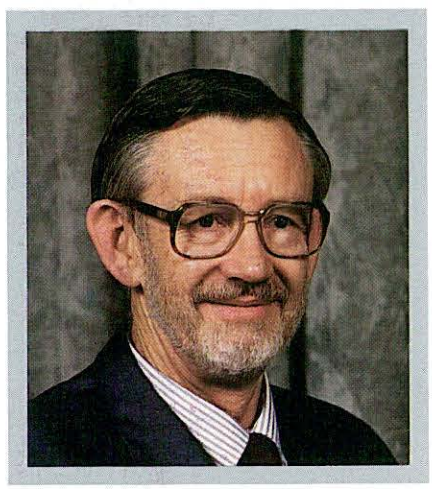
Even so, Eskom's projected capital expenditure over the five-year period from 1985 to 1989 has been reduced by R2 700 million.

"Eskom is using this opportunity to phase out some 1 400 MW of old and inefficient plant, which are also relatively big sources of pollution," Semark says. It is also modernising about 2 000 MW of newer plant to be more cost effective. Other units will be put in reserve storage or mothballed, and brought back into the system when required. Plant in reserve storage can be made available at short notice; mothballed plant takes longer to recommission.



"This method of dealing with excess capacity provides not only economic benefits but also optimal flexibility. Because more efficient plant is used, costs are reduced and should demand grow at a higher rate than expected, generating units can be brought back into service," he says.

With the closing of old power stations and plant taken out of service for modernising, reserve storage or mothballing, the remaining excess capacity will never be more than 1 000 MW at any given time.



## NEW PEAK DEMAND, BUT QUALITY OF SUPPLY GENERALLY GOOD

A new maximum demand of 20 589 MW on the integrated Eskom system was recorded in 1988, 2,9% higher than in the previous year. Energy sent out during the year exceeded the 1987 figure by 4,8%.

"At the same time, quality of supply was generally good. The number of low-frequency incidents, when the system frequency drops to less than 49,7 Hz, was reduced from 90 incidents in 1987 to 62 during 1988," says Randolph Forbes, general manager for distribution and marketing.

There were a number of power system disturbances during 1988 when some transformers were lost. In June and July, veld fires caused multiple tripping of 400 kV and 275 kV lines in parallel and generation had to be redispatched and lines switched to avoid cascade tripping. Most of these disruptions were pre-empted and supplies could be kept going.

"There was only one case of customer load shedding, as opposed to three during 1987, and one case of manual load shedding," Forbes says. Eskom has an arrangement with major customers and blocks of customers to shed load voluntarily when the operating system is unexpectedly forced into an overload situation.

The commissioning of a real-time state estimator now enables unchecked and occasionally faulty telemetered data entering the centralised and regional computer control systems to be monitored and corrected on a continuous real-time basis. This leads to greater efficiency of the system.

**TOP, LEFT: Paul Semark, general manager of generation. The way excess capacity is being dealt with has both economic benefits and optimal flexibility. LEFT: Randolph Forbes, general manager of distribution and marketing. Some power system disturbances, but supplies were kept going.**

# FIVE POWER STATIONS NEARING COMPLETION

Five generating units, with a total installed rating of 2 360 MW, were put into commercial service during 1988 at a total capitalised cost of R3 063 million. These are Unit 5 at Tutuka, Units 1 and 2 at Palmiet, Unit 3 at Matimba and Unit 1 at Kendal.

The project engineering and project management were entirely undertaken by Eskom's Engineering Group.

"This brings Eskom's total installed capacity to 33 176 MW, with a sent-out rating of 31 465 MW," says Alex Ham, general manager of engineering. "Generating plant with a total rating of 11 374 MW is currently under construction at Tutuka, Matimba, Kendal, Majuba and Lethabo power stations.

**Tutuka power station**, 26 km from Standerton in the eastern Transvaal, is a wet-cooled station and its coal is obtained from a dedicated colliery, New Denmark, capable of supplying 10,05 million tons of coal a year.

When completed in June 1990, the station will comprise six steam turbine-driven generators, each capable of developing 609 MW. Five of these units are already in commercial service, of which Unit 5 came on stream in November 1988.

Since work started, the Chairman's safety trophy has been awarded to the Tutuka construction site six times.

**Matimba power station** is near Ellisras in the north-western Transvaal. It is the world's largest direct dry-cooled station with a total installed capacity of 3 990 MW. This is 11 times the size of Wyodak in the United States, which was previously the largest direct dry-cooled station.

"The development of this technology is being directed by Engineering Group and has placed Eskom in the forefront of dry-cooling technology in the world," says Ham.

The siting of the station was influenced by the availability of large quantities of discard coal from Iscor's nearby coking coal production mine. The use of a product for which there is no other commercial use is of great economic benefit to the country.

Unit 3 of Matimba's sets of 665 MW each was taken into commercial operation in September 1988. The remaining three units will be completed in 1989, 1990 and 1991.

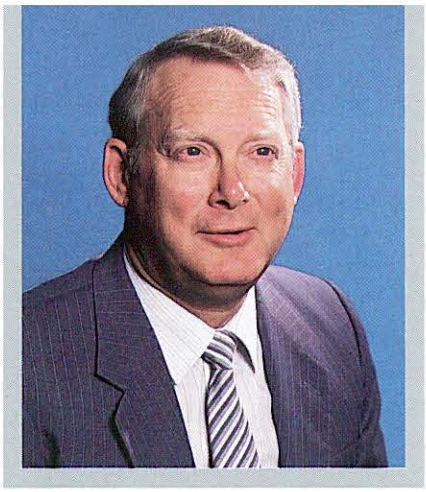
GEA and Engineering Group received the Projects and Systems Award for contracts in excess of R10 million in 1988 from the South African Institution of Mechanical Engineers for the direct-cooling system.

**Kendal power station** is near Witbank in the eastern Transvaal. The station uses an indirect dry-cooling system with condensers and natural-draught towers.

Unit 1 was placed in commercial service in October 1988. The unit is rated 686 MW and this load has been handled comfortably since it went into service. On completion of the six sets in 1993, the station will have an installed capacity of 4 116 MW and will be the largest indirect dry-cooled power station in the world.

Safety on site during construction is a high priority and Kendal

**BELOW: Kendal power station. When complete in 1993, it will be the largest indirect dry-cooled power station – 4 116 MW – in the world. A unique feature is the massive cooling towers, also the largest in the world. They have internal tube-bundle heat exchangers and stand 165 m high with a base diameter of 165 m.**



**ABOVE: Alex Ham, general manager of engineering. Technological achievements are considerably increasing the exploitable coal reserves of South Africa.**

# Eskom in action 1988

Continued

was rewarded for their efforts with a five-star rating from NOSA, the National Occupational Safety Association, in September 1988.

**Majuba power station**, near Volksrust in the eastern Transvaal, is Eskom's largest power station project. Three units each with a rating of 657 MW and a further three with a rating of 711 MW each are planned. To reduce Eskom's excess capacity in the early 1990s, the commissioning of Majuba's units has been deferred by up to four and a half years. The first unit will now be commissioned in 1996 and the last in 2001.

Because of the deferment, it is necessary to store the imported turbine plant in South Africa. Procedures have been developed and contracts issued to ensure the safe and reliable storage of the plant, and the experience has been invaluable to Eskom.

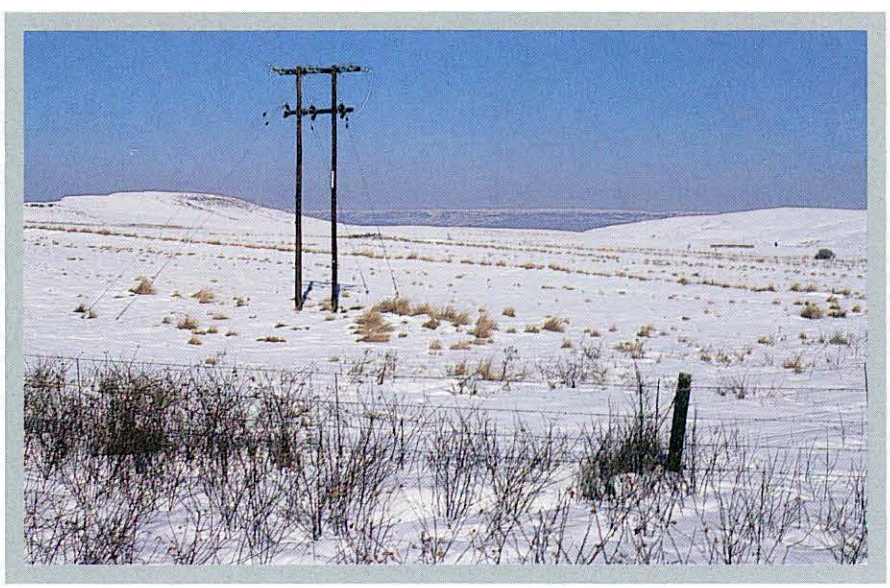
"Majuba is the first major project to employ the new General Conditions for Civil Works and this has led to a considerable improvement in the management of major civil contracts," says Ham. "The project is also leading the implementation of the G C Cue project management package which will improve management control significantly."

**Lethabo power station** in the northern Orange Free State, just south of Vereeniging, is a breakthrough for Engineering Group who were responsible for directing the design of these unique boilers which successfully burn coal with a calorific value as low as 14-16 MJ/kg.

"This quality of coal is generally considered to be unexploitable and by using this coal some 700 million tons of such fuel have been made available," says Ham. "It is a significant technological achievement which increases the exploitable coal reserves of South Africa considerably."

The first four units of the station were commissioned between 1985 and 1987. The fifth and sixth units will be taken into commercial service in June 1989 and December 1990.

In June 1988, Lethabo became the first Eskom power station construction site to be awarded a five-star grading by NOSA.



## FLOODS AND SNOW TEST ENDURANCE OF ESKOM STAFF

Eskom employees were put under severe pressure during the floods that struck a large part of South Africa early in 1988. Then, a few months later unusually cold weather caused major disruptions to the system once again.

Both the public and news media praised Eskom employees for the prompt way in which they acted in the emergencies and for their dedication, perseverance and concern for the victims.

This was the second year in which floods caused major disruptions, after many years of drought during which Eskom employees had to use all their inventiveness to develop schemes which would ensure sufficient water supplies for power generation. In one instance, the flow of the Vaal River was temporarily reversed.

The floods in February and March 1988 ravaged the Orange Free State and Northern Cape in particular. More than 1 000 electrical supply points were washed away and up to 460 rural customers were left without power.

The violence of the water caused over R9 million of damage to Eskom equipment. More than 260 km of power lines were swept away.

Repair teams worked round the clock, under very trying conditions, to restore power supplies. The seven masts on the 88 kV line to the Welbedacht Dam, for example, were washed away and the line was lying on ground which could not be reached by vehicle. Material and manpower had to be ferried in by helicopter. Structures were assembled on a nearby koppie and airlifted to the site.

All power supplies were restored within days.

During an unusually cold spell last winter, with nearly the entire south-eastern Orange Free State and Lesotho caught in unexpected icy conditions, the sudden demand

for electricity led to the failure of plant near Bloemfontein. Teams from Eskom and the Bloemfontein municipality worked round the clock to restore power.

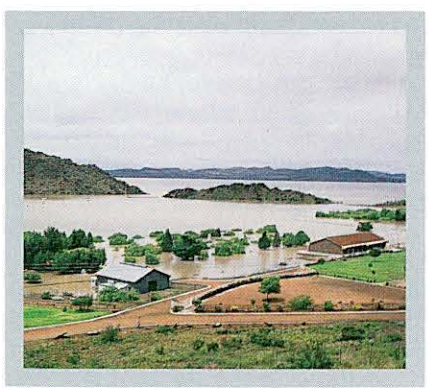
In Lesotho, hundreds of people in remote parts of the country were cut off from food and fuel. Eskom teams assisted by flying in supplies.

## HIGH SAFETY RATING AT ESKOM SBUs

The disabling injury frequency at Eskom strategic business units was 2,16 disabling injuries per million manhours worked, one of the best ratings in industry. The fatality rate also decreased, to 0,5 per five million manhours worked.

More than 82% of Eskom's SBUs now hold a NOSA four-star grading or better. This includes 17 five-star ratings. Matla achieved 11 million injury-free manhours in 1988, a world record for this type of power station.

Eskom's safety programme started 19 years ago when it had an injury frequency rating of 16,5 disabling injuries per million manhours worked, one of the poorest ratings in industry at the time.



## THREE OLDEST POWER STATIONS CLOSED DOWN

Three of Eskom's oldest power stations were retired in 1988. After a long and distinguished career, Umgeni near Pinetown, West Bank near East London and Hex River near Worcester joined Klip power station, which was shut down permanently in 1986.

They will be dismantled and sold.

Together, they provided 153 years of service. They burnt 114 million tons of coal and produced 140 000 million kilowatt hours of electricity.

Although small by today's standards – together they had an installed capacity smaller than one of the new 600 MW units – these stations once represented some of the most advanced power station technology. They made a major contribution to South Africa's economic development.

Cost effectiveness, not necessarily age, is a major criterion in deciding whether to close down a power station. The cost of transporting coal to the site, the generating capacity and the efficiency of the equipment are taken into consideration. The availability of spare capacity has hastened their decommissioning by a few years. Although they will be fondly remembered, they will perhaps not be all that sadly missed. They belong to an era when pollution was not a problem and the cost of generating electricity was not as competitive as it is today.

**BELOW: West Bank power station, one of the three power stations closed down in 1988. These stations were technologically advanced for their time, but by today's standards they are no longer efficient and cost effective.**

## TRAINING AND DEVELOPMENT IMPROVES PRODUCTIVITY

South Africa's economic performance is being severely hampered by poor productivity. According to Dr John Maree, chairman of the Electricity Council, the only way in which this problem can be overcome is by developing the potential of the country's human resources as rapidly as possible.

"If we are to be competitive, both locally and internationally, we have to keep costs down and mobilise our resources as effectively as possible. The correct use of our human resources, in particular, is a crucial component," he says.

"This country's greatest asset is its people. There is a wealth of potential which we have overlooked in the past. If this country wants to prosper and grow, we have to develop our own people and give all of them, not only a

# Eskom in action 1988

Continued

select few, the chance to exploit their full potential."

Dr Maree says that improved productivity is a key factor in keeping Eskom's costs down. As a result, one of the largest and most comprehensive training programmes in South Africa has been mounted to provide Eskom employees with the facilities necessary to improve their development and keep up with changing conditions and requirements.

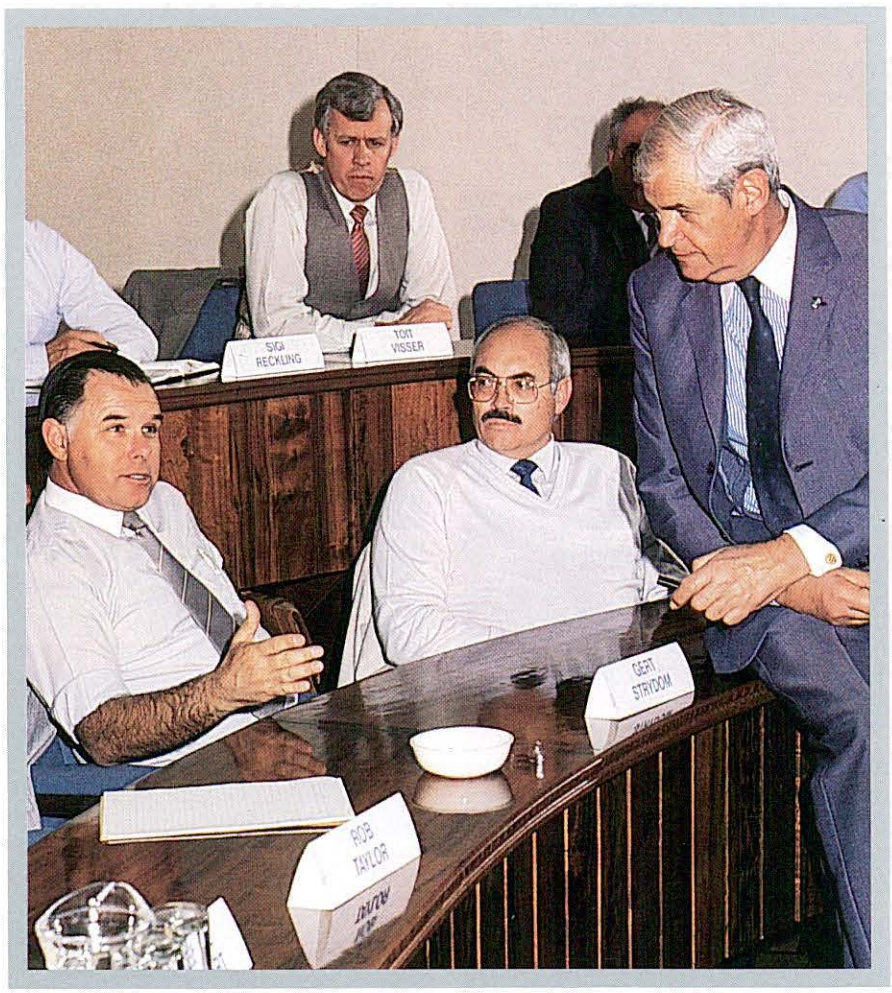
Courses range from newly developed computer-based literacy training to advanced management programmes.

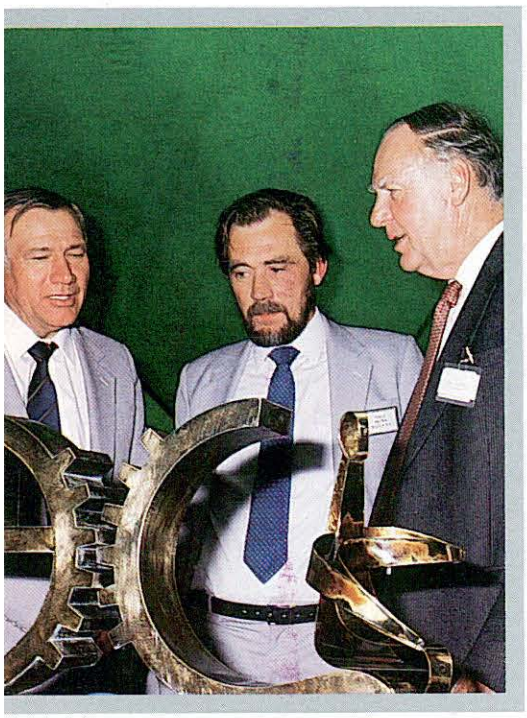
Eskom's quality circle programme, a priority for 1988, now has 585 circles, well ahead of target.

An industry training board for the control and accreditation within the electricity supply industry is being established in collaboration with trade unions. Eskom's operator training courses have also been accepted by the Department of Education and Culture.

More than 19 500 employees, 10,8% more than in 1987, attended courses at Eskom College. About 100 students from Swaziland, Botswana, the Cape Verde Islands, Venda and Bophuthatswana were trained by Eskom in various aspects of electricity supply.

The number of apprentices recruited and trained increased, compared with the year before. In all, 254 apprentices passed their trade tests. The number of students being trained on the PLATO system, mainly operators, nearly doubled from 4 072 in 1987 to 7 690 in 1988.



**ABOVE: Communication is an ongoing process. Electricity Council chairman John Maree spends a great deal of time talking to employees on all levels and in different parts of the country.**

**LEFT: Award for Matla. The safety programme at Matla led to an increase in production, high employee morale and a new world safety record. Chief executive Ian McRae (right) presented the Management Board's special safety trophy to power station manager Chris Brown (centre). Safety risk manager Fritz van Vuuren is on the left.**

## OUTSTANDING ACHIEVERS REWARDED

Johannes Mahlakwane, an assistant official in Transmission Line Engineering, gained the respect of the farming community during the construction of one of the major lines from Eskom's new Majuba power station near the Transvaal and Natal border.

In 1987, he visited all the farmers in the area to inform them of the construction of the line, singlehandedly hired local labour to clear the bush, negotiated and paid their wages. He further had power saws repaired locally and bought new equipment when necessary to allow the work to continue as quickly as possible.

In the process he won not only

the respect of the community, but also their unconditional co-operation. He showed that problems can be solved and turned into opportunities.

Mr Mahlakwane was one of the Eskom employees who were nominated for the Chairman's and Managers' awards in 1988. He won the Chairman's Award in category 1, for unskilled and semi-skilled employees.

In category 2, for semi-professional and professional employees, the Chairman's Award went to Romano Formaggio, assistant superintendent in mechanical maintenance at Lethabo power station, and his team. The team came up with highly innovative designs for devices to reduce wear on mixing paddles of ash conditioners and belt-scraper wear elements, and the cradle system. Both designs have been patented and are attracting local and international attention. Saving implications for Eskom are estimated at R1,2 million per year for Lethabo power station alone.

In category 3, for management employees, the winners were Chris Brown, manager of Matla power station, and his team. The implementation of the safety programme at Matla led to an increase in production, high employee morale and a world safety record.

The 1988 Executive of the Year was Mick Davis, then deputy general manager finance and now general manager of this group. He won this award for his unflagging dedication and impact on the working environment of Eskom, encouraging those around him to produce results and show progress of unmistakable quality.

The 1987 Executive of the Year, Johan van den Bergh, was appointed general manager of the management services group in 1988.

Eskom believes that recognising outstanding achievement is necessary for an organisation to prosper and improve its productivity. Outstanding achievers are identified first on SBU level and they are nominated for the SBU Managers' Awards. Winners of these awards are then considered for the Chairman's Awards.

The awards recognise individuals and problem-solving groups like quality circles for their innovation and ability to see things in a fresh perspective.

## WORLD-CLASS RECORDS AT MATLA POWER STATION

The giant 3 600 MW Matla power station, named after the Sotho word for "strength", continues on its record-breaking career. In 1988 it added another two records to an already impressive list of seven operating and safety awards.

In May 1988 it achieved a new world safety record of 10 million manhours in a coal-fired power station without a disabling injury. This achievement earned the Matla team a certificate from NOSA. In June, 11 million manhours were achieved.

Matla's workforce of more than 1 500 is highly motivated and has made safety a high priority. As with all power stations, Matla takes part in Eskom's formal safety programme, developed with NOSA.

In February 1988 Matla's boiler No. 6 achieved a new record of 505 days of continuous operation. As a base-load station, Matla operates continuously, except for planned maintenance stoppages. Its excellent operating record makes it one of the best utility plants in the world.

Matla's first award was for the unusual design of its boiler house superstructure, made of concrete instead of steel, which won it the Design of the Year Award in 1979.

## AWARD-WINNING STATION OPENED

**ABOVE: Dr Dawie de Villiers, Minister of Administration and Privatisation, officially opened the Palmiet pumped-storage scheme in October 1988. Palmiet provides peak-demand electricity to the Eskom system and augments water supplies to the Cape Town area.**

Palmiet pumped-storage scheme, winner of the EPPIC National Premium Award for excellence in integrated environmental planning and management, was put into commercial service in 1988.

The station is situated in the exceptional natural beauty of the Hottentots Holland Mountains near Grabouw in the Western Cape, one of the ecologically most sensitive areas in South Africa. It provides peak-demand electricity to the Eskom system and will also augment the water supplies of metropolitan Cape Town.

Palmiet was originally conceived by Eskom in the 1970s and was developed jointly with the Department of Water Affairs. The project was a forerunner of the concept of environmental engineering. From the early stages, a comprehensive programme of environmental control and protection was established and rehabilitation proceeded alongside construction.

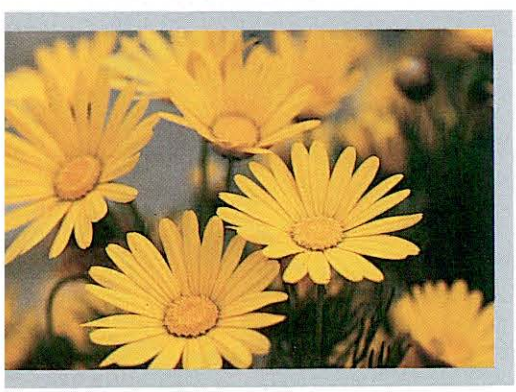
Contrary to doubts expressed

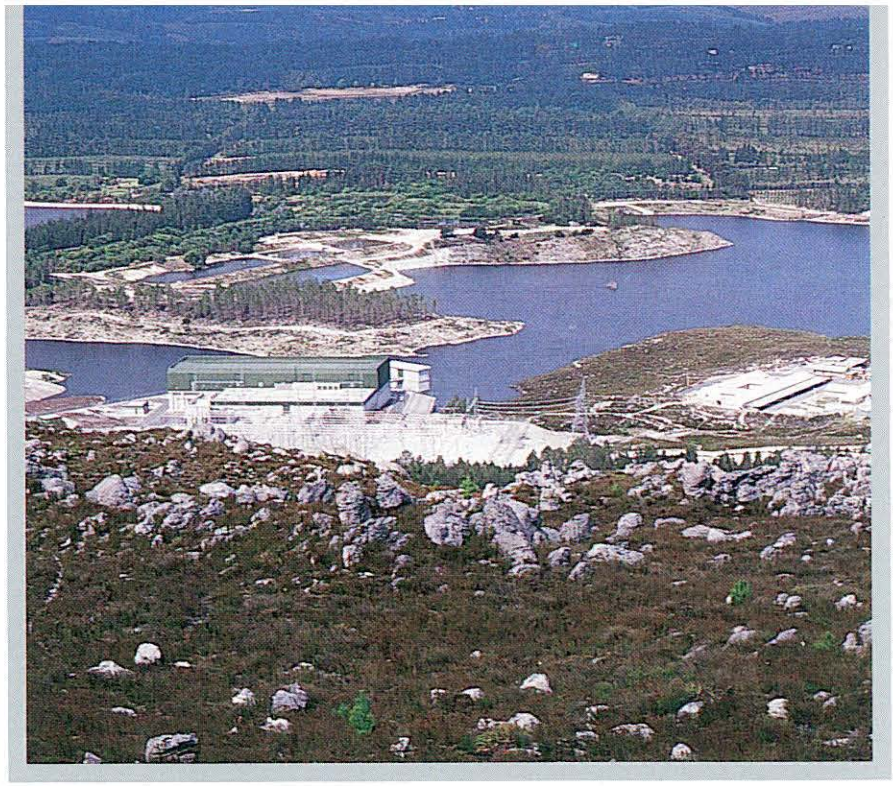
initially, this approach was remarkably cost efficient. The integrated and participative approach to blend industry with the environment cost less than 0,5% of the total project cost, compared with the usual 2% in industrialised countries. The approach has, in addition, created an atmosphere of co-operation and mutual dependence among a large number of governmental bodies, the private sector, universities and Eskom.

Its unique conception won Palmiet, apart from the EPPIC (Environmental Planning Professions Interdisciplinary Committee) award, also the Most Outstanding Civil Engineering Achievement in 1988 from the South African Institute of Civil Engineers. In 1986 the Merit Award for Excellence of the Institute of Landscape Architects was awarded to Ecokonsult, the environmental consultant for the project.

At Palmiet, water is pumped from the lower Kogelberg Dam to the upper Rockview Dam in off-peak periods. It is then released during system peak demand to drive the two 200 MW generators.

About 30 million cubic metres of water will be discharged into the nearby Steenbras Dam annually for use by metropolitan Cape Town.





# HOLISTIC APPROACH TO AIR QUALITY MANAGEMENT

The inevitable influence that power generation has on the environment was the object of much attention in 1988. Eskom recognises that it has an obligation to all who are affected to manage this impact in a responsible manner.

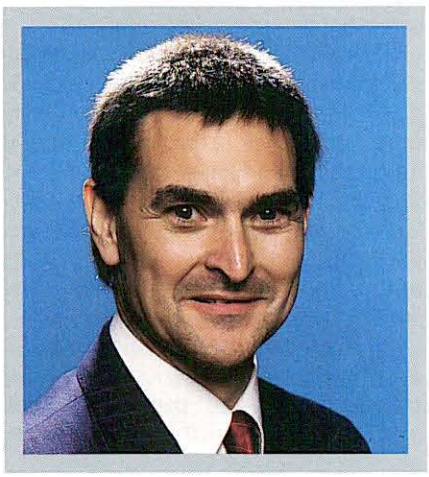
The scope of Eskom's environmental programme ranges from the suitable siting of pylons to air quality management. Air quality, particularly in the eastern Transvaal where many of Eskom's power stations are situated, was a major focus of investigation.

"Atmospheric conditions in the eastern Transvaal highveld lack turbulence and tend to collect rather than disperse emissions from industrial plant and other sources. For this reason, we have found that with the very tall stacks, emissions – from which most of the dust particles have already been removed – are released more than 200 m above the ground, picked up by the high-level wind system and diluted so that they are well below any harmful level of concentration," says Johan van den Bergh, Eskom's general manager of management services. "Both dry and wet deposition is the result of a cumulative effect to which Eskom is not the only contributor."

Eskom burns some of the lowest grades of coal in the world, which also have a relatively low sulphur content. Eastern Transvaal power stations release lower quantities of sulphur compounds to the atmosphere than similar plant elsewhere in the world. Nevertheless, every effort is made to contribute towards better air quality.

"Older power stations were less efficient and less well designed in terms of air quality management. Most of these have now been retired, and newer stations are being retrofitted with flue-gas conditioning plant to comply with the more stringent requirements in force today. This will cost R100 million over the next few years. New power stations are designed to minimise the impact on the environment," Van den Bergh says.

At Kriel power station, for example, the recent installation of the flue-gas conditioning plant has



Continued

reduced the amount of fly ash released to the atmosphere from 180 tons per day to 20 tons.

Eskom's air quality management strategy is aimed at determining the requirements of all who are affected by air quality and integrating these into a responsible approach to air quality standards.

"The emphasis is on prevention rather than cure, as processes cannot be easily influenced once they have been established," Van den Bergh says.

Eskom maintains an extensive monitoring programme in respect of air quality and will periodically publish results to keep the public informed.

## SCOPE OF LIVE-LINE WORK EXTENDED

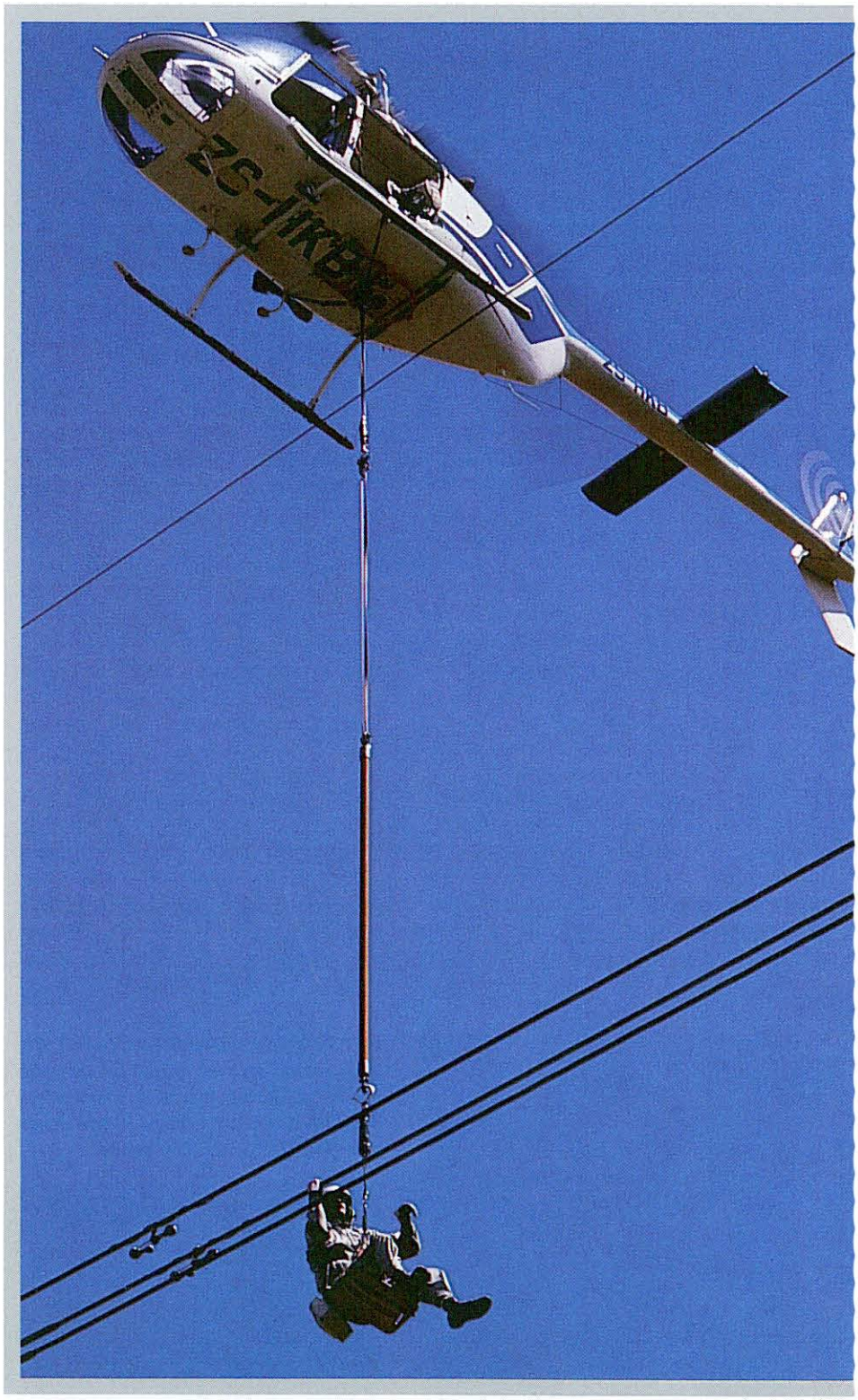
The connection of new supplies and routine maintenance is increasingly being done with live lines, after studies by Eskom's Engineering Investigation Division (EID) and Distribution and Marketing Group.

This is considerably reducing the number of hours of interrupted service to customers.

The electrical breakdown limits of various live-line methods were identified. As a result, the safety of operations under any given set of live-line conditions can be maximised without degrading the overall performance of the line and without increasing the risk of flashover.

Use of helicopters is becoming increasingly indispensable for spray washing of high-voltage transmission line insulators for the removal of salt spray pollution. Despite the high initial capital cost of helicopters, routine maintenance on a typical line can now be done 30% more quickly and at 60% of the previous cost.

A coverup and gloving technique is also being used for lower voltages, such as 11 kV, so that rural supplies can be extended, connected and repaired without disrupting individual farming activities.



**OPPOSITE: Johan van den Bergh, general manager of management services. The requirements of all who are affected by air quality must be determined. At Palmiet, environmental control and protection proceeded alongside construction.**

**ABOVE: Helicopters are used extensively in Eskom's operations. Their use has reduced the cost of routine maintenance on power lines by 40% and time spent on such jobs has been cut by a third, despite the high initial capital cost.**

# Eskom in action 1988

Continued

## RATIONALISATION OF ELECTRICAL EQUIPMENT BOOSTS LOCAL MANUFACTURE

A special strategic technology group to drive a programme on a national basis to make South Africa more self-sufficient in electrical plant and equipment was formed in 1988.

As the major supplier of electricity in South Africa and a large user of electrical equipment, Eskom has to ensure that it is in a position both to maintain its present plant and equipment, and to expand when the demand warrants it.

The initial thrust, led by Eskom, has been to create a user group of organisations associated with the electricity supply industry. The primary objective is to rationalise the variety of specifications which users issue and with which manufacturers have to contend. This rationalisation should enable industry to fulfil its role in a more productive manner and increase local manufacture to counteract the increasing threat of sanctions and technological isolation.

"We cannot do this effectively on our own," says Ed Ralph, Eskom's general manager of strategic technologies. "All the users of electrical equipment are in similar positions and rely on the manufacturing industry to meet their needs."

Therefore, according to Ralph, all users of equipment such as municipalities, the petrochemical industry, mining and other organisations should co-operate in a joint venture. By working together, and also involving manufacturers, requirements can be rationalised and an environment conducive to improved local manufacture should be created.

"At the moment, the variety and range of equipment which performs very similar functions is too large to encourage cost-effective local manufacture in a market which is too small for this type of proliferation. This can be rectified by rationalising the specifications to reflect the needs and not the wants of users, limiting variations to those which are essential for the system or environment of the user," he says.

While the main activities cover electrical equipment, consideration is also being given to mechanical equipment specifically used by Eskom and other organisations which use related plant.

The co-operation shown by both users and manufacturers indicates a need for this type of approach and, with the support of the South African Bureau of Standards and the Department of Trade and Industries, augurs well for the success of the programme.

## ESKOM BATTERY TEST SYSTEM PATENTED

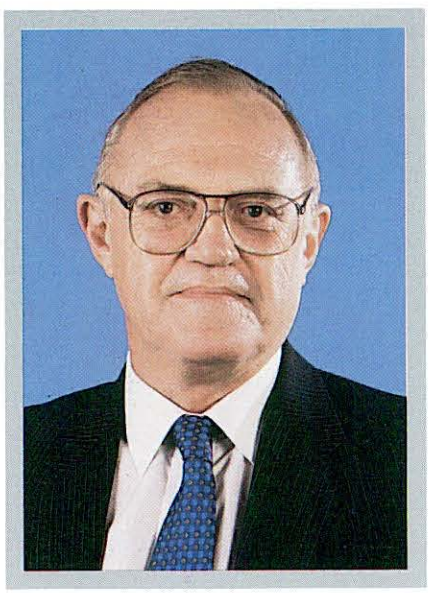
A battery test system (BTS) for load tests on emergency supply systems, developed at a far lower cost than comparable equipment, has been patented by Eskom.

In the case of a power failure, the vital instrumentation and protection equipment together with high-voltage breakers and the strategic auxiliary plant depend entirely on DC supplied from batteries. Regular load tests have to be carried out to ensure that battery capacity remains within the manufacturer's original specifications. In the past, these tests have been very labour intensive, time consuming and even dangerous.

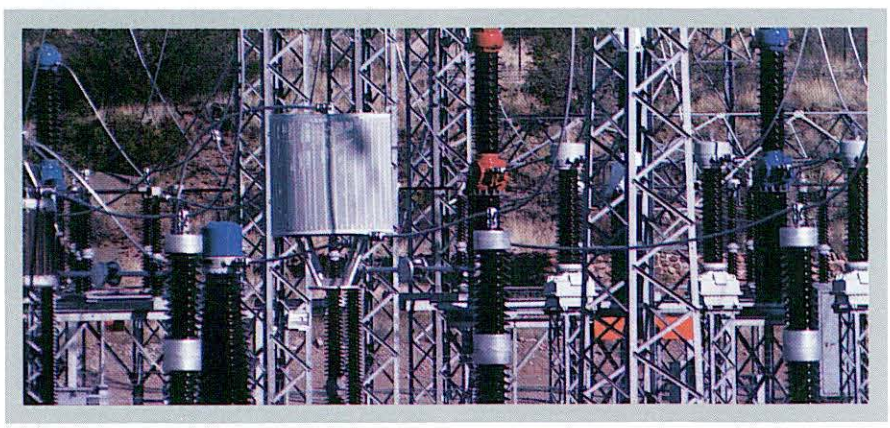
The Eskom BTS makes the entire load test procedure automatic by means of a computer-controlled constant current device, and records are produced both on paper and on diskettes in PC-compatible form.

The BTS also pinpoints faulty cells in old batteries and enables them to be rehabilitated rather than scrapped, resulting in considerable cost savings.

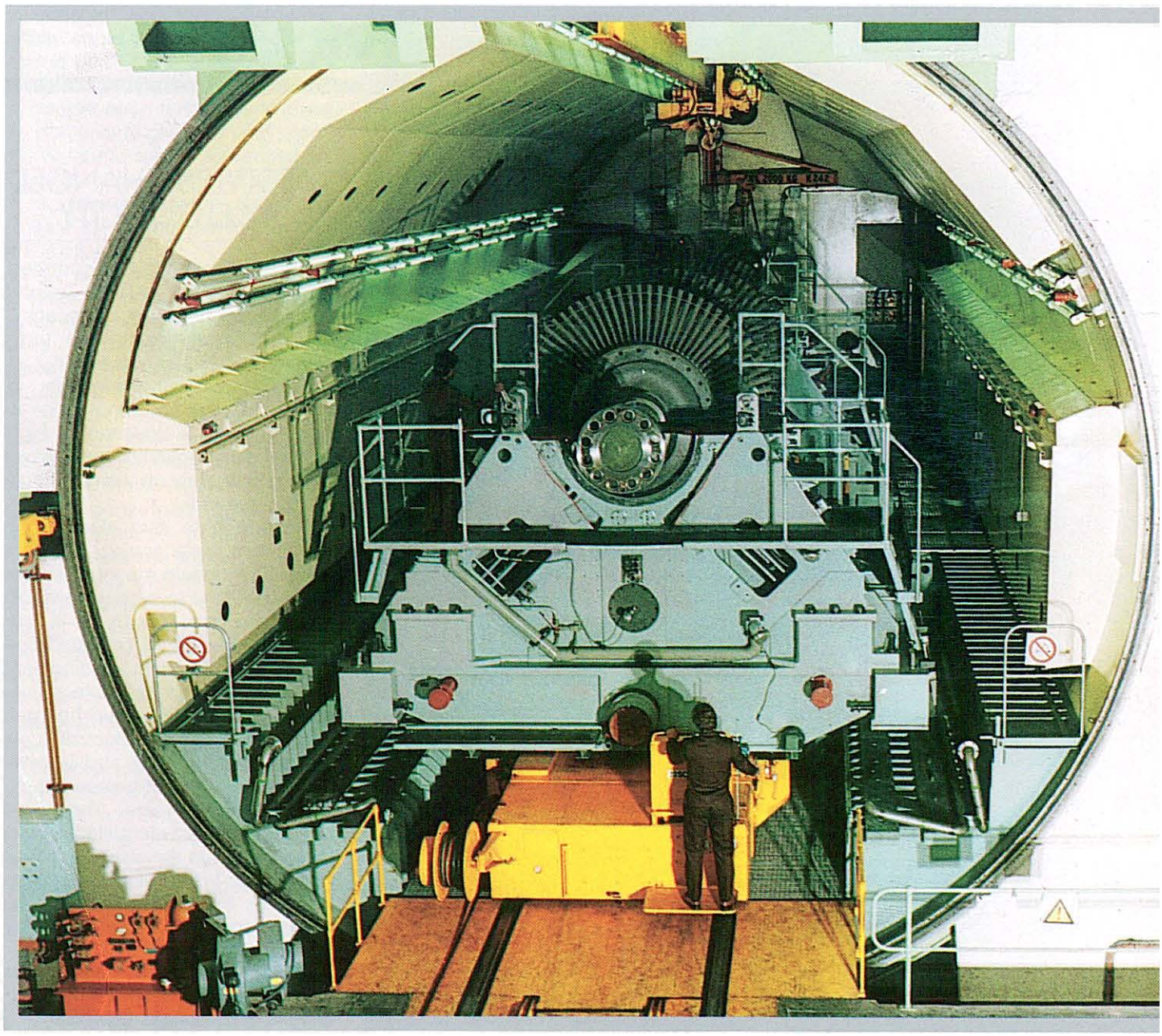
The Eskom BTS has already generated a great deal of interest in the market.



**LEFT: Ed Ralph, general manager of strategic technology. At present the range and variety of electrical plant and equipment in South Africa is too large to encourage cost-effective local manufacture.**



**OPPOSITE: The facilities of Eskom's Central Maintenance Services include a crane with a 600-ton lifting capacity to handle the largest transformer and generating units on the Eskom system.**



# MAINTENANCE UNIT GEARED TO COMPETE PRIVATELY

Central Maintenance Services (CMS), a maintenance unit operating within the Eskom organisation, is geared to become a commercially viable and profitable undertaking by the early 1990s.

Its unique facilities are available to smaller companies which cannot afford the machinery and specialised staff.

The main workshop at Rosherville, just south of Johannesburg, incorporates facilities which are not available elsewhere in South Africa, including a crane with a 600-ton lifting capacity to handle the largest transformer and generating units on the Eskom system. It further features heavy machining equipment, specialised welding capabilities and 300-ton vacuum balancing and overspeed facilities.

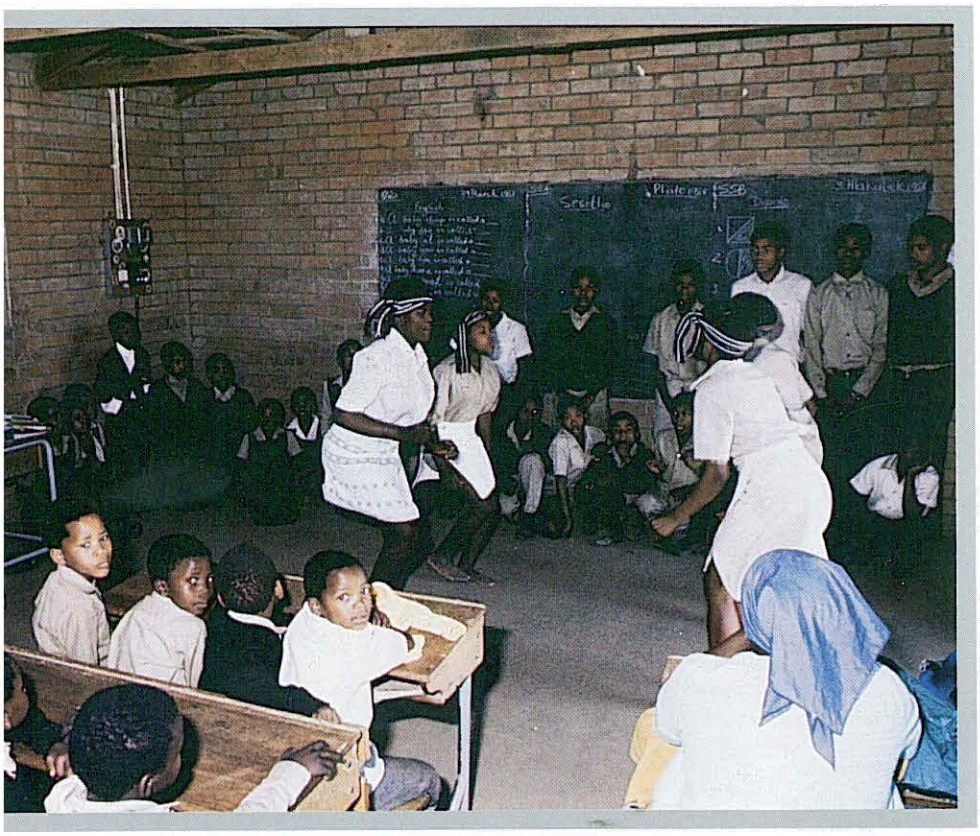
Site operations are conducted throughout southern Africa and include specialised turbine and generator servicing as well as switchgear and transformer maintenance and repair. Sophisticated site vibration monitoring and analysis are also undertaken.

The organisation provides a maintenance, repair and refurbishment service to all operating areas of Eskom at its main workshops as well as on-site services to power stations and the distribution and transmission network.

Because the work of CMS is more closely allied to activities in the private sector than any other area of Eskom, the opportunities that can be exploited through privatisation are actively being investigated. Special attention is being given to joint ventures, fan manufacturing and repair, transformer services and the possibility of import substitution on major turbo-generator plant.

# Eskom in action 1988

Continued



## LIFESTYLES CHANGED BY ELECTRICITY

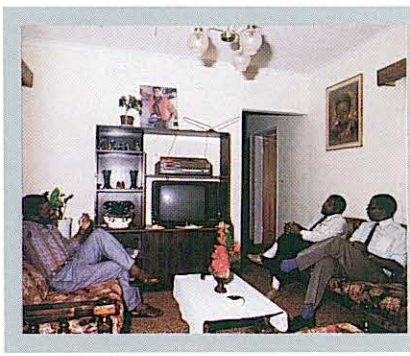
While electricity is a commodity that is taken for granted in millions of homes, it means a totally different lifestyle to those who have only just acquired it.

Recent research undertaken on behalf of Eskom among newly electrified black households highlighted some advantages which people who grew up with electricity tend to overlook.

Respondents said electricity is convenient, time saving, safe and clean. Convenient means that food takes less time to prepare because previously fires had to be lit, and often fuel had to be collected first. In rural areas, just finding and carrying firewood can take several hours a day, which could be spent more productively. Electricity, by contrast, saves time and is available immediately when needed.

Electricity is safe, they said, because in non-electrified homes there is always the danger of fires, suffocation from carbon monoxide, burns or explosions from stoves, heaters and gas. Some mentioned

**LEFT AND BELOW: People who are accustomed to electricity tend to overlook many of its advantages. Lights and modern teaching aids for schools make education more effective. Reticulated residential areas are safer and more pleasant. In the homes, electricity gives access to appliances which save time and provide more opportunities for relaxation. Above all, electricity is safe; the constant fear of having to live with open fires, lamps, candles and other traditional forms of heating and lights, is removed.**



the constant fear that a billowing curtain could topple a candle or a lamp and start a fire. Gutted houses are a constant reminder of the danger open fires pose to people, particularly children, and property. Safety is further increased by electricity because houses are better lit, streets become safer and the fear of danger lurking in the dark is allayed.

They also perceive electricity to be clean because it has no smell, makes no smoke and there are no ashes to be disposed of. This makes for a more pleasant and wholesome environment. Initially, though, some new users of electricity retain their wood and coal stoves because these also provide heating in winter. As far as appliances are concerned, top of the list are refrigerators, kettles, irons, television sets and stoves.

The quality of family life is considerably improved by adequate lighting. Children find that they study better, home industries and hobbies flourish and television entertains. Even community life is stimulated and the morale is higher.

The enhanced lifestyle that electricity is bringing about is already having a marked effect on the economy. The demand for electrical appliances is stimulated and, in this process, new job opportunities are created.

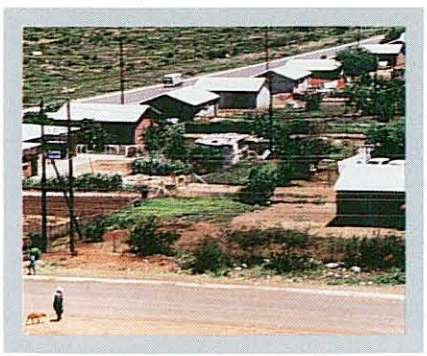
## ELECTRICITY FOR ALL AT AN AFFORDABLE PRICE

The innovative approach adopted by Eskom to bring electricity to millions of people in black towns, is reducing reticulation and installation costs and accelerating the pace of electrification.

Devices such as aerial bundled conductors, for both high and low voltage, strung along midstand boundaries, and pole-mounted transformers are 40% cheaper than the method used so far. To eliminate expensive housewiring, "ready boards" which consist of three plugs and a light, are being introduced. This method allows even a mud hut to have electricity.

In all, these and various other devices, such as the simplification of unnecessarily high technical specifications and applying fitness-for-purpose criteria, will cut reticulation and installation costs by up to 50%.

**RIGHT AND ABOVE: Unnecessarily high technical specifications are being simplified to reduce the cost of bringing electricity to people, even in rural areas. Collecting traditional fuel, like firewood, can take many hours each day, which could be spent more productively. Even traditional homes can now be provided with electricity.**



# Eskom in action 1988

Continued

Implementing and funding the electrification programme, however, is a major undertaking. This is being overcome by creating joint ventures involving the local authority, the local private sector and the local community along with the electricity supplier.

The first of these joint ventures, Kwanolec (Pty) Ltd, was registered in 1988. It was established as the supply authority for the town of Kwanobuhle near Uitenhage in the Eastern Cape. Eskom holds 50% of the shares, and 50% are held by a consortium of members of the Uitenhage branch of the Midlands Chamber of Industries, which includes Volkswagen South Africa. The project is in part financed from loans from the Development Bank of Southern Africa, and can become a model for many similar townships.

The Cape Provincial Administration is keen to extend the concept to other developing towns in 1989.

Payment for power consumed is also being made simpler. Because new users are often unaware of the cost of the electricity they consume, magnetic card-operated "prepayment" or "budget" meters are being introduced. Customers pay in advance for electricity and bills at the end of the month are eliminated. In this way, they not only have better control over how much they are spending on electricity, but learn which appliances are the most economical.

Although none of these cost-saving measures is entirely new, this is the first time that they are being used together in South Africa.

## SOLAR UNITS FOR RURAL AREAS INVESTIGATED

Farmers and other prospective users in rural areas far from electricity supplies could, in the near future, take advantage of a solar power system investigated by Eskom.

A working group was established recently to investigate photovoltaic power supplies both for Eskom's own use at remote telecommunication sites and for rural domestic applications.

This source of electricity may be an option where connection to the Eskom system is too costly. The unit has solar panels mounted on the roof. The batteries, controls and inverter are inside and provide 220 volt AC, which should be able to cater for most domestic appliances, except those used for cooking and water heating.

Two units will be built to Eskom's specifications early in 1989 for customers in the Northern Cape. These will be closely monitored with a view to refining the system in terms of customer needs.

## PRIVATISATION STUDIES WERE COMPREHENSIVE

About 70 organisations in eight countries were interviewed in the process of investigating privatisation, according to Ters Oosthuizen, privatisation and legal general manager.

"Both electricity and non-electricity utilities were interviewed," Oosthuizen says. "We also spoke to investment bankers, management consultants, accounting firms, consulting engineers, lawyers, as well as industry and consumer associations."

Members of the private sector with financial, legal and economics backgrounds, were invited to serve on a steering committee to advise Eskom. The services of local and foreign advisers and consultants were also used and major customers were invited to comment.

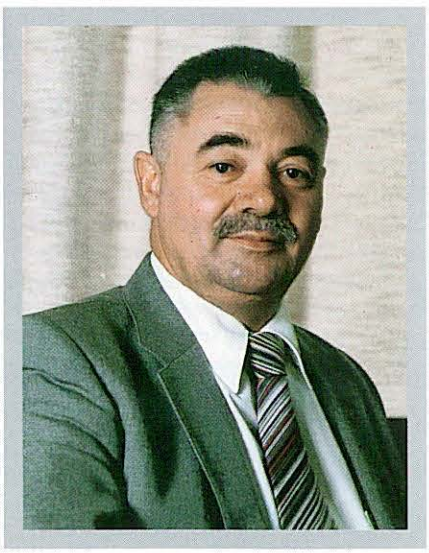
The investigations were completed towards the end of 1988 and a preliminary report was prepared.

## A YEAR OF INDUSTRIAL PEACE AND NO LABOUR DISRUPTIONS

While a small percentage of employees participated in stayaway actions during 1988, Eskom experienced a year of relative labour peace with scarcely any labour unrest. The biggest stayaway was associated with the Labour Relations Amendment Act, but Eskom's operations were not affected.

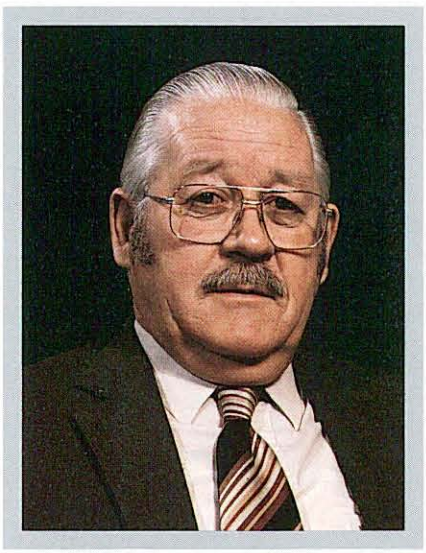
Eskom's relations with the 15 recognised trade unions representing 70% of its employees remained healthy, even though it was necessary to agree to disagree on a few occasions.

Negotiations covered a wide range. A salary dispute with trade unions representing Eskom's salaried staff (white collar) was referred to the industrial court, but in the end was settled through negotiation. In the case of general workers (unskilled and semi-skilled) a wage dispute was referred to arbitration and an award was made.



**ABOVE: Ters Oosthuizen, privatisation and legal general manager. Opinions on privatisation were sought from many organisations and individuals.**

The downscaling of Eskom's activities was the subject of negotiations which resulted in a collective agreement being concluded early in 1988 with all 15 trade unions concerned. Negotiations on the further downscaling of activities in the second half of the year were less successful, but nevertheless resulted in an agreement signed by 13 of the trade unions.



**ABOVE: Lood Rothman, senior general manager. Quality helps contain the cost of electricity.**

## INTEGRATED APPROACH TO QUALITY MANAGEMENT

To turn Eskom into the excellent organisation it aims to be, all issues dealing with productivity and performance management are being integrated into the concept of quality management.

"Quality is what excellent companies concern themselves with," says Lood Rothman, senior general manager. "But everybody usually has his own interpretation of what quality is. We need a common understanding of the concept to cascade it down the organisation so that it becomes everybody's business."

During 1988, Rothman and a team of senior executives have entrenched this concept in the organisation, with encouraging results.

"We want quality to be part of our value system and way of life at Eskom," Rothman says. "We are therefore addressing it in three areas, namely the processes we use, our products and services, and our people."

A focus on quality, he says, gives direction and guides an organisation to being professionally managed. In South Africa, quality has not been improving in the same way as it has in the major developed economies.

"We are now probably where Japan was after the war," Rothman says. "As a country, we are out of line with our trading partners. If we want to be competitive, we have to bridge the gap as soon as possible."

Eskom has recognised that improved quality will enable it to contain the cost of electricity. The organisation has accepted the four cornerstones of quality, namely the definition of quality as conformance to requirements, a system of error prevention, a performance standard of zero deviation from requirements, and the cost of non conformance as a measure of quality.

"We are linking these to all productivity issues in Eskom, from quality circles to technical performance. Our focus on quality is becoming part of our culture, and the customer will benefit in the years to come," Rothman said.

## NEW APPLICATIONS FOR ELECTRICITY

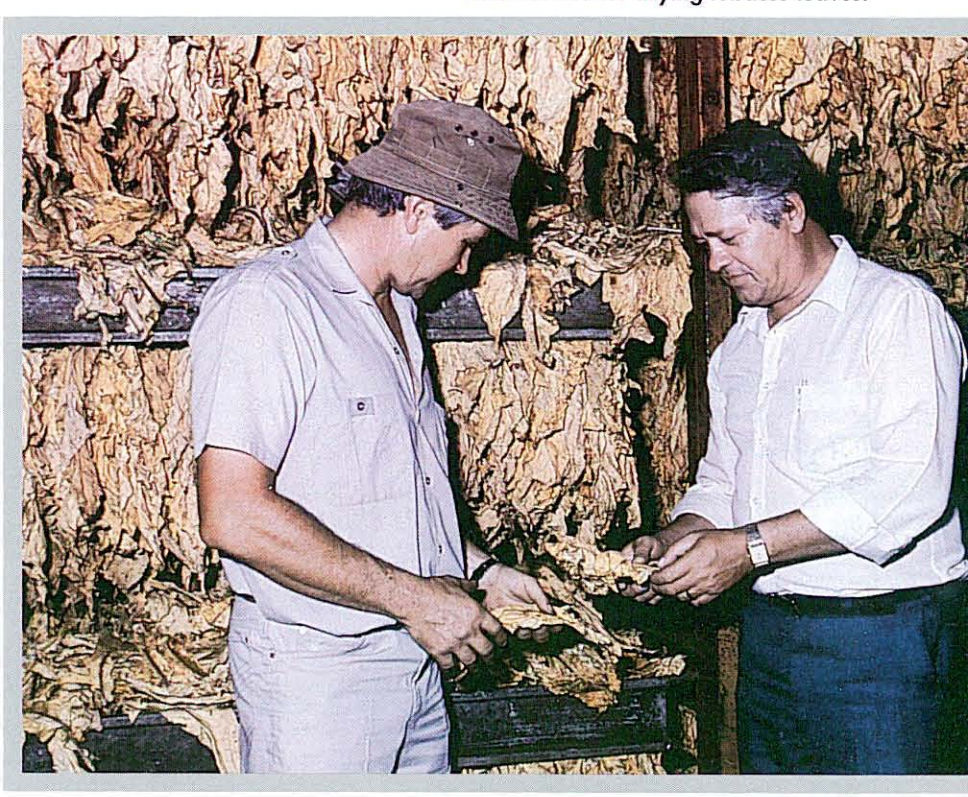
Novel devices powered by electricity were introduced to industry in 1988 by Eskom's Distribution and Marketing Group (D&M), developed with the Engineering Investigation Division (EID).

One of the devices is a heat pump dehumidifier which provides a source of warm dry air. Owing to its high efficiency, this device is an ideal medium for certain applications, such as the drying of some agricultural produce and pottery clay before firing.

Some industrial plant using gas and diesel were converted to electricity.

There is a growing demand for this type of service, which caters for specific market needs. D&M and equipment manufacturers work together as a team to identify and meet such requirements.

**BELOW: Distribution and Marketing executives meet with customers to identify specific electricity needs, such as new devices for drying tobacco leaves.**



# Tables

## 1. Statistical overview

| | **1988** | 1987 | 1986 | 1985 | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Financial,** R millions | | | | | | | | | | |
| Revenue | **8 159** | 7 046 | 5 845 | 4 625 | 3 832 | 3 302 | 2 695 | 2 141 | 1 772 | 1 529 |
| Net income[1] | **816** | 702 | 781 | 738 | 732 | 744 | 671 | 507 | 414 | 476 |
| Fixed assets in commission, at cost | **28 680** | 24 986 | 19 907 | 15 496 | 12 058 | 9 218 | 7 689 | 6 323 | 5 604 | 4 255 |
| Works under construction | **5 512** | 6 075 | 7 753 | 8 552 | 7 271 | 6 434 | 5 198 | 3 854 | 2 644 | 2 582 |
| Capital expenditure | **3 969** | 3 895 | 3 755 | 4 757 | 3 719 | 2 757 | 2 741 | 1 951 | 1 447 | 1 375 |
| Total net borrowings | **24 334** | 21 475 | 19 462 | 17 621 | 13 861 | 10 686 | 8 534 | 6 334 | 5 013 | 4 187 |
| **Plant performance** | | | | | | | | | | |
| Total power station capacity, installed rating, MW | **33 176** | 31 261 | 28 086 | 25 716 | 24 514 | 22 949 | 21 749 | 20 049 | 18 349 | 15 974 |
| Total power station capacity, assigned sent-out rating, MW | **31 465** | 29 618 | 26 682 | 24 359 | 23 168 | 21 673 | 20 523 | 18 989 | 17 339 | 15 056 |
| Peak demand on integrated Eskom system, MW | **20 589** | 20 001 | 18 278 | 17 852 | 17 296 | 15 639 | 15 532 | 14 674 | 13 668 | 12 855 |
| Average station availability[2] | **79,1** | 79,2 | 78,5 | 77,5 | 74,9 | 71,9 | 74,3 | 74,2 | 74,7 | 78,8 |
| Station load factor, per cent[3] | **52,3** | 54,3 | 55,5 | 58,0 | 58,1 | 55,6 | 59,3 | 62,2 | 57,8 | 60,9 |
| Integrated Eskom system load factor, per cent | **75,5** | 73,9 | 77,3 | 76,2 | 75,0 | 76,9 | 75,3 | 77,6 | 77,5 | 76,4 |
| Coal burnt, thousands of tons | **64 489,6** | 65 787,0 | 58 915,9 | 59 488,6 | 58 703,6 | 55 010,2 | 55 198,4 | 53 903,7 | 46 755,0 | 43 264,9 |
| Coal burnt, kg/kW.h sent out | **0,521** | 0,535 | 0,515 | 0,522 | 0,533 | 0,546 | 0,551 | 0,563 | 0,568 | 0,580 |
| Average heat rate of coal-fired stations, MJ/kW.h sent out | **10,71** | 11,00 | 10,95 | 11,26 | 11,45 | 11,57 | 11,82 | 12,01 | 12,16 | 12,33 |
| Average heat content of coal (as received), MJ/kg | **20,44** | 20,48 | 21,19 | 21,52 | 21,38 | 21,11 | 21,39 | 21,25 | 21,34 | 21,22 |
| Overall thermal efficiency, sent-out basis | **33,6** | 32,7 | 32,9 | 32,0 | 31,4 | 31,1 | 30,5 | 30,0 | 29,6 | 29,2 |
| Average coal cost, R/ton | **18,67** | 17,11 | 14,87 | 13,25 | 12,55 | 12,44 | 11,75 | 9,71 | 8,12 | 6,96 |
| Average coal cost, c/kW.h sent out | **0,9727** | 0,9155 | 0,7665 | 0,6916 | 0,6692 | 0,6793 | 0,6471 | 0,5473 | 0,4614 | 0,4045 |
| **Electricity output** | | | | | | | | | | |
| Total electricity sent out in South Africa, million kW.h[4] | **140 502** | 134 751 | 130 056 | 126 206 | 120 835 | 112 366 | 109 536 | 106 135 | 99 905 | 92 615 |
| Eskom electricity sent out as percentage of South African total | **97,2** | 96,1 | 95,1 | 94,5 | 94,3 | 93,8 | 93,6 | 93,9 | 93,0 | 92,8 |
| Total electricity sent out on Eskom system (Eskom stations and purchased), million kW.h[5] | **139 197** | 132 774 | 126 766 | 122 494 | 117 086 | 108 321 | 104 920 | 100 425 | 93 021 | 86 037 |
| Total sent out from Eskom stations, million kW.h | **138 837** | 132 507 | 126 511 | 121 987 | 116 581 | 103 295 | 102 769 | 97 824 | 83 362 | 75 643 |
| Subtotal, from coal-fired stations, million kW.h | **123 777** | 122 947 | 114 298 | 113 941 | 110 094 | 100 738 | 100 217 | 95 675 | 82 342 | 74 485 |
| Subtotal, from hydro-electric stations, million kW.h | **3 162** | 1 617 | 1 623 | 624 | 560 | 595 | 1 016 | 1 653 | 992 | 1 144 |
| Subtotal from pumped-storage stations, million kW.h | **1 403** | 1 774 | 1 785 | 2 107 | 1 994 | 1 957 | 1 519 | 415 | — | — |
| Subtotal, from diesel and gas-turbine stations, million kW.h | **2** | 2 | 2 | 0 | 8 | 5 | 17 | 81 | 28 | 14 |
| Subtotal, nuclear power station, million kW.h | **10 493** | 6 167 | 8 803 | 5 315 | 3 925 | — | — | — | — | — |
| Total purchased by Eskom and sent out on Eskom system, million kW.h | **360** | 267 | 255 | 507 | 505 | 5 026 | 2 151 | 2 601 | 9 659 | 10 394 |
| Total consumed by Eskom, million kW.h[6] | **2 567** | 3 229 | 3 018 | 3 265 | 3 188 | 2 917 | 2 404 | 712 | 71 | 58 |
| Total available for distribution, million kW.h | **136 630** | 129 545 | 123 748 | 119 229 | 113 898 | 105 404 | 102 516 | 99 713 | 92 950 | 85 979 |
| Total sold, million kW.h[7] | **129 493** | 122 524 | 117 353,0 | 112 305,9 | 106 904,1 | 98 251,1 | 96 135,9 | 93 844,0 | 87 539,3 | 80 582,8 |
| Growth in kW.h sales, per cent | **5,7** | 4,4 | 4,5 | 5,1 | 8,8 | 2,2 | 2,4 | 7,2 | 8,6 | 10,7 |
| **Employees** | | | | | | | | | | |
| Total number at 31 December | **56 726** | 56 830 | 60 800 | 66 000 | 64 560 | 62 420 | 58 850 | 52 080 | 47 490 | 43 690 |
| Ratio number/million kW.h sold | **0,438** | 0,464 | 0,518 | 0,588 | 0,604 | 0,635 | 0,612 | 0,555 | 0,542 | 0,542 |
| **Sales to utilities in southern Africa,** million kW.h | | | | | | | | | | |
| Becor (Bophuthatswana) | **2 194,8** | 2 124,5 | 1 805,9 | 1 750,4 | 1 490,1 | 1 242,9 | 1 181,5 | 1 324,8 | 1 213,1 | 1 124,1 |
| BPC (Botswana) | **53,4** | 77,5 | 232,3 | 222,4 | 185,7 | 159,7 | 87,4 | 11,2 | — | — |
| Ciskei | **299,8** | 250,7 | 191,4 | 164,5 | 133,7 | 104,4 | 84,1 | 4,8 | — | — |
| EDM (Mozambique) | **340,4** | 329,2 | 303,8 | 227,8 | 283,5 | 293,2 | 293,2 | 235,1 | 24,9 | 106,9 |
| LEC (Lesotho) | **170,9** | 156,2 | 134,6 | 123,7 | 116,8 | 110,9 | 123,6 | 117,4 | 100,2 | 84,2 |
| SEB (Swaziland) | **290,3** | 253,5 | 277,1 | 227,2 | 250,2 | 333,4 | 308,9 | 211,0 | 200,4 | 175,9 |
| SWAWEK (SWA/Namibia) | **452,9** | 613,6 | 411,1 | 223,8 | 186,9 | 422,2 | 160,1 | 173,9 | 193,2 | 185,4 |
| Teskor (Transkei) | **126,9** | 110,6 | 84,9 | 99,8 | 138,7 | 160,2 | 120,8 | 106,9 | 99,1 | 87,0 |
| VEC (Venda) | **73,8** | 59,8 | 54,0 | 45,0 | 35,0 | 27,1 | 24,1 | 20,1 | 16,2 | 6,0 |
| ZESA (Zimbabwe) | **16,5** | 16,4 | 15,6 | 11,5 | 12,5 | 13,1 | 13,2 | 11,2 | 10,4 | 10,0 |
| | **4 019,7** | 3 992,0 | 3 510,6 | 3 096,0 | 2 833,0 | 2 867,1 | 2 396,9 | 2 216,3 | 1 857,5 | 1 779,5 |

*1. Certain adjustments had to be made to make figures comparable with current figures, which are presented in terms of the Eskom Act of 1987. 2. Capacity hours available x 100/total capacity hours in year. 3. kW.h sent out x 100/(average assigned sent-out rating x hours in year). 4. Electricity sent out by Eskom, some industries and municipalities which generate all or part of their electricity requirements. 5. Includes Eskom electricity sent out to neighbouring countries. 6. In respect of pumped-storage facilities and synchronous condenser mode of operation. See Table 2, Note 7. 7. Difference between electricity available for distribution and electricity sold is due to transmission losses.*

# Tables

Continued

## 2. Power stations in service at 31 December 1988

| Name of station | Type | Location | No. and rating of generator sets MW | Total installed rating MW | Total sent-out rating MW[1] |
|---|---|---|---|---|---|
| Acacia | Gas turbine | Cape Town | 3 x 57 | 171 | 171 |
| Arnot | Coal fired | Middelburg, Tvl | 6 x 350 | 2 100 | 1 955 |
| Camden | Coal fired | Ermelo | 8 x 200 | 1 600 | 1 520 |
| Drakensberg | Pumped storage | Bergville | 4 x 250 | 1 000 | 1 000 |
| Duvha | Coal fired | Witbank | 6 x 600 | 3 600 | 3 450 |
| Grootvlei | Coal fired | Balfour | 6 x 200 | 1 200 | 1 130 |
| Hendrik Verwoerd | Hydro-electric | Norvalspont | 4 x 80 | 320 | 320 |
| Hendrina | Coal fired | Hendrina | 10 x 200 | 2 000 | 1 900 |
| Highveld | Coal fired | Sasolburg | 8 x 60 | 480 | 412 |
| Ingagane | Coal fired | Newcastle | 5 x 100 | 500 | 465 |
| Kendal | Coal fired | Witbank | 1 x 686 | 686[2] | 640[2] |
| Koeberg | Nuclear | Cape Town | 2 x 965 | 1 930 | 1 840 |
| Komati | Coal fired | Middelburg, Tvl | 5 x 100; 4 x 125 | 1 000 | 891 |
| Kriel | Coal fired | Bethal | 6 x 500 | 3 000 | 2 850 |
| Lethabo | Coal fired | Sasolburg | 4 x 618 | 2 472 | 2 372 |
| Matimba | Coal fired | Ellisras | 3 x 665 | 1 995[2] | 1 845[2] |
| Matla | Coal fired | Bethal | 6 x 600 | 3 600 | 3 450 |
| Palmiet | Pumped storage | Grabouw | 2 x 200 | 400 | 400 |
| Paratus | Gas turbine/diesel | Walvis Bay | 1 x 22,4; 4 x 6,4 | 48 | 48 |
| Port Rex | Gas turbine | East London | 3 x 57 | 171 | 171 |
| Salt River | Coal fired | Cape Town | 4 x 30; 2 x 60 | 240 | 228 |
| Taaibos | Coal fired | Sasolburg | 8 x 60 | 480 | 440 |
| Tutuka | Coal fired | Standerton | 5 x 609 | 3 045 | 2 925 |
| Vaal | Coal fired | Viljoensdrif | 9 x 33 | 318[8] | 270 |
| Vanderkloof | Hydro-electric | Petrusville | 2 x 110 | 220 | 220 |
| Vierfontein | Coal fired | Viljoenskroon | 12 x 30 | 360 | 336 |
| Wilge | Coal fired | Witbank | 2 x 30; 3 x 60 | 240 | 216 |
| **Total in service, 27 Eskom stations[3]** | | | | 33 176 | 31 465 |
| Subtotal, coal fired (19 stations)[4] | | | | 28 916 | 27 295 |
| Subtotal, gas turbine (3 stations)[5] | | | | 390 | 390 |
| Subtotal, hydro-electric (2 stations)[6] | | | | 540 | 540 |
| Subtotal, pumped storage (2 stations)[7] | | | | 1 400 | 1 400 |
| Subtotal, nuclear (1 station) | | | | 1 930 | 1 840 |
| **Total in service, 27 Eskom stations** | | | | 33 176 | 31 465 |

*1. Differences between generator rating and total station rating, and installed and sent-out rating reflect auxiliary power consumption and reduced capacity caused by age of the plant and/or low coal quality. 2. Dry-cooled unit specifications are based on design back-pressure and ambient air temperature. 3. In addition to its own installed capacity, Eskom also has a firm contractual capacity of 1 355 MW from Cahora Bassa, which was not available during 1988. It also has agreements to purchase electricity from Swawek, Tescor and some municipalities. 4. Base-load stations, except in the case of older, uneconomical plant, which are used only for peak demands or in emergencies. 5. Used only for peaking or in emergencies. 6. Use restricted to peaking and emergencies and availability of water in Hendrik Verwoerd and P.K. le Roux dams. 7. Pumped-storage facilities are net users of electricity and are used for peaking. Water is pumped during off-peak periods generate electricity during peak periods. 8. Includes 3 x 7 MW house sets.*

## 3. Generating sets taken into service during 1988

| | Total installed rating MW | Total sent-out rating MW |
|---|---|---|
| Kendal, set 1 | 686 | 640 |
| Matimba, set 3 | 665 | 615 |
| Palmiet, set 1 | 200 | 200 |
| Palmiet, set 2 | 200 | 200 |
| Tutuka, set 5 | 609 | 585 |
| **Total** | 2 360 | 2 240 |

# Tables

Continued

## 4. Generating sets on order at 31 December 1988

| Name, type and location of power station | No. and installed rating of set MW | Sent-out rating of set MW | Total installed rating of station MW | Total sent-out rating of station MW | No. of sets in service (on order) | Total installed rating of sets on order | Total sent-out rating of sets on order | Year of completion first (last) set |
|---|---|---|---|---|---|---|---|---|
| Kendal, coal fired, Kendal | 6x686 | 640 | 4 116 | 3 840 | 1 (5) | 3 430 | 3 200 | 1988 (1993) |
| Lethabo, coal fired, Vereeniging | 6x618 | 593 | 3 708 | 3 558 | 4 (2) | 1 236 | 1 186 | 1985 (1990) |
| Majuba, coal fired, Volksrust | 3x657<br>3x711 | 3x612<br>3x668 | 4 104 | 3 840 | 0 (6) | 4 104 | 3 840 | 1996 (2001) |
| Matimba, coal fired, Ellisras | 6x665 | 615 | 3 990 | 3 690 | 3 (3) | 1 995 | 1 845 | 1987 (1991) |
| Tutuka, coal fired, Standerton | 6x609 | 585 | 3 654 | 3 510 | 5 (1) | 609 | 585 | 1985 (1990) |
| **Total generating sets on order** | | | | | | 11 374 | 10 656 | |

*Dates on which sets on order will be taken into commercial service may change, depending on growth in electricity demand.*

## 5. Transmission and distribution equipment in service at 31 December 1988

| | | 1987 | **1988** | Change |
|---|---|---|---|---|
| **Main transmission system km** | 765 kV | 871 | **871** | 0 |
| | 533 kV DC | 1 030 | **1 030** | 0 |
| | 400 kV | 10 696 | **11 220** | 524 |
| | 275 kV | 6 598 | **6 718** | 120 |
| | 220 kV | 1 239 | **1 239** | 0 |
| **Distribution lines km** | 165 – 132 kV | 15 550 | **15 923** | 373 |
| | 88 – 33 kV | 20 536 | **20 579** | 43 |
| **Reticulation lines km** | 22 kV – lower | 130 797 | **144 222** | 13 425 |
| **Total all lines km** | | 187 317 | **201 802** | 14 485 |
| **Cables km** | 165 – 132 kV | 67 | **67** | 0 |
| | 88 – 33 kV | 390 | **393** | 3 |
| | 22 kV – lower | 3 894 | **3 791** | –103 |
| **Total all cables km** | | 4 351 | **4 251** | –100 |
| **Transformers** | Capacity MVA | 136 673 | **141 475** | 4 802 |
| | Number | 108 170 | **117 496** | 9 326 |

*Although two lines are constructed at 765 kV, only one runs at this voltage, and the other at 400 kV.*

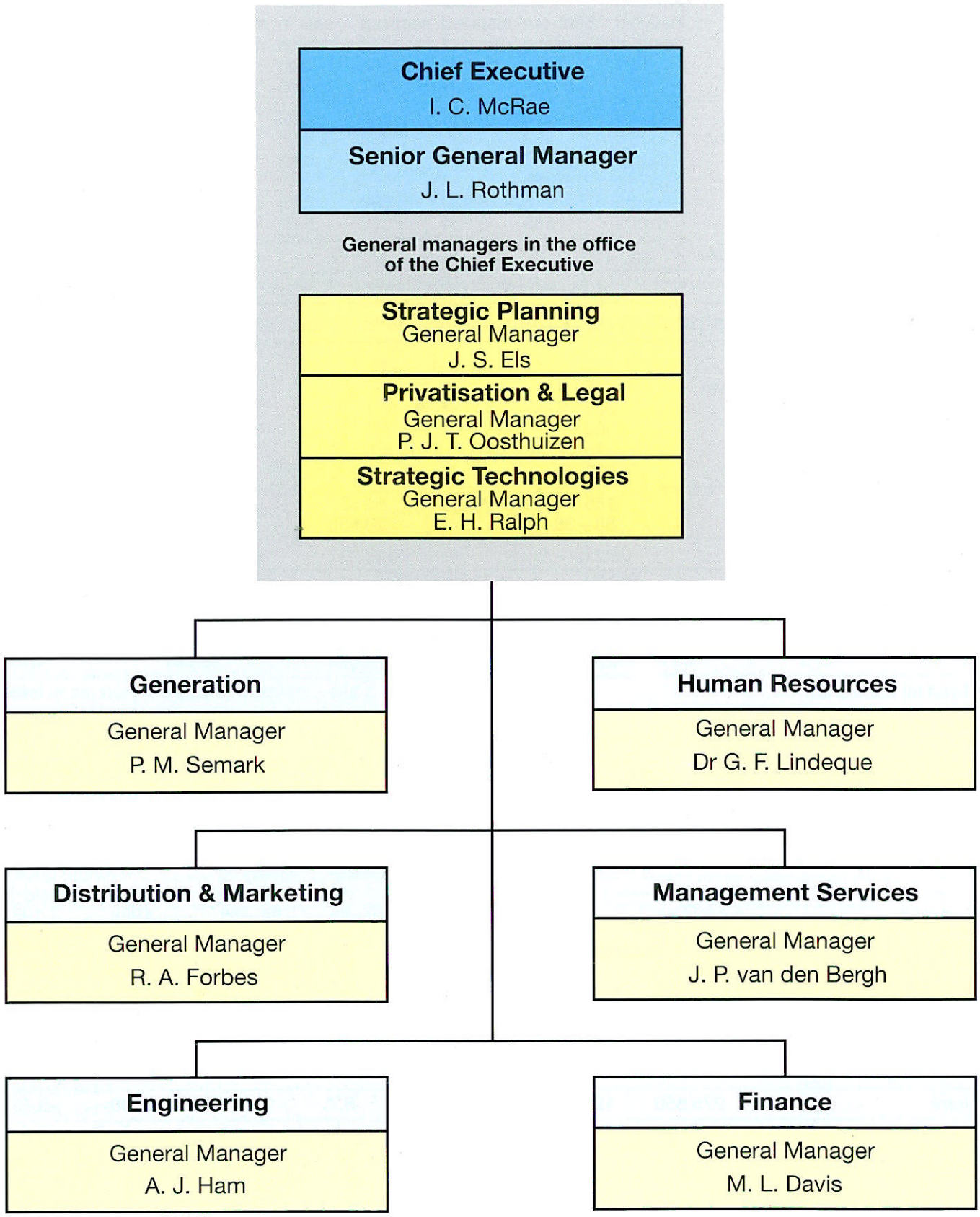
## 6. Sales of electricity to categories of customers

| Category | Number of customers | Million kW.h sold **1988** | 1987 | Increase % 87 – 88 | Average yearly % increase 84 – 88 | Average price c/kW.h sold 1988 | 1987 |
|---|---|---|---|---|---|---|---|
| Bulk | 595 | **49 433** | 45 418 | 8,8 | 8,6 | **6,118** | 5,580 |
| Domestic & street lighting | 153 577 | **1 341** | 1 279 | 4,8 | 4,5 | **11,914** | 10,954 |
| Industrial/commercial | 18 903 | **36 574** | 35 262 | 3,7 | 2,5* | **5,968** | 5,470 |
| Mining | 555 | **34 341** | 32 849 | 4,5 | 6,5 | **6,035** | 5,540 |
| Rural/farming | 101 749 | **3 163** | 3 022 | 4,7 | —* | **11,672** | 10,440 |
| Traction | 31 | **4 120** | 4 049 | 1,7 | –0,1 | **8,171** | 7,612 |
| Own usage | 246 | **521** | 645 | –19,4 | —* | **2,599** | — |
| Total | 275 656 | **129 493** | 122 524 | 5,7 | 5,7 | **6,300** | 5,751 |

**Basis of sales to the industrial category has changed, which distorts comparisons. Distribution losses and usage on Eskom distribution premises and also sales to rural customers, previously included under industrial sales, are now also listed separately.*

# Organisation structure

Members of the Management Board as at 8 March 1989






Printed by The Standard Press