Eskom

A new dawn has arrived

1923 - 2013

Mpumalanga Province

1923-2013

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FOREWORD

Nandu Bhula
Senior General Manager
Operating Unit Coal 3

When in search of spectacular scenery with abundant wildlife and the famous “Big Five”, you need not look further than the Mpumalanga Province, the “Place Where the Sun Rises”, bringing with it light and hope. It is therefore apt that Eskom finds its roots firmly planted in this province. Many of our citizens are unaware of the remarkable history of this great organisation and the visionaries who have, over the last nine decades, transformed the electricity industry in our country from this remarkable province. Others may not be aware of the “Big Eleven” power stations from this province that make up the lion’s share of South Africa’s generating capacity. This book attempts to change that!

Compiling a short informative piece of literature on Eskom in the Mpumalanga Province was not going to be an easy task, mainly because of the rich history of Eskom in the province and the abundant stories and individual experiences of Eskomites over the years. This book, however, succeeds in capturing the 90 amazing years that Eskom has been in existence. It portrays the company’s growth inch by inch and highlights the overwhelming spirit of all those who pioneered and paved the way forward year after year. This piece of history will make anyone associated with the organisation and the Mpumalanga Province beam with pride.

Eskom’s footprint in Mpumalanga has over the past 90 years grown from one humble hydro power station (a fact that my hydro colleagues will find fascinating), to a fleet of 11 thermal power stations with a generating capacity of just over 30GW, which equates to over 70% of the installed capacity in South Africa. It is therefore no surprise that the Mpumalanga Province is considered to be the heart of the Eskom supply chain, pumping life through the very veins of our growing economy, focused at improving the quality of life of all South Africans and our Southern African neighbours.

You are invited to explore the fascinating Eskom journey captured in this booklet, from humble beginnings when they took over the operation of the Malieveldspruit hydro, through the challenging years during World War I and II and the extensive capital expansion programmes over the years that followed. It was in the Mpumalanga Province, rich in coal reserves and thus perfect for the construction of coal-fired power stations, where our power system finds its roots. Power stations were built and transmission and distribution infrastructure grew until they reached every corner of the province and then the country.

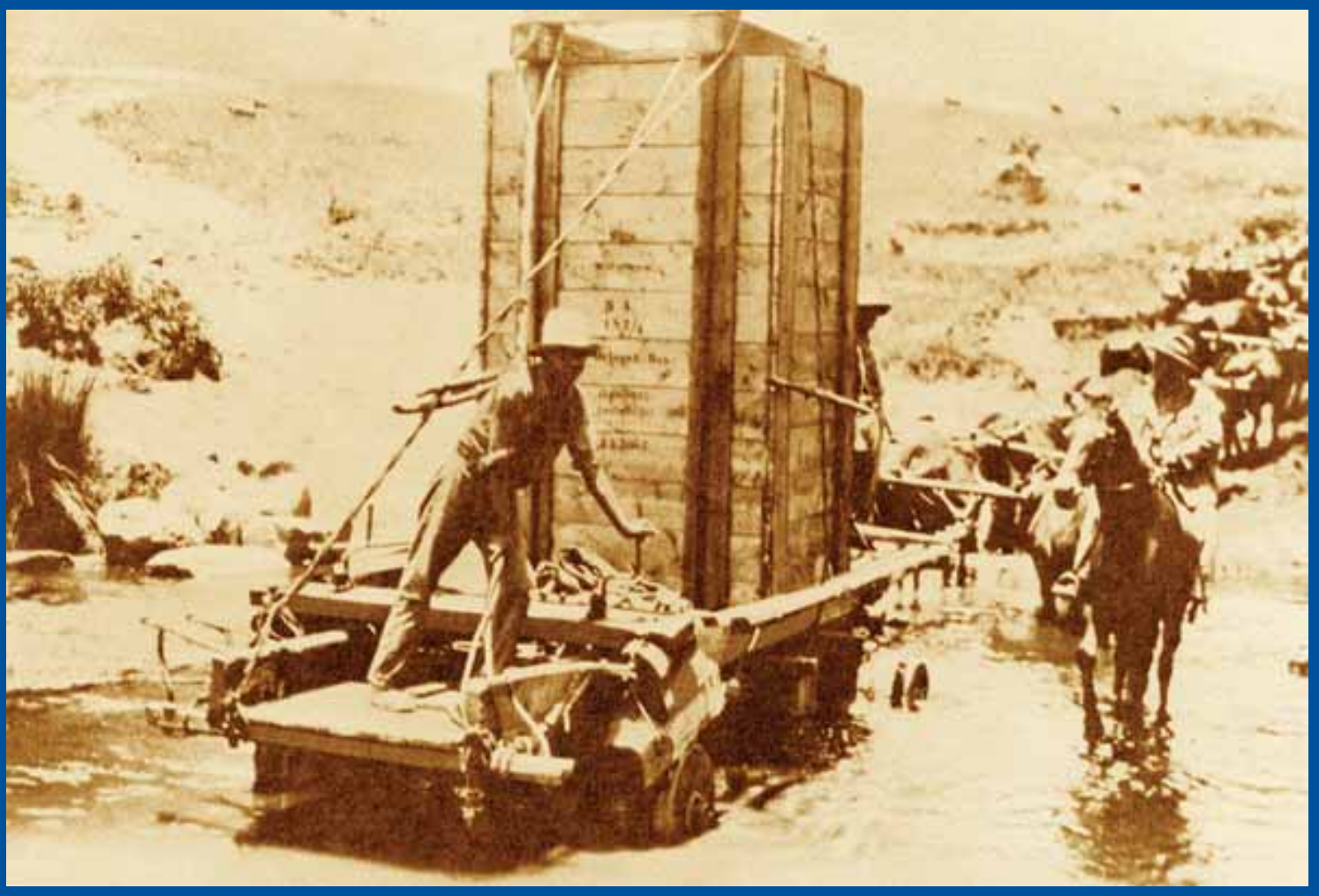
In this book, you will discover many interesting facts like which power station has the largest cooling towers on the continent, which power station triggered the start of the national power grid and how we returned to service the oldest de-commissioned (mothballed) power stations in the world. The new 4800MW coal-fired power station currently under construction is also featured, as it starts a new chapter in our history as one of the largest of its kind in the world by generating capacity.

As a proud and passionate Eskom Guardian, I have no doubt that this book will remind all who read it of the vital role the organisation has played, from its roots in the Mpumalanga Province, to one of the largest electricity companies in the world today.

I am personally and professionally honoured to be part of this historic booklet and I wish Eskom a happy 90th birthday. May it continue to be an employer of choice and keep the lights burning, thus ensuring sustainable economic growth and prosperity to all South Africans into the future.

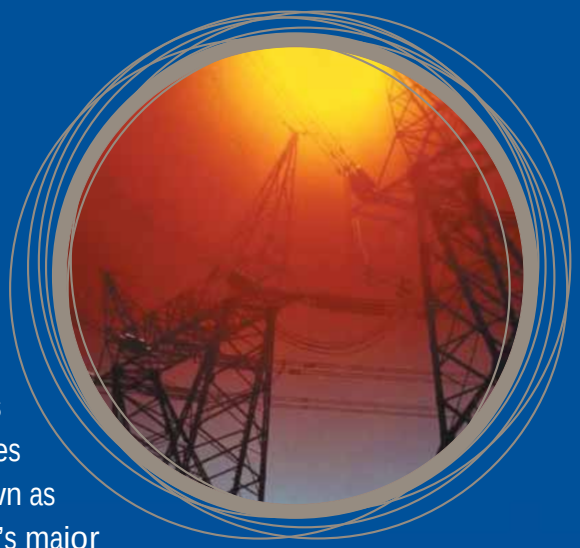
Nandu Bhula

The story begins in 1923 …



Sabie Siemens trans delivery in September 1925

MPUMALANGA PROVINCE
“The place where the sun rises”

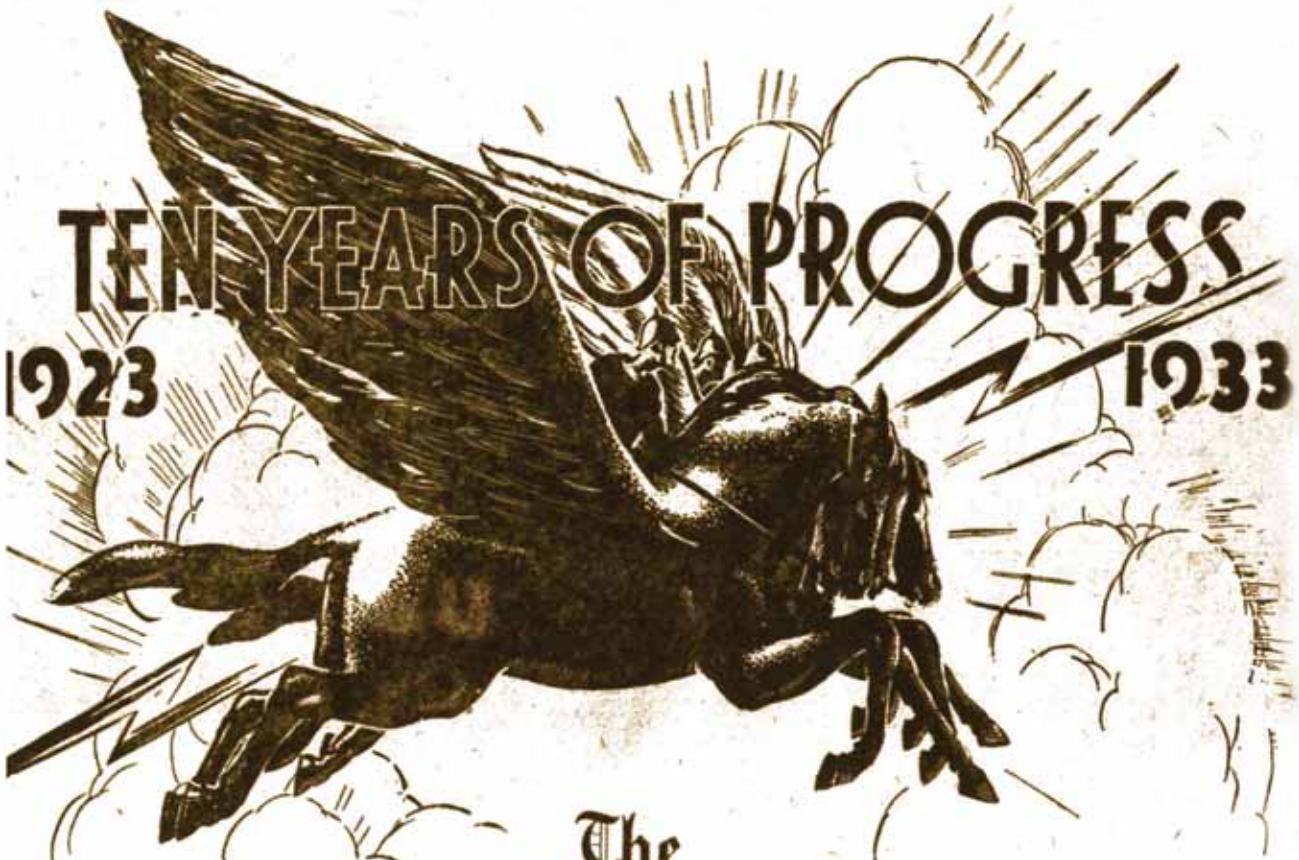


I N T R O D U C T I O N

Mpumalanga, in the northeast of South Africa, is a province with spectacular scenic beauty and an abundance of wildlife. Bordered by the countries of Mozambique and Swaziland to the east and the Gauteng Province to the west, it is situated mainly on the high plateau grasslands of the Middleveld, which roll eastwards for hundreds of kilometres. In the northeast, it rises towards mountain peaks and terminates in an immense escarpment. In places this escarpment plunges hundreds of metres down to the low-lying area known as the Lowveld. Mpumalanga is rich in coal reserves, and home to South Africa’s major coal-fired power stations – three of which are the biggest in the southern hemisphere.

Mpumalanga produces about 80% of the country’s coal and remains the largest production region for forestry and agriculture. Mining, manufacturing and electricity contribute 41.4% of the province’s GDP, with the remainder from government services, agriculture, forestry and related industries. Mpumalanga is the fourth-biggest contributor to South Africa’s GDP. Mbombela (Nelspruit) is the capital and the administrative and business hub of the Lowveld. Witbank is the center of the local coal-mining industry. Standerton, in the south, is known for its large dairy industry; and Piet Retief in the southeast is a production area for tropical fruit and sugar. Middelburg is a large farming and industrial town. It is known as the ‘stainless steel capital of Africa’. A large sugar industry is also found at Malelane in the east; Ermelo is the district in South Africa that produces the most wool; Barberton is one of the oldest gold-mining towns in South Africa; and Sabie is situated in the forestry heartland of the country. Mpumalanga Province is also divided into three district municipalities, namely Ehlanzeni District Municipality, Gert Sibande Municipality and Nkangala District Municipality, which are in turn divided into eighteen local municipalities.

As you travel from Gauteng towards the east, where the sun rises on a windless winter’s morning, and you see the Eskom power lines in the distance running across the countryside, you know you have entered the region known as the coal pantry of South Africa, the Mpumalanga Province. On the horizon towers the mines and power stations as far as your eye can see and all of a sudden you realise this mighty torrent called Eskom started somewhere here as a mere trickle. At the heart and core of South Africa’s electricity history and distribution is Eskom, today celebrating 90 years as electricity provider. Eskom sold its first electricity in South Africa in the Eastern Transvaal, known today as the Mpumalanga Province, in November 1925. Sabie Undertaking was the source of the flow of ESCOM electricity in the Mpumalanga Province.



The Electricity Supply Commission

What it is, What it has done and What it means to South Africa.

The Commission is a corporate body, constituted under the Electricity Act, 1922.

In the operation of its Undertakings, the Commission, as a public body, but representing no particular group of persons or interests, has as its objective a cheap and reliable supply of electricity in the interests of each and all of its consumers throughout South Africa. During the last ten years, the Commission has more than achieved its object in providing an abundant supply of cheap electricity for South Africa's industrial development and increased domestic convenience, at prices among the lowest in the world.

A copy of a Brochure recording the progress of the Commission during the past decade will be sent FREE to interested persons. Requests must be typed on official letterheads.

To-day, the Commission has five Undertakings, at Witbank, Colenso, Durban, Cape Town and Sabie, with an installed Generating Plant Capacity of 350,000 horsepower and a capital investment of £8,300,000.

Industrialists and other users of electricity in the territories served by the Commission are invited to discuss the possibilities of increasing the use of electricity to their advantage.

Inquiries may be addressed either to the Commission's Head Office, Electricity House, 82, Marshall Street, JOHANNESBURG, or to the Engineer-in-Charge at any of the Undertakings.

ELECTRICITY–THE SPIRIT OF PROGRESS

This is the story of Eskom's journey in the Mpumalanga Province from the first sale of electricity in November 1925 to the building of Kusile Power Station, the most advanced coal-fired plant project in Eskom.

SABIE RIVER GORGE POWER STATION
1925 – 1927

In the Sabie area (Lowveld) there were several gold-mining companies using electricity in their mining operations. In some instances hydro power was used on a small scale, but the supply was not enough to cope with the mining development. These companies therefore approached the government of the day for permission to construct a larger hydro-electric station in the Sabie River Gorge. Repeated requests for this permission eventually resulted in the government instructing ESCOM to investigate the proposal.

In order to assist the consumers in the Sabie area, ESCOM took over the Malieveldspruit hydro, and began its first electricity transaction in South Africa in November 1925. In the next two months, November and December 1925, ESCOM sold 727,401 units, or 364 000 units per month. The average number of units sold per month during 1967 was 2 221 500 000.

This station was replaced by a hydro station in the Sabie River, which came into commercial operation in mid-1927. The Sabie River Gorge hydro station was the first station designed by ESCOM engineers. A 22 000-volt transmission line conveyed the electricity from the Sabie River Gorge Power Station to Sabie and a 3300-volt distribution line was erected from the substation at Sabie for the supply of electricity to consumers in the Golden Valley area. Continuity of supply was maintained from mid-1927 until November 1964.

WITBANK POWER STATION
1925

Making a difference

The erection of the Witbank Power Station was achieved by an agreement between ESCOM and the Victoria Falls Power Company (VFP). ESCOM was to finance and own the power station that the VFP was to design, build and operate. The VFP agreed to transmit all surplus electricity capacity to the Witwatersrand.

In 1925, the Commission obtained four power-supply licences and the Cape Town, Witbank, Sabie and Central Natal undertakings were established. A year later, the Witbank coal-fired power station was commissioned.

Located in the heart of the coalfields

After World War I and the 1922 Rand Revolt, additional power was urgently required. The VFP, who virtually held the monopoly for supplies to the gold mines, planned a new power station to be situated in the Witbank coalfields and connected to the existing system at Brakpan by means of a double circuit 132kV transmission line. It was planned to install 20MW sets. There were distinct economic advantages in building the power station at Witbank, on account of the large quantity of duff (fine) waste coal, which could be purchased at a very moderate cost. The cost of transport over the government railways would also be avoided. The low cost of fuel would more than compensate for the additional costs in locating the station 100 km to the west. The plans included the construction of spray ponds at site and the building of a dam across the Olifants River on the farm "Doornpoort". The necessary water rights were obtained from the Water Court, and all servitudes were registered in the Commission's name. The dam had a capacity of 170 cubic metres. From the dam, water was pumped over a distance of 7,2 km to a high-level service reservoir on the farm "Joubertsrust". From the reservoir, water was gravitated for a distance of 1,2 km to the generating station. Mass excavations for two cooling ponds on the site of the station started in 1925. It was estimated that 5 000 kilolitres of water per day were required for boiler-feed circulation, and general station purposes.

The Witbank Power Station was a base-load station at a high load factor, principally powered by using coal powder, or "duff", as it was known. With its location in the heart of the coalfields, it enabled the Commission to provide very cheap electrical power to its consumers.

Decommissioning of Witbank Power Station

With the construction of the Wilge-, Komati-, Camden-, Hendrina-, Arnot-, Kriel- and Grootvlei Power Stations, the Witbank Power Station was used less. It was finally closed down early in 1970. The building at Witbank was still used as the headquarters of the Eastern Transvaal Operation.

DISTRIBUTION/TRANSMISSION
1925

Amendment of Witbank Licence 1925

The Commission's largest consumer from the Witbank Undertaking was the Victoria Falls and Transvaal Power Company Limited. One large industrial consumer decided to transfer to Witbank, mainly because of the availability of cheap power. Several collieries in the Witbank district also decided to take supplies of electricity from the Witbank Undertaking, and negotiations were proceeding with other consumers in the district.

A formal agreement, dated 25 May 1926, was concluded with the Witbank Municipality, according to which the Commission will undertake the supply and reticulation of electricity to all consumers, residential and otherwise, within the township, as well as the lighting of streets.

Totals units sold to all consumers during 1926 and 1927:

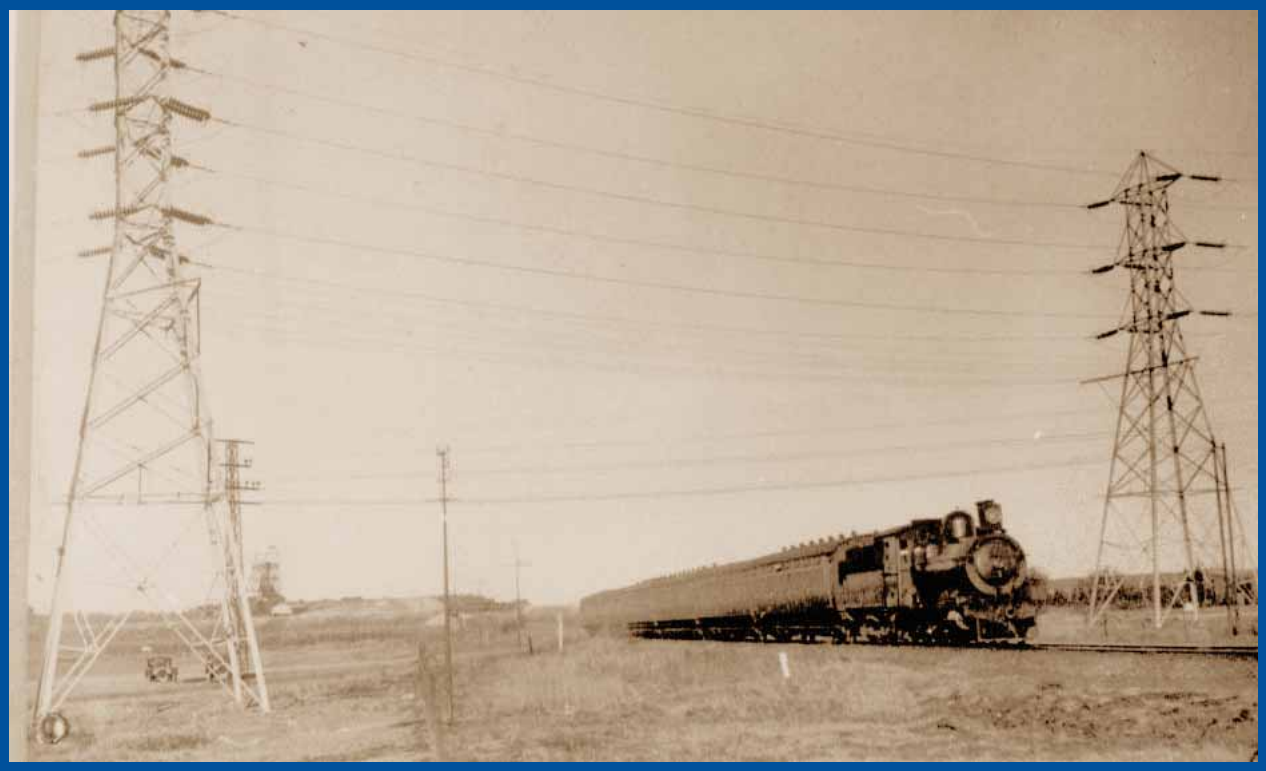
Witbank	599 092 935
Sabie	2 666 341

Number of Consumers 31 December 1927:

Witbank	
Domestic and Lighting:	288
Industrial and mining:	6
Bulk supplies:	1
Sabie	
Industrial and mining:	3

TRANSMISSION
1928 – 1929

The Commission's consumers in Witbank now included nine of the collieries in the Witbank District. Three of the nine collieries had not yet been connected, but the transmission lines to these collieries were on course for construction, and supplies commenced during 1929. At the end of 1936 all producing collieries in the Witbank district were consumers of the Commission.



Consumers included the following: The Rand Carbide, Ltd. (Supply commenced December 1926); Witbank Colliery, Ltd. (May 1927); S.A. Coal Estates (Witbank), Ltd. (Navigation Colliery) (July 1927); Middelburg Steam Coal and Coke Company, Ltd. (October 1927) and Coronation Collieries, Ltd (Kromdraai Colliery) (December 1927); Tweefontein United Collieries, Ltd. (Negotiations completed end 1927). As the demand for power increased, the standard tariff was reduced.

A 380/220V distribution system in the Witbank municipal area consisted mainly of overhead lines for the distribution of electricity to all residential and other consumers within the township, as well as for street-lighting purposes, which started in August 1927. In the Witbank district the Commission had a 21 000V reticulation system, consisting of 13 km of underground cables and 20 km of overhead lines transmitting electricity to substations situated in the Witbank township and on the respective consumers' premises. This network was placed in commercial operation on 1 January 1928.

WITBANK DISTRIBUTION SYSTEM
1948

Between 1948 and 1949 alone the number of consumers grew from 1388 to 1551. The consumers were mostly collieries, but included towns such as Bethal, Bronkhorstspruit, Ermelo, Carolina and Breyten. Due to the increase in demand, new facilities (feeders, distribution systems, generators, dams and offices) had to be constructed. Power failures were also experienced during the winter of 1951.

It was also during this period that the most accidents occurred, although the Witbank plant, on the whole, had one of the best safety records in the Commission. In 1952 a 21kV circuit breaker was destroyed at Rand Carbide. The roof of the plant collapsed, but no serious power failure was experienced. At the Witbank municipal sub-central, a similar circuit breaker was destroyed in an explosion and the town of Witbank was without power for 8 hours.

The erection of conductors over 27,75 miles completed the 41,75-mile 88kV line on reinforced structures from Witbank via Middeldrift to Bethal. The line was energised at 21kV and supply, on this temporary basis, was given to Bethal in July. The work entailed the construction of 1,5 miles of 11kV lines in Bethal on behalf of the municipality, and the laying of about a mile of 11kV cable.

Capacity of ESCOM's power stations more than doubled: 1945 -1959

ESCOM estimated that, over the succeeding 10 years, capacity would have to be doubled again. This could only be achieved by building larger power stations. The erection of the smaller Wilge Power Station launched the large-scale exploitation of the rich Eastern Transvaal coalfields for power generation. ESCOM's biggest coal-fired power stations were to be erected in this area. Komati Power Station, with a capacity of 1 000MW was commissioned in 1962.

Eastern Transvaal Undertaking – Bulk Supplies

Bulk supplies were made available to the municipalities of Trichardt at the end of March 1959 and Groblersdal in April 1959. Reticulation systems were established in the villages of Marble Hall, where 71 consumers were connected, 53 in Morgenzon and 12 consumers in Eendrag. The extension of the Undertaking's distribution system eastwards by 132kV line from Komati Power Station to Witkloof and Machadodorp, and 21kV lines to Machadodorp/Belfast and Machadodorp/Waterval Boven was completed at the end of 1959.

WILGE POWER STATION
1954

Demand for power outweighed the demand for economy

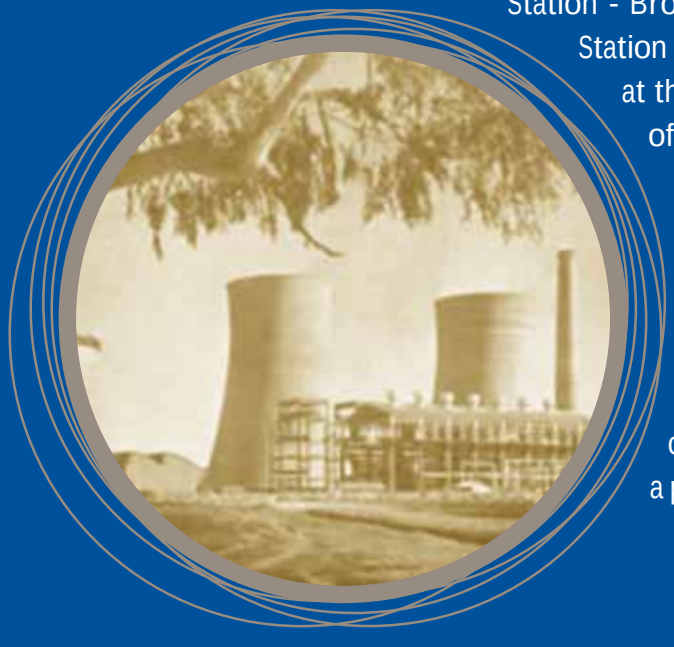
Wilge Power Station was situated near Ogies on the Witbank coalfields. This ensured a plentiful supply of coal; nevertheless, the size of the station had to be restricted to 240MW because of limitations on the water supply. At a time when designers of power stations were making every effort to save money, it could be asked how a station of this small size was justified. The simple answer is that the urgency of the demand for power outweighed the demand for economy.

In 1953 work began on the pipeline from Bronkhorstspruit dam, the construction of the make-up water pump house at the dam, the erection of steelwork for turbine house 1 and for boilers 1 to 4. The erection of workshops and construction of railway tracks from the Colliery siding began. The first unit was commissioned in 1954 and the last in 1958. The station was used for plant training from 1990 until 1994, after which it was demolished.

It was planned to have the station completed by the end of 1955 at an estimated cost of £10,327,000, which was revised to £10,800,000 even before construction started.

Transmission System from Wilge Power Station to Struben distribution station

A transmission system of 132kV, stretching over 41 circuit miles from Wilge Power Station to the Struben distribution station, was completed in 1955. Carrier equipment for control of the pump was installed on the Wilge Power Station - Bronkhorstspruit dam line. Two 21kV cables were laid from Wilge Power Station to complete the outgoing feeders. A special linking substation was provided at this point to enable supplies to be maintained in the event of failure of one of the cables.



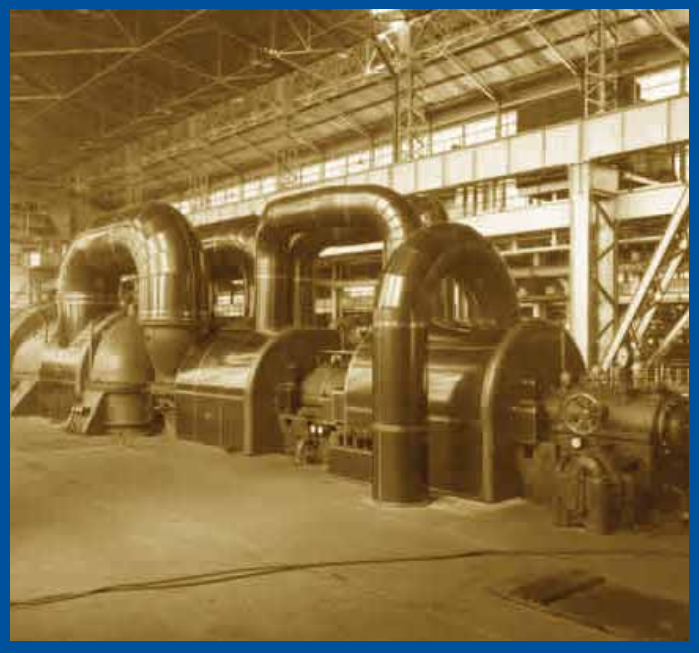
Wilge Power Station was completed in a record time, but not without compromising the performance and efficiency of the station. It was not uncommon for power stations to be built without a boiler house, but the extreme weather conditions on the Highveld made it necessary for the boilers to be protected. Because of the haste in which Wilge was completed, the first eight boilers initially had no boiler house. This created a potentially dangerous situation and a boiler house was added in later years.

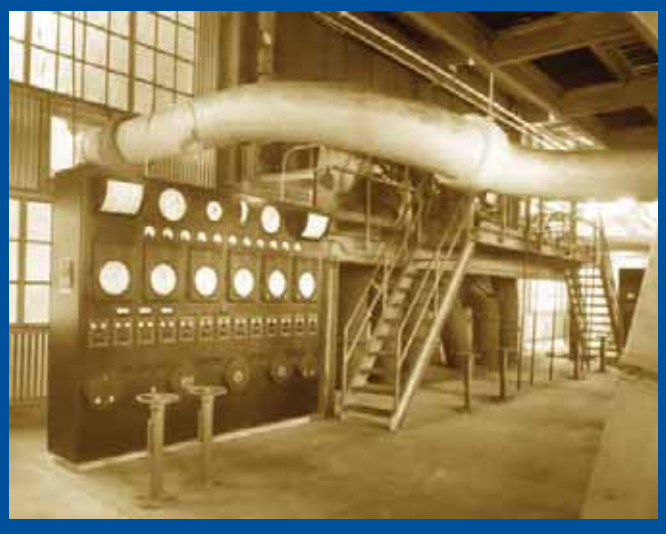
Eskom honours agreement - Decommissioning of Wilge Power Station

In 1993 Kendal Power Station, situated not far from Wilge Power Station, was completed. The closing of Wilge after completion of Kendal was part of the agreement with the air-pollution authorities.

In the early 1980s the growth rate for electricity consumption fell from 5.1% to 4% per annum.

In the first half of the 1990s there was hardly any growth in South Africa, and a negative growth rate was experienced in 1992. In 1994 all new power station construction activities, with the exception of Majuba Power Station, ceased. The older and less efficient power stations were mothballed or decommissioned.





New ESCOM logo was introduced in 1962

ANNOUNCEMENT OF MORE COAL-FIRED POWER STATIONS
1960 – 1969

The 1960s saw the announcement that more coal-fired power station giants were to be erected in the Eastern Transvaal. Camden (1530MW), Hendrina (1965MW), Arnot (2352MW), Kriel (3000MW) and Grootvlei (1150MW) were erected.

Grootvlei Power Station pioneered the use of a dry-cooling tower system. Some of these stations were only completed in the 1970s, increasing ESCOM's power generation capacity dramatically. ESCOM assisted South Africa's unparalleled economic growth by accommodating the country's electrical power needs.

ARNOT POWER STATION
1965

A step towards advanced technology

John Dean
Power Station Manager

In 1965/66 contractors started with roads, pipelines and ground work on the farm Rietkuil, which Eskom bought from seven owners. Sufficient water, and especially coal supply in the Rietkuil area ensured that the construction of Arnot Power Station commenced in 1968. Arnot was fully operational by June 1975. Three of its units were put into reserve storage (mothballed) in 1992, due to the surplus generating capacity Eskom had at the time. The units were recommissioned in 1996, 1997 and December 1998 respectively, returning the total capacity to 2100MW.

The vast flats surrounding the station are often graced with an abundance of cosmos flowers. Another former inhabitant of these flats was the white rhino, which was honoured as the central symbol of the stations' official logo. The majestic animal's reputed characteristic of "no retreat" is suitably matched by the determination and industry shown by Arnot's employees. These qualities have earned them outstanding acknowledgement for performance over the years.

Arnot currently boasts six units with increased installed capacity of up to 400MW per unit, and a total installed capacity of 2352MW. Arnot was also the first to be commissioned with a reheat system and electronic automatic controls.

KOMATI POWER STATION
1966

Powered by performance


Rudi van der Wal
Power Station Manager

The planning of Komati Power Station started during mid-1950 on the farm Koornfontein. The deed of transfer of the land was signed on 22 November 1957. Site levelling started in April 1958 and the first unit, Unit 5, was commissioned on 06 November 1961 and Unit 9, the last, in March 1966. Komati Power Station was one of the first pulverised fuel firing stations and designed to generate 1000MW, with five units rated at 100MW and four at 125MW.

During 1988 a decision was made to mothball three units. One was kept in reserve and the other five were only operating during peak hours.

It was also decided not to let the plant deteriorate, but to conserve it properly to return it at a later stage. The conservation process was called mothballing. The first plant to be mothballed was turbine 5 on 15 December 1987, followed by Boiler 3 on 26 March. The rest of the plant was mothballed at intervals thereafter and the last to be mothballed was Unit 4 on 6 December 1990. Different methods were used to prevent deterioration of the plant, such as painting, the use of vapour corrosion inhibitors (VCI) and the passing of dehumidified air through the boilers, turbine feed and steam circuits and the generators.

Komati Power Station reached a huge landmark on 9 February 2012, with 6 units on load for the first time since 5 October 1989. This means having 6 units available after 22 years, 3 months and 4 days. In the early 2000s a decision was taken to return Komati Power Station to service to meet the growing demand for electricity. The User Requirement Specification was compiled and approved on 14 August 2006.

The units were returned to service, starting with Unit 9; this unit was declared fit for commercial operation on 4 January 2009. Unit 8 followed on 31 March 2009. Thereafter, on 12 July 2010, Unit 7 was declared fit for commercial operation. Unit 4 followed on 29 December 2011 and Unit 5 on 3 February 2012. Unit 6 then followed on 5 March 2012. By mid-2013, with the last unit due to be declared commercial (Unit 3), Komati will have 9 units running, with a total installed generation capacity of 1000MW.

With a goal of being the “Best return-to-service power station by far” and a motto of “We are Powered by Performance”, Komati won most of the winter-challenge awards in Operating Unit Coal 3 (a group of power stations) and in 2010 Komati’s plant performance was exceptional. It set a new goal in 2010 to “Be the Best-of-the-Best in Generation” and at the Chairman’s Awards function in 2012, Komati was awarded the coveted Jan H Smith award for the best all-round performance for a Generating Power Station in the Eskom fleet for the 2012 financial year.

CAMDEN POWER STATION
1966

Starting point of a national power grid


Anthony Kuzelj
Power Station Manager

The station was originally designed for a service life of 40 years and was commissioned during 1966 – 1969. Due to surplus capacity and the lower than expected growth in the demand for electricity, the plant was shut down and preserved from 1988 – 2005. Camden was then returned to service due to the sharp increase in the demand for electricity. The first unit, Unit 6, was returned to service on 31 March 2005, with the balance of the units being returned over the period 2005 – 2009 at intervals of six months apart, with a total installed capacity of 1520MW.

The construction of a power station in this area had no negative effect on the surrounding community, because it was a hollow area and uncultivated ground, but it did, however, create a lot of job opportunities.

The tender for coal was awarded to the Trans-Natal Coal Mining Company, which had a coalfield capable of supplying a station of the size envisaged for a period of 30 years. It was situated near Camden railway station some ten miles (16 km) from Ermelo in the Eastern Transvaal (Mpumalanga). The proximity to the railway station gave the power station its name.

In locating power stations in the Eastern Transvaal (Mpumalanga), where abundant coal reserves were present and where the Department of Water Affairs made adequate supplies of water available, Eskom was able to continue with its policy of erecting pithead power stations where power can be generated cheaply.
Work began on the site in November/December 1962 and the first turbo-generator was commissioned in April 1967. The last of the eight units was commissioned in 1969.

Camden became the starting point of the national power grid, consisting of a series of 400kV lines which today interconnect the entire country. Power flowed from Camden over a high-voltage system, which was amongst the most extensive in the world. With the low cost of generation in the pithead power stations in the Transvaal

(Mpumalanga), it was more economical to supply those distant consumers in this manner than to build more coal-fired power stations in the Western Cape.

When Camden was completed it had cost R126m and stood as another symbol of the economic strength of South Africa. Like all Eskom stations, Camden stood as a monument to the founders of the South African power supply industry, who created an enterprise in which the people of the country are the shareholders and receive dividends in the form of the benefits they derive from the use of electricity.

Over the years Camden Power Station saw many historical events in its generating life. The station won the National Fire and Rescue competition three times, as well as a NOSA 5-star grading in 1996. Camden also won the Best Unit Emissions Performance in 2011/2012 and days without a lost-time injury 2011/12. Camden finished the financial year in 2011/2012 with a 100% HRSI.

Many employees who started their careers at Camden rose through the ranks and ended up as executive directors and power station managers. Jac Messerschmidt began as an apprentice technician and rose to be an Executive Director of Eskom.

EXPANSION OF THE EASTERN TRANSVAAL UNDERTAKING
1965

The expansion of the Eastern Transvaal Undertaking continued at a phenomenal rate. Total sales of electricity increased from 506 million units in 1956 to 1,937 million units in 1965, an increase of nearly four-fold in only 9 years.

The large increase in traction supplies was due to the commissioning of the new traction substation at Brakfontein, and the first sections of the Witbank/Komatipoort electrification. At the end of 1965 seven of the sixteen substations were completed and energised.

In the industrial category, the supply taken by RMB Alloys Limited at Middelburg increased from 98 million units in 1964 to 220 million units in 1965.

One of the highlights during 1965 was when approximately 34 miles of 88kV line to supply the two traction substations at Middelburg and Olifants River were completed; 115 miles of 132kV line between Rockdale and Marathon distribution stations were also completed.

In the Lowveld area, Nelspruit Municipality accepted the terms offered by ESCOM for a partial supply and preliminary work for the supply over 9 miles of 66kV line to be built from Marathon to Nelspruit. The supply to White River Municipality, which was previously furnished by Nelspruit, was taken over by ESCOM in July 1965.

During 1971, the first 400kV transmission line between Hendrina Power Station and Vulcan distribution station near Witbank was completed.

During 1972 the 5 235 million units sold represented an increase of 14.76 per cent over the figure for 1971. The chief contributors to the increase in units sold were industrial consumers, in particular Rand Carbide and Ferrometals in the Witbank area.

During 1972 a 275kV supply was made available to Lorenzo Marques. A small supply was previously taken at Ressano Garcia.

A total of 470 new farm supply points were connected during 1972, bringing the total of such supplies to 3187. Most of the new connections were made from extensions to existing schemes, and approximately 600km of circuit extensions were erected during the year to provide the new supplies. These were in the Arnot, Burgersfort, Middelburg and Blyde River areas.

HENDRINA POWER STATION
1976

From the 70s to new advanced technology

Julian Nair
Power Station Manager

Hendrina Power Station came into operation between June 1970 and December 1976. When it was built, it had the longest turbine hall of any Eskom power station. The last unit was commissioned in December 1976. Between 1995 and 1997, half of Hendrina's 10 units were refurbished and then boasted some of the most advanced system control technology in the world. The station's 5-in-1 control room was the first in the southern hemisphere. The second half of the units was refurbished between 2000 and 2003. Hendrina Power Station is one of Eskom's oldest continuously running power stations. The power station is situated about 40 kilometres from Middelburg, Mpumalanga. It has approximately 1000 employees.

Hendrina has had many notable achievements since its inception. In 1999, it received a Gold Award from the National Productivity Institute. The station furthermore received an award in the form of a special mention during the International DuPont Annual Safety Awards ceremony held in Düsseldorf, Germany on 4 November 2009.

DuPont Sustainable Solutions made the following comment regarding Hendrina's achievement: "The overall quality of the projects that were sent in to apply for a total of 29 projects in 70 category entities was outstanding, which makes your achievement particularly significant." The submission centred around the safety performance improvement at Hendrina over a three-year period, which was a five-fold improvement, decreasing from a lost-time injury rate (LTIR) of 0,51 (equates to five LTIs) in 2006/7, to an all-time low of 0,10 (equates to one LTI) in 2008/9. Hendrina's total recordable injury rate (TRIR) also decreased from 2, 94 to 1, 64 over the same period.

Further milestones at Hendrina Power Station

- Hendrina was the first Eskom coal-fired power station to receive certification on all three of the following standards: ISO9001, ISO14001, and OHSAS 18001.
- The station's 5-in-1 control room for units 6-10 was the first of its kind in the Southern Hemisphere.
- In 2010, the power station received a NOSA Safety System 5-star grading.

- In 2011 the Power Station Manager of Hendrina, Julian Nair was awarded the International NOSA Executive of the Year award.
- In 2012, a Guardian from Hendrina, Solly Ntuli, emerged victorious in the Light Delivery Vehicle (LDV) category in the World Professional Drivers' Championships.

The Station was also awarded with a "Blue Drop" Gold award by the Ministry of Water Affairs and Forestry in 2012, for continuous excellence in the production of potable water. The power station supplies water of excellent quality to the Pullenshope residential area and Optimum coal mine.

GROOTVLEI POWER STATION
1977

The 1960s demand for an increase in electricity

Gersh Bonga
Power Station Manager

Grootvlei Power Station was built in the late 1960s. Situated near Balfour in the Mpumalanga Province, the power station, consisting of six coal-fired units, has an installed capacity of 1200MW. The first set (Unit 3) was commissioned in 1969 and the last of the six units (Unit 6) was commissioned in 1977. This was the first station of this size to have dry cooling and both direct (Unit 5) and indirect cooling (Unit 6).

In 1990 the decision was taken to mothball the station and on its return to service, the intention was to refurbish Grootvlei to a condition which allowed the plant to supply reliable peaking power, but the station subsequently has been used as a base-load station due to capacity constraints. The station has undergone a R7,2 billion upgrading programme with all six units now in commercial operation. Grootvlei was part of Eskom's return-to-service project, which included Camden and Komati Power Stations.

Although the station is old, it has been upgraded and brought in line with modern power stations, incorporating the latest cost-effective technology. The station has a newly-designed 8-in-1 control room for six units. The station has also been fitted with new design static excitation systems, with other areas having been refurbished with minor enhancements.

After 7 612 days of being mothballed and 12 851 days after first being commissioned, the Grootvlei return-to-service project handed Unit 1 over to Generation for commercial operation on 1 April 2008. The following are amongst a number of firsts for Grootvlei Power Station and the Grootvlei return-to-service project:
To mention a few:

- New and current large Eskom projects to achieve two million man-hours without a lost-time injury.
- First power station to manage/run its own raw water supply (intake at the Vaal Dam).
- First Eskom power station to use heavy fuel oil.
- First Eskom power station to install low NOx burners.
- First Eskom power station to utilise replica evaluations to assess condition of main steam pipework material.

- First Eskom power station to be refurbished with “internal arc proof” MV switchgear.
- First Eskom power station to install a full Honeywell control system on the units and common plant.
- First Eskom power station to be refurbished with full static excitation systems on the generators.

Grootvlei showed commitment to the local community

The return to service of Grootvlei Power Station began in 2004. From inception to return to service, the project team was mindful of its responsibilities towards the local community. As a first step, the project manager contacted the mayor of Dipaleseng Municipality and the Department of Labour to set up a system to ensure local people benefited from job opportunities. A team of 15 locals was employed to assemble splash grid supports on site, rather than have these items assembled in Gauteng.

In addition to supporting the local economy through wages paid to local people, Eskom sourced services and goods with an estimated value of R62 million from companies within the Dipaleseng Municipality. Some members of the project team are tutoring at local schools and organise clothing and food for the children through personal donations.

KRIEL POWER STATION
1979

Amongst the first of the electricity giants

Thomas Conradie
Power Station Manager

Kriel Power Station was the forerunner of the new generation of giant coal-fired power stations developed to generate the increasing supply of electricity demanded by South Africa's constant growth.

The planning, design and construction of Kriel Power Station began in the early seventies, and the station began operating at full capacity early in 1979.

When Kriel was completed it was at the time the largest coal-fired power station in the Southern hemisphere generating 3000MW of power. As the first of the new generation of giant coal-fired power plants, Kriel lead the way for Eskom's technical, operational and structural advancements, and the subsequent stations now produce 3600MW power.

Located in the middle of a rich coal-mining area, Kriel is supplied by Anglo American Inyosi Coal from Kriel Colliery – the coal comes from both conventional underground mining and open-cast mining. This coal is fed directly to the power station's coal staithes, or interim coal storage units, at rates of up to 1600 tons per hour. The storage capacity of the emergency stockpile is 1 700 000 tons. All 6 units run full-time, unless a unit is shut down for maintenance.

Kriel is unique in that each turbine generator set is located separately in its own turbine hall, whereas in Eskom's other stations, all the turbines are housed in a single turbine hall, all placed along the same axis.

Kriel Power Station has reached its mid-life and through extensive refurbishment, the operating life will be extended to 60 years. The upgrade includes the replacement of the old control system with a new state of the art digital control system. Electrical switchgear has also been replaced and extensive mechanical upgrade is ongoing. Upgrades on units 1, 2, 4, 5 and 6 have been completed. Unit 3 is scheduled to be refurbished in 2013.

Kriel Power Station

EASTERN TRANSVAAL UNDERTAKING (ETU)
1973

First live-line team established

A total of 6 098 million units of electricity were sold during 1973.

Swaziland became the Undertaking's second foreign consumer as a result of the successful completion of the 132kV line from Witkloof distribution station near Carolina to Oshoek on the Swaziland border. A 132kV line was completed from Marathon distribution station near Nelspruit during the year to a new chemical plant, Delta Manganese, in the Nelspruit district.

Eskom Park

On the Highveld, further progress was made with the 132kV supply to Kriel Power Station, its coal mine and Kriel township.

During 1974 work commenced on Eskom Park, the Undertaking's headquarters in Witbank. The building was completed in 1975.

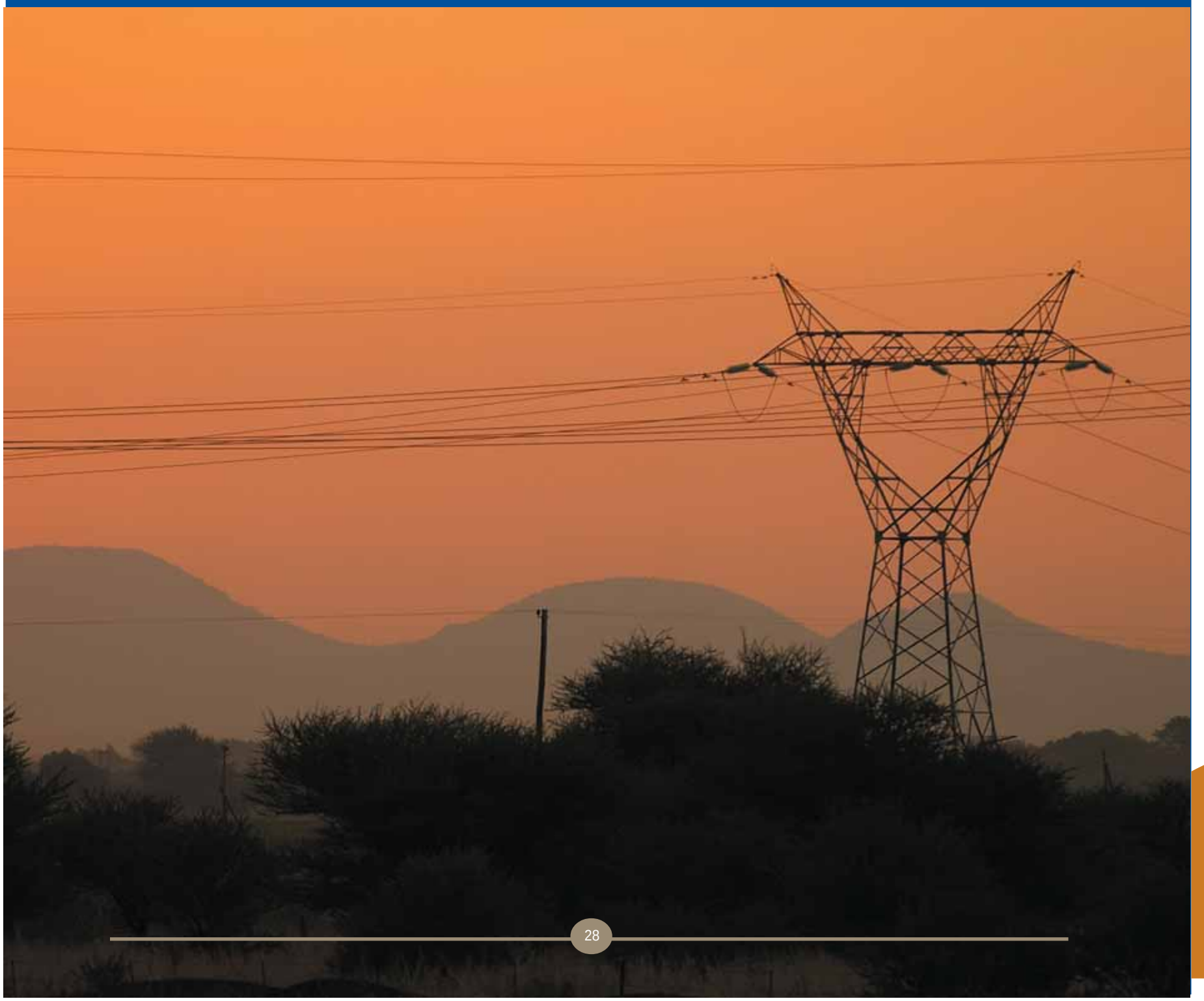
The 440kV Vulcan distribution station near Witbank represents the input point of three of ESCOM'S largest power stations. It was planned to be ultimately connected with Arnot, Hendrina and Kriel Power Stations by two, and one 400kV lines respectively. The first 400kV line from Arnot Power Station was completed during 1974 and the second during 1975.

On Friday, 14 March 1975, ETU notched up a first in ESCOM and in South Africa: The first fully- qualified live-line team went into action. At the "passing-out parade," the team very effectively demonstrated the practice of working fully-energised and operational high-voltage overhead power circuits. The team used a 132kV line near Witbank and within 75 minutes replaced a broken insulator on an angle strain tower. According to the experts, the time taken for this operation would have been more under normal maintenance conditions. The team then went on to replace a complete suspension string of insulators on the next tower. This work took less than an hour to complete.

Live Line Team

In 1976 two additional 45MVA 132/33kV transformers were installed at Churchill substation near Witbank to accommodate the increased demand from Ferrometals. To provide Matla Power Station and colliery with 21kV construction supplies, a temporary 132/22 kV substation was commissioned. In 1976 construction commenced on the 132kV lines intended to connect Matla and Duvha Power Stations and the then future Sasol 11 complex to the national transmission system.

During the same year, 390 new farm supply points were provided, requiring the erection of 428km of new transmission lines. Construction was also in progress on new schemes in the Witbank, Morgenzon and Piet Retief districts.



TRANSMISSION

A National Grid (extracted from 'A Symphony of Power')

Bheki Ntshangase
North East Grid Manager
Transmission

The old dream of a nation-wide, interconnected network – the ultimate pool - was becoming possible in the late 1960's. Transmission technology had advanced to the point where long lines with voltages of 275kV and 440kV were feasible, if not commonplace. Escom engineers and planners undertook intensive studies to determine the optimum configuration of a national integrated system. Building power stations was more expensive than building transmission line, but considerations, such as line losses, system stability and the difference in generating costs still prevented the introduction of long transmission lines between the Cape and the Transvaal until the late 1960's. However, the huge difference in coal costs between the Cape and the Transvaal eventually tipped the scales in favour of transmission. Anticipating a steady growth in the demand in the Western Cape, Escom embarked on the phased construction of a countrywide, high-voltage network in stages of about 300km each from 1969 onwards.

The first phase consisted of a 400kV transmission line linking Camden Power Station near Ermelo with the Atlas Substation near Vereeniging, a distance of about 200km. The line was next extended to Perseus Substation near Dealsville in the Free State some 300km to the south, from where two 275kV lines were built to the Cape Northern Undertaking and the city of Bloemfontein. From Perseus the next 300km leg extended the 400kV line to Hydra Substation near De Aar, where it would link up with the hydro power stations on the Orange River, which were just then being built.

In 1969, the 400kV line was strung across some 250km of the barren wastes of the Karoo to Droërivier Substation near the town of Beaufort West, where a lower 132kV connection was made for railway electrification and a supply to the south-western districts of the Cape – Oudtshoorn, George, Knysna, Mossel Bay and Plettenberg Bay.

From Beaufort West, the 400kV transmission line was extended the last 450km all the way to Muldersvlei Substation near Cape Town. By August 1970, a total route length of some 1500km had been covered from Camden.

The network was completed in record time despite the fact that during 1970 and the early months of 1971, construction of transmission lines

was seriously delayed owing to a shortage of steel and cement. The delay in the erection of the major 400kV line between Natal and the Transvaal system caused considerable disruption of important industrial developments in Natal. As an interim measure, engineers first connected the Natal system to the Rand system early in 1971, via a 132kV line built for railway traction between Kroonstad and Bethlehem in the Free State. Two Taaibos generators were decoupled from the Rand systems and tied to this extension of the Natal system. This arrangement – used for system stability reasons – worked satisfactorily until the first 400kV line between Camden and Ingagane was completed in October 1971 .

In 1973, in Escom's fiftieth year of existence, it commissioned the last main portion of the national grid between Hydra and Poseidon substations near Cookhouse, securing supplies to the Eastern Cape and Border undertakings (Port Elizabeth and East London).

When this major network was completed, the expensive coastal stations ran only during peak-load periods and emergencies, and the bulk of the electricity came from the lower-costs coal-fired stations on the Highveld. The exception later was Koeberg Nuclear Power Station, which supplied a stabilising base load at the Cape end of the system.

The economical size of power stations and their turbo-generators grew ever larger because of the pooling of all power and demand sources. This resulted in better economies of scale, and helped to drive down the unit cost of electricity throughout the country.

During 1982, Transmission completed the extension to Sol substation and the associated 400kV and 132kV transmission lines to establish the major 132kV supply to Sasol 3. The project was completed ahead of schedule to meet Sasol's critical programme.

Hendrina Kriel Tower 43

MATLA POWER STATION
1983

A strength to reckon with

Bruce Moyo
Power Station Manager

Matla, which means strength or power in SeSotho, is a coal-fired power station, situated near Kriel on the Mpumalanga Highveld. It is a base-load plant, which means it operates continuously, except for regular scheduled stoppages for inspection and maintenance on the individual units.

Matla consists of six 600MW units at an installed capacity of 3600MW, the first of the giant 3600MW coal-fired power stations to be commissioned in the 1980s. Average availability over the last 3 years is at 93.84%. Matla is one of a few power stations in the world with a concrete boiler house superstructure, giving it an outward appearance very different from other power stations in South Africa. The use of concrete reduced the construction lead time and capital costs at a time when there was a worldwide shortage of steel. The planning and design of Matla Power Station commenced in the early 1970s. It was designed for an operating life of 30 years, but its life span has since been extended to 60 years. Construction started late 1974, and the first of the 600MW sets started feeding power into the national grid towards the end of 1979. Matla reached full operational capacity in early July, 1983.

DUVHA POWER STATION
1984

A giant of excellence

Shamiel Jappie
Power Station Manager

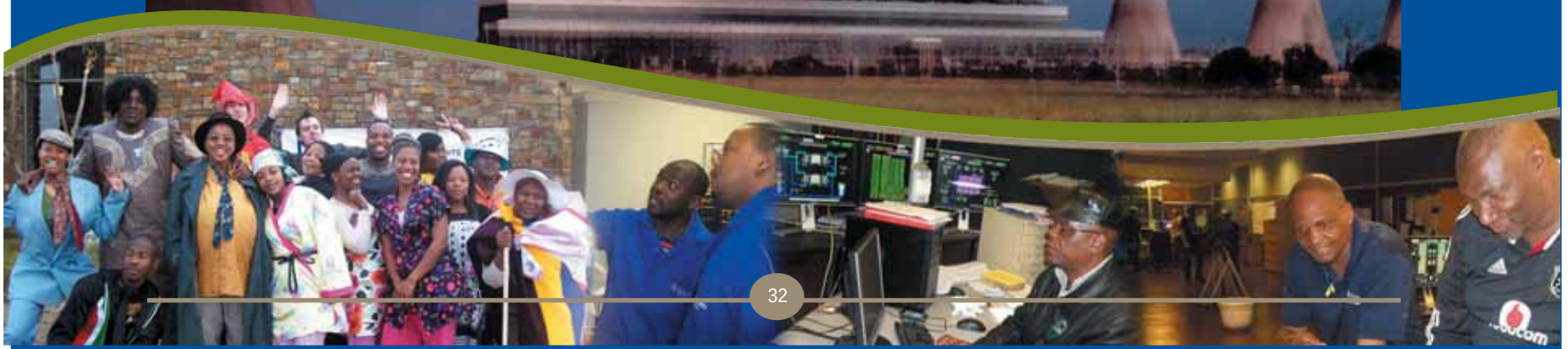
Coinciding with the construction of Matla, a new power station rose just outside the town of Witbank, adjacent to a new dam that had been constructed to augment the original Doornpoort dam, which ESCOM had built for the Witbank Power Station in the 1920s.

Construction started in November 1975 and the last unit came into operation in 1984. At the time of its construction, Duvha was a giant of excellence: it cost a staggering R1.6 billion to build; its chimneys were the largest freestanding concrete structures and its mine the largest open-cast colliery in the Southern Hemisphere.

In 1993 Duvha became the first power station in the world to be retrofitted with pulse jet fabric filter plants on three of its six units. These plants contribute largely to the reduction of air pollution by removing 99.99% of the fly ash which otherwise would be released into the air through the station's chimneys. On 5 August 1996, Duvha achieved a world record by running six units on load for 72 days, 17 hours and 13 minutes.

Duvha's excellent safety record is proven by the fact that it has been awarded NOSCAR status ten times already by the National Occupational Safety Association (NOSA).

Duvha prides itself for producing top leadership in Eskom. Two of its former power station managers eventually held top positions in Eskom, namely Ehud Matya and Brian Dames.



TUTUKA POWER STATION
1985

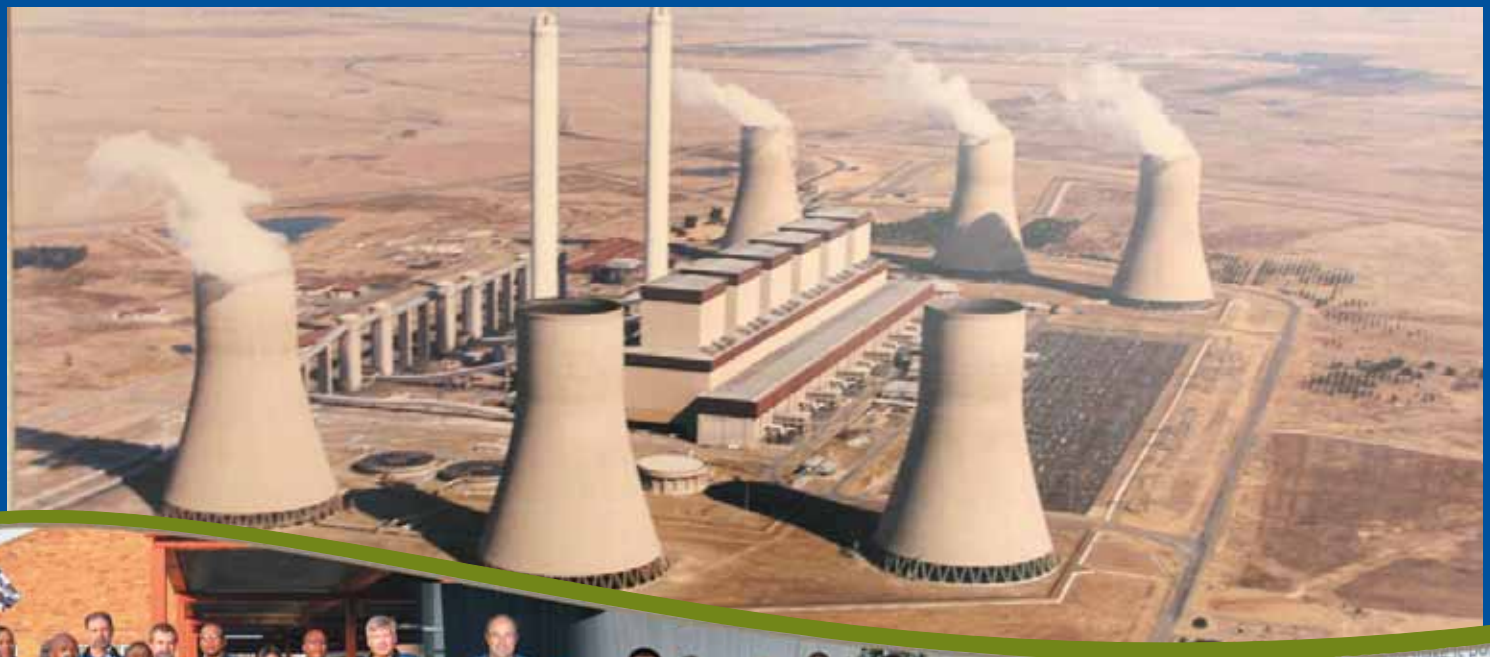
An important link in the 765kV extra-high-voltage system

Ryno Lacock
Power Station Manager

Tutuka means “progress” in Zulu. The power station is located about 25km from Standerton in Mpumalanga, adjacent to the New Denmark colliery. Tutuka is a coal-fired power station and has an an installed capacity of 3654MW, consisting of six 609MW units. The first unit was put in commercial operation on 1 June 1985 and the last unit on 4 June 1990. After 25 years of operation, the power station is in the process of refurbishing and replacing a number of major components that are reaching the end of their design life. To reduce its environmental impact, Tutuka is embarking on a large project to replace its electrostatic precipitator dust filters with fabric filter plants. These will reduce particulate emissions to less than 50mg/Sm^3.

On the national electricity grid, Tutuka is the nearest power station to the important Alpha substation in the 765kV extra-high-voltage transmission system, that links Mpumalanga with the Western Cape and KwaZulu-Natal. Tutuka is linked to Alpha substation with a short 400kV transmission line. The giant 400/765kV transformers at Alpha are rated at 2000MVA and the 765kV reactors at 400MVA each.

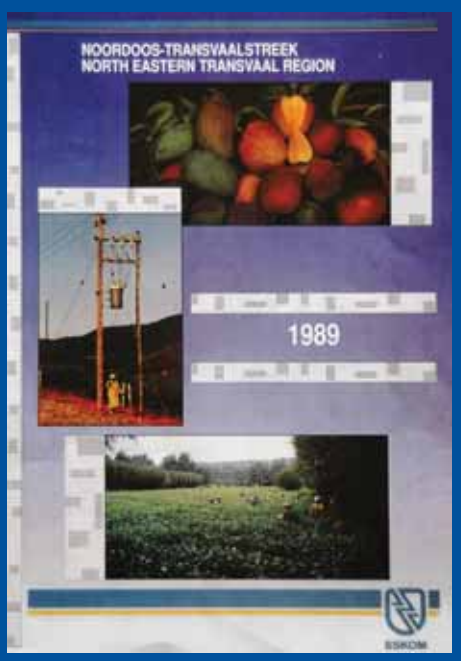
The employees of Tutuka are proud to have been awarded a NOSCAR safety award in September 2012, as well as receiving ISO14001 certification in 2012.



In 1987 ESCOM was renamed Eskom and a new logo was introduced.

Des Govender
General Manager Mpumalanga
Operating Unit

DISTRIBUTION
Eastern Transvaal and North-Eastern Transvaal Region



About 1 100 new farm supply points were connected in the region in 1982, of which 133 were within the five rural schemes completed during the year. Five schemes were under construction, involving 330 points of supply, of which 160 had been made available. A further five schemes were approved and 1500 supply points had to be connected.

In 1986, Eskom was restructured into Generation, Transmission and Distribution. Distribution was divided into twelve regions, grouped into two distribution divisions – Natal and Cape; Transvaal and Orange Free State. The 12 regions were classified as business units. The Mpumalanga Province was at the time divided into two regions, Eastern Transvaal (Witbank) and North-Eastern Transvaal (Nelspruit).

In 1991, the Distribution business restructured from 12 regions to 5 Distributors. The former Eastern Transvaal (Witbank) and North Eastern Transvaal Regions (Nelspruit) were now known as the Pretoria Distributor.

Anton Kotze
Senior Manager Asset Creation
Mpumalanga

Musa Mabila
Senior Manager Operations and Maintenance
Mpumalanga

Thandazile Mazibuko
Senior Manager Customer Services Operations
Mpumalanga

DISTRIBUTION

With the formation of the new regions, the goal of the then North Eastern- and Eastern Transvaal Regions was to supply electricity to each household, business and industry that could afford it, in the shortest possible time, in the most effective way, without neglecting existing customers.

The regions were established to bring Eskom closer to its customers and were part of the Marketing and Distribution group of Eskom.

A new market emerges

Over the next few years, discussions led to the establishment of a number of other joint ventures with some of the so-called self-governing territories. In KaNgwane (in the Eastern Transvaal Lowveld) a joint venture called Kescor was created. By 1993, Eskom had also taken over some direct supplies in Lebowa and KwaNdebele. Amongst the early rural electrification projects undertaken by Eskom in the former North Eastern Region was one in the township of Elandskraal, north-east of Marble Hall in the homeland of Lebowa. It was located 27km from the nearest existing network that served local farmers. The project was approved in October 1990 and the first customer was already connected in December. The final cost for the project was R750 000.

There were remarkable success stories of small enterprises emerging in Elandskraal as a result of the electrification project. Elandskraal became a prime example of what electrification was meant to achieve. Different businesses opened up: a dressmaker, a baker, a welding shop and several more. Within a short time, many residential customers were also connected to the network and the town was able to boast its first street lights.

The average cost per connection in 1993 was R2 689.

In 1991 North-Eastern Transvaal Region (NETR) entered a new era by competing on the “free market” when the NETR gained five of the sixteen contracts of Kescor. The electrification of KaNgwane gained momentum with the granting of a loan to Kescor by the Development Bank of South Africa. The main objective of Kescor was the development of the domestic market sector, backed up by a reliable technical and customer focussed service.

By gaining five of the sixteen contracts, NETR proved its business attitude and by utilising its well-established infrastructure, competent people and its commitment to speed up the electrification of developing areas, Eskom was seen as a major business fraternity in the Lowveld.

The region also supplied power across the RSA borders to Mozambique and Zimbabwe and contributed to Eskom’s vision of a power network for Africa.

REMEMBER YOUR POWER 49

Eskom and Mozambique built good relations

On 11 October 1989, three towers of the 275kV-line between Komatipoort and Infulene on Mozambique's side were sabotaged. The main supply to Maputo was affected. On 12 October 1989, the Mozambique government and Electrique de Mozambique (EDM) approached Eskom to assist with the repair of the line. Eskom Engineering took responsibility and appointed Power Lines as contractor. NETR was responsible for co-ordinating the project.

The project started on 17 October 1989 and in spite of heavy rains was completed on 26 October 1989. In June 1994, Eastern Transvaal Region completed the R15.8 million Columbus- substation at the Columbus Stainless Steel plant in Middelburg.

Regional Electricity Distributors (REDs) - 2005

The Distribution Division in Eskom has embarked upon a strategic initiative to reduce its seven regions to six in order to align our business with the intended Regional Electricity Distributors (REDs). Since 2005, Northern Region and North Eastern Region functioned as the Northern Region.

Distribution

The Northern Region, of which the Mpumalanga Province was part of, was awarded "Region of the Year" at the 2011 Chairman's Awards. Mr Louis Maleka, General Manager, received the "Executive of the Year" award.

Louis Maleka
General Manager

Top safety performance of units in Distribution - 2012:

- Electricity Delivery Network Management - 36 years without a lost-time injury (LTI).
- Specialised Power Plant Mechanical - 31 years without an LTI.
- Secunda Zone Management office - 29 years without an LTI.
- Financial Services - 20 years without an LTI.
- Machadodorp Customer Network Centre - 19 years without an LTI.
- Middelburg Customer Network Centre - 19 years without an LTI.
- The Mpumalanga Operating Unit has also achieved 2 million man-hours without a lost-time injury in November 2012.

2012 - The year of transformation

Eskom implemented transformation in the Distribution Division, from the previous 6 regions to 9 provincially-aligned Operating Units (OUs). The Northern Region Wires business divided into two operating units, namely the Mpumalanga and Limpopo Operating Units. Customer Services became an entity on its own, running parallel with the Wires business.

The Mpumalanga Operating Unit is divided into three Zones:

- **eMalahleni**
  ~ The centre of the coal-mining industry
- **Mbombela**
  ~ The capital, administrative and business hub of the Lowveld
- **Ermelo**
  ~ An area known for mixed farming and mining activities; and

- **48 Customer Network Centres** (CNCs) were established to improve customer service and keep the lights burning

- **Group Customer Services** (GCS) established 10 Customer Services (CS) hubs in the province to support GCS's vision of creating a world-class customer service organisation, with a mandate of putting the customer at the centre of our business.

On 1 March 2013, Eskom celebrated 90 years of powering South Africa! Indeed a milestone and an important occasion in the history of the organisation.

Eskom sold its first electricity in South Africa in the Eastern Transvaal, known today as the Mpumalanga Province. It all started here, in the beautiful province of Mpumalanga, in 1923 and spread throughout the country. The history is so rich and colourful, it is overwhelming. The Sabie Undertaking was the source of the flow of ESCOM electricity in the province.

Today, the Mpumalanga Province is the heartbeat of the electricity industry in South Africa. Not only has this organisation made life for many South Africans easier by keeping the lights on, but thousands of people have jobs to wake up to, meaning that many families are directly touched by this organisation.

What a journey Eskom has had; 90 adventurous years of customer service and job creation. It would be a lie if we said these 90 years were smooth sailing. There were tests and trials along the way, with load shedding in 2008 and the MYPD3 hearings this year, to mention but a few, but it was all worth it. We all have just one goal in mind: to keep the lights burning.

KENDAL POWER STATION
1993

The world's largest dry-cooled power station

Christopher Nani
Power Station Manager

Construction started on Kendal Power Station in July 1982. The last of its six units was commissioned in 1993. It took 11 years to complete and it is currently the largest indirect dry-cooled coal-fired power station in the world. This means that it uses significantly less water in its cooling processes than the conventional wet-cooled power stations. Kendal is designed to generate a total of 4116MW, which makes it the biggest by capacity in the Eskom Generation fleet.

The station's cooling towers are the largest structures of their kind in the world, with a height and base diameter of 165m each.

The largest generator transformer ever manufactured for the South African market was delivered to Kendal Power Station on 18 May 2008, almost two-and-a-half years after placing the order. It is the first of 4 transformers that would, over the next couple of years, replace some of the original transformers that are nearing the end of their production life.

Kendal was the first power station in the five-star history of Eskom to obtain a NOSA 5-star safety grading while still under construction. The station received three million man-hours without a disabling injury on 8 February 1994 and again on 10 December 1997. Kendal power station also obtained the award for the best power station in Eskom in 1993 and 1994.

Black-start facility

Kendal has two diesel-fuelled gas turbines called the black-start facility. This facility is on stand-by to restart the national grid in case of a country-wide black-out. These gas turbines have a combined output of 36MW at 25ºC and they have the capacity to enable Kendal Power Station to start up one unit, from where the other units and power stations can be started up within a short period after a total black-out, thus resuscitating the national grid of South Africa.

MAJUBA POWER STATION
2001

Amongst the “6-pack” giants

Gladman Mkwai
Power Station Manager

This 4 110MW station, Eskom’s second-largest power plant, constructed at a cost of R11.9 billion, is one of the five biggest power stations in the world and the first to have been officially opened in South Africa after 1994. Construction started in 1983 and the first of its six units was placed in commercial operation in April 1996. The remaining five units were added at a rate of one unit per year, with the final unit coming into operation in April 2001.

Majuba Power Station has always generated a great deal of interest and speculation. The original planning proposal for Majuba, as contained in the Planning Proposal for Expansion Schemes, dated January 1982, allowed for Unit 1 to start production in September 1988, with subsequent units at one-year intervals (Unit 6 in September 1993).

Majuba has no dedicated mine and currently purchases coal through short/medium term supply contracts (15 suppliers). It is the only coal-fired power station in the country that has predominantly 2-shifted capabilities.

As soon as the site for Majuba Power Station near Volksrust had been chosen, Eskom and the Chief Directorate of Nature and Environmental Conservation embarked upon a relocation programme to save the sungazer lizards, which would be affected by the building of the power station. More than 3 000 lizards were moved to suitable areas on surrounding farms and in the Majuba Nature Reserve, a 271ha reserve proclaimed for the conservation of this species of lizard. Eskom has successfully commissioned an underground coal gasification pilot plant next to Majuba power station, following extensive studies and test work that started in 2001. The underground coal gasification process uses a matrix of wells drilled into the coal bed. Air is injected and the coal is ignited underground, producing a synthetic gas, which is harvested and then used as a fuel for either boilers or turbines. Gas from the pilot plant was successfully flared in January 2007, demonstrating that the process works.

The technology promises a commercially-competitive combustible gas, and has synergies with conventional mining, enabling mines to exploit coal reserves that could not normally be mined. This application is a first for Africa and the front-runner in terms of Eskom’s research into clean coal technologies.

What makes Majuba Power Station unique

- Different sources of coal.
- Only Eskom plant operating a train-tippler plant.
- Coal delivered per month by rail 0.42 million tons, by road 0.74 million tons, approximately 700 trucks per day.
- Majuba utilises two different cooling technologies: indirect dry-cooling and wet-cooling technology.

REHABILITATION AND MAINTENANCE ROAD PROGRAMME

Eskom takes a zero tolerance approach to safety; hence it is going the extra mile by committing resources and funding through the roads rehabilitation and maintenance programme. This programme focuses on the dilapidated roads on the routes used to transport coal to Eskom's power stations in the affected areas of Mpumalanga. The rehabilitation and maintenance program started in 2005 and the following roads received attention:

D2274 (Pullenshope), North Shaft road (Tutuka), Mafube road (Hendrina) and maintenance of other gravel roads.

Eskom commenced with phase 1 of extensive road rehabilitation and maintenance in October 2007, due to:

- Extensive road failure on coal transportation routes.
- Alternate routes suffering similar degradation as preferred routes, all roads now impacted.
- Limited implementation of local road refurbishment projects.
- Provincial roads re-allocated to South African National Roads Agency Limited (SANRAL).
- Associated risks, including the impact on coal supply and safety.

Eskom recognised the direct relationship between consistent and reliable methods of coal transportation to the security of supply of electricity to the country at large.

Eskom spends in excess of R700 million on road repairs.

A business case was presented to Eskom Board of Directors in March 2007 and an initial sum of R548 million was approved for dealing with the most critical routes identified through on-going liaison with authorities, industry and community representatives. In order to complete the rehabilitation and maintain the identified roads, the project was divided into phases and the amount mentioned above was for the first phase.

Eskom became involved with repairs on certain national, provincial and private roads and as a result roads received attention. To mention a few:

- National
- N2 Ermelo - Camden
- Provincial
- Private
- Tutuka southern bypass
- Camden stockyard
- Hendrina stockyard
- Municipal roads in the towns of Bethal, Ermelo, Amersfoort and Morgenzon
- Filling of potholes and dust suppression

MAJUBA RAIL-SIDING PROJECT

The Majuba Rail-Siding Project was initiated in 2004, with the aim of establishing a private railway line that will be used to transport coal from the existing Transnet Coal Export railway line to Majuba Power Station's coal stockyard. The project entails the construction of a 68km single heavy-haul track departing from a junction located 8km west of Ermelo to Majuba Power Station. The track is electrified by 25kV AC network, consisting of 4 substations and 4 relay rooms for signalling. The completion of the project will result in a significant reduction in the number of trucks on the roads that are currently used to transport coal to the power station.

Site establishment by the main civil contractor is planned to start in October 2012 and construction is planned to commence early in December 2012. The anticipated completion date is December 2015, and the project is estimated at a cost of R5,2 billion. The coal will be sourced from various mines in Mpumalanga and will shift the transportation mode from road to rail. The new rail capacity will allow an increase in the burn rate of Majuba Power Station from approximately 12.5 M/ta (Million tons per annum) to 14 M/ta. The new rail capacity will handle 12.5 M/ta (million tons per annum) to 14 Mt/a with a design capacity of 21 M/ta. This new railway is a vital component in the strategy to increase the base-load supply capacity to meet the expected growth in electricity demand. The completed Majuba transport system will include modifications and optimisation to the existing tippler and conveyor load-out system, improve the availability to sustain an off-loading rate of up to 14 M/ta and exclude modifications to the existing Majuba coal stockyard system.

Social / economic / environmental impact

This rail project forms part of Eskom's Road-to-Rail migration strategy. The initiative seeks to reduce road safety incidents and social risks associated with road transportation, less road damage and possible accidents. In addition, rail transportation of coal will further contribute to reduce road traffic on Mpumalanga's roads. There are currently approximately 498 trucks on the road per day, so rail transport will lead to less carbon emissions and improved condition of the roads.

The project is expected to create approximately 1000 direct construction employment opportunities at peak, with a number of indirect employment opportunities. Unskilled and semi-skilled workers will be sourced from the local communities and farms surrounding the railway-line servitude. The project further anticipates spending on Corporate Social Investment programmes, as well as local supplier development and economic participation in the project.

KUSILE POWER STATION PROJECT
2008 – 2013

Kusile background

> The most advanced coal-fired plant project in Eskom Kusile is a Ndebele and Siswati word meaning "The Dawn Has Come"

Abram Masango
General Manager
Kusile Project

The Kusile construction site is about 1 355 hectares in size, and is located on the Hartbeesfontein and Klipfontein farms. It is the most advanced coal-fired power plant project in Eskom after Medupi Power Station in Lephalale, where construction commenced in 2007. As a rule, a coal-fired power station takes about ten years to build, but due to the more recent capacity constraints, the Kusile project has been fast-tracked and it is anticipated that it will take about eight years to complete. The Kusile Power Station project is at least four times bigger than the Gautrain project in terms of capital expenditure.

Construction started in 2008 and the station will consist of six units, each rated at approximately 800MW installed capacity, giving a total of 4800MW. Once completed, Kusile will be the fourth-largest coal-fired power station in the world.

Coal will be supplied by Anglo Coal (New Largo and Zondagfontein Collieries). The combination of the resources is expected to yield not less than 800 million sales tons over a period of not less than 47 years.
The new power station is a vital component in the strategy to meet the ever-increasing demand for electricity in South Africa. Kusile Power Station is also Eskom's second most advanced coal project and will include supercritical (high-efficient) technology, world-class environmental controls and air-cooled condensers.

Kusile Power Station will be the first power station in South Africa to have flue gas desulphurisation (FGD) installed. FGD is the current state-of-the art technology used to remove oxides of sulphur (SOx), e.g. sulphur dioxide (SO_2), from the exhaust flue gases in power plants that burn coal or oil. Eskom is fitting FGD to the Kusile plant as an atmospheric emission abatement technology, in line with current international practice, to ensure compliance with

air quality standards, especially since the power station is located in a priority airshed. The FGD plant is a totally integrated chemical plant, using limestone as feedstock and producing gypsum as a by-product. Gypsum is used in the manufacture of drywalls and ceilings. The contract to manufacture and install FGD has been awarded to Alstom. The site clearance involved the following activities:

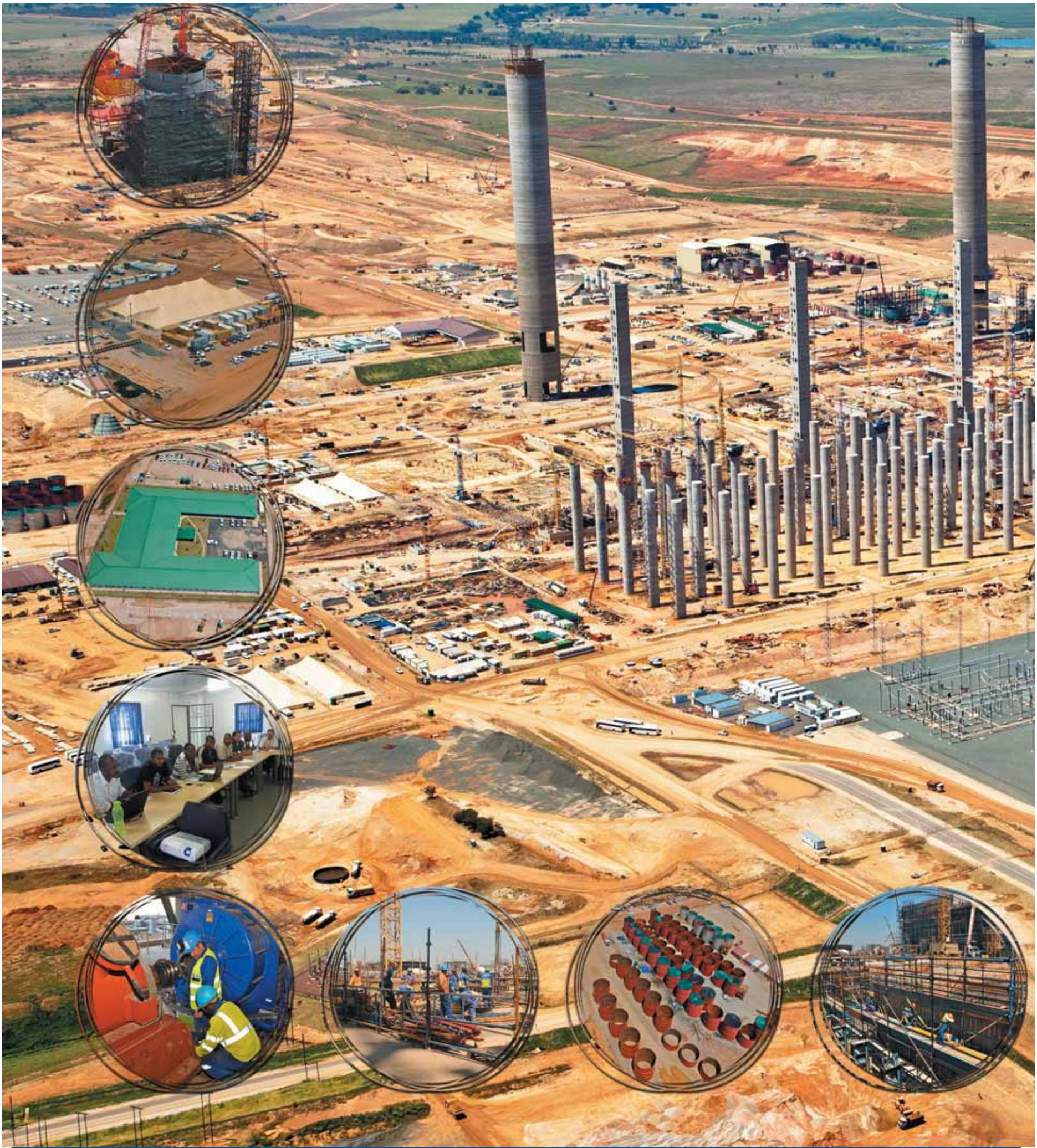
- Removal and conservation of the topsoil – to be used for rehabilitation of the site when construction is completed.
- Levelling of the site – in other words, filling lower sections from soil collected in higher-rising sections.
- Search and rescue of plants undertaken before removal of soil.
- Preservation of high-integrity wetlands within the site.
- Relocation of graves and the preservation of two heritage sites.

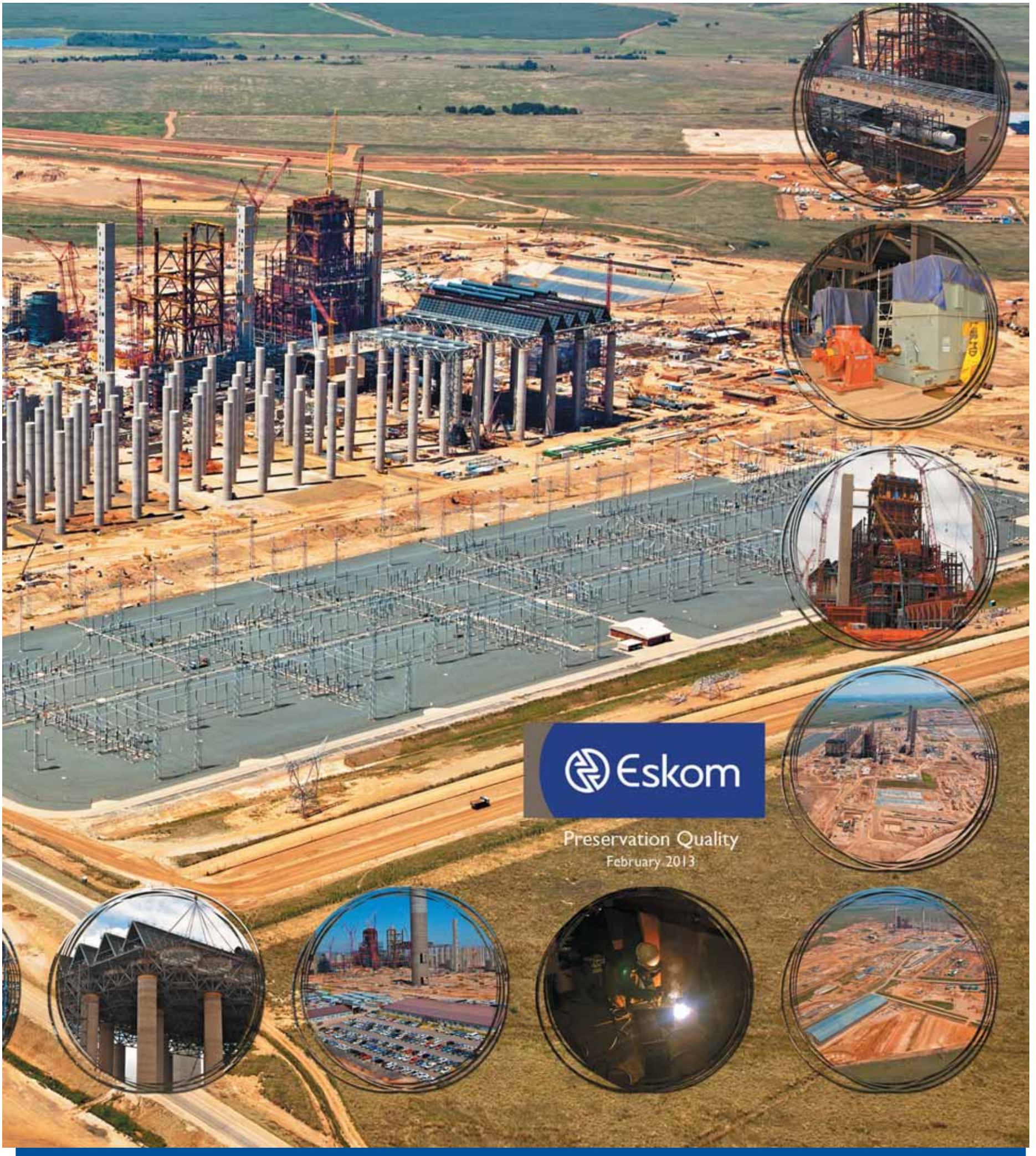
The site clearance for moving about 10.5 million cubic meters of soil and vegetation was completed in March 2010.

The main construction involves power station buildings; administrative buildings such as control, medical and security buildings; roads and a high-voltage yard. The likely associated infrastructure includes water treatment works, wastewater treatment works, access roads, railway line, water supply pipelines, a coal stockyard, limestone offloading facilities, an ash disposal facility, a coal and ash conveyor system, and water storage facilities. In the interim, given that construction could involve as much as approximately 12 000 people at peak, there will also be a great need for the building of temporary accommodation. The Kusile project currently employs over 11 000 people, of which over 5 600 people are from Mpumalanga. In total, 71 000 people are directly impacted by Kusile.

Contracts awarded

In 2007, Eskom awarded contracts for Kusile to Hitachi Power Africa for the boiler contract, and to Alstom S&E for the turbine contract. In 2008, Eskom awarded the Main Civils contract to Kusile Civil Works Joint Venture. The joint venture comprises the following construction companies: Stefanutti Stocks, Group 5, Basil Read and WBHO construction. The Site Services contract was awarded to an Eskom subsidiary, Roshcon. The contract entails the construction of site facilities, such as sewerage facilities and electricity reticulation. The contractor mobilised to site in 2009. Other contractors that have been mobilised to site include Lonerock (access road) and WHBO (water pipeline construction).




Eskom
Preservation Quality
February 2013

The first unit is planned for commercial operation in 2014. The other units will be commissioned at approximately 8-month intervals, with the last unit expected to be in commercial operation by 2018. To date, the project is still on schedule to meet the target date.

Headline figures

- Funding required: approximately R169 billion (local and offshore)
- Capacity as % of Eskom's installed base: 11% (4 800MW)
- 26-kilometer new road is under construction, connecting Kusile to the N12

Economic participation of local businesses

The construction of Kusile has enabled many residents from the neighbouring towns such as Witbank, Delmas and Ogies with employment opportunities and community development. Local businesses in the area are also benefiting immensely from the project.

Take-over plans

Johan Prinsloo
Power Station Manager

The birth of Kusile power station is a once in a lifetime opportunity for management and employees in general. We are challenged, not only by the size, but on the one hand by the technology applied, and on the other hand there is an opportunity to explore new management practices that will create new windows of opportunities.

The success of a power station lies in the motivation of its employees. Strong leadership and a culture of achievement and belonging are paramount as a cornerstone in the design of the organisation.

We have in our planning for Kusile Power Station focussed on designing a culture and mapping out leadership qualities/attributes that will be the golden thread of this organisation for years to come. We have the opportunity to think differently in the design and therefore are utilising this opportunity to create a different outcome.

Filling of critical positions in the Kusile structure has commenced to ensure continuity of services, from erection to commissioning and plant take-over. Technicians and operators appointed in the Kusile structure are currently working at Kendal and Majuba Power Stations to acquire generic technical skills which will assist them to manage the technical and operational aspects of Kusile when commissioned.

CURRENT INFRASTRUCTURE IN MPUMALANGA

Generation:

Eskom currently operates 13 coal-fired power stations in Eskom, of which 11 are in Mpumalanga, with an installed capacity of 30 047MW out of the 37 745MW in Eskom.

A new power station using cleaner technology, Kusile, is currently being built in the Province.

Network

Transmission:

- 63 HV transmission lines of voltages ranging between 88 and 765kV
- 29 substations with 4 731km of line.

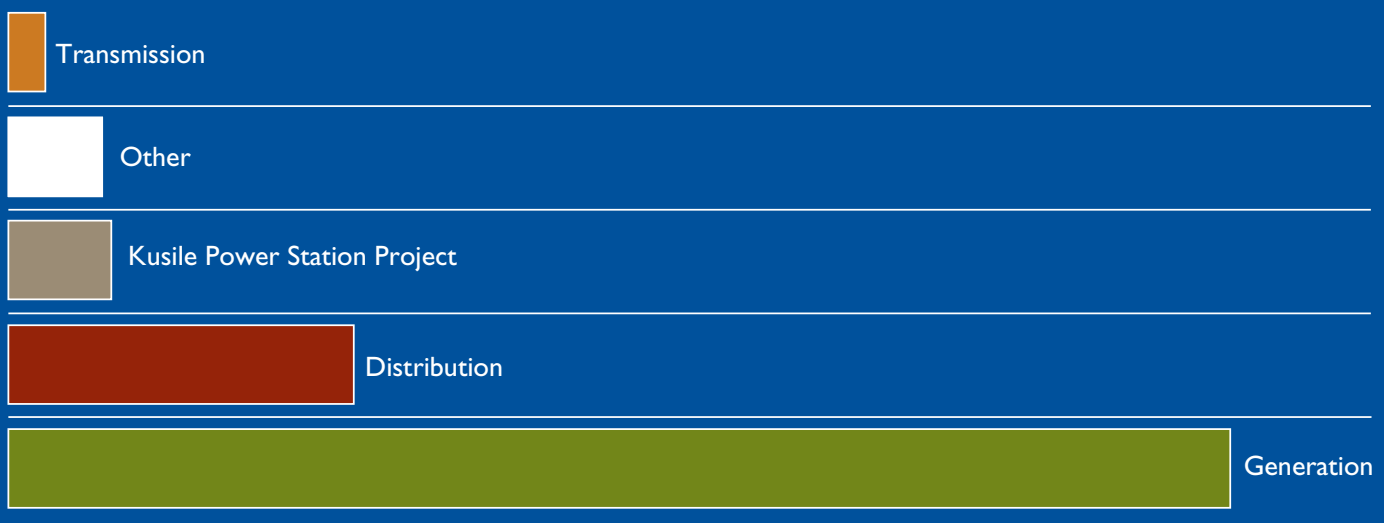
Distribution:

- 9 486.748km of HV lines
- 27 643.095km of MV lines
- 265 substations

Customers:

- Approximately 560 965 customers
- 38 Customer Network Centres

Employees



DOWN MEMORY LANE

Raoul Martin worked as Engineer-in-Charge in 1935 at the Sabie River Power Station, a position he held throughout his ESCOM career until he retired in 1962 at the age of 81 years.

Page 6

Supplement to The Lowvelder, Lydenburg News, Letaba Herald, Phalaborwa Herald, Northern Review, Friday, December 7, 1990

Kescor now running

THURSDAY August, 23 the Kescor page was written in the history of North Eastern Transvaal Region. The agreements were signed on that day by Eskom's Chief Executive, Dr Ian McRae, and the Chief Minister of KaNgwane, Mr Enos Mabuza.

The establishment of Kescor resulted from the desire of the KaNgwane Government to promote the rapid development of the area as well as to ensure the efficient operation and expansion of the network in KaNgwane, utilising Eskom's expertise.

Previously, the KaNgwane Government used to buy electricity in bulk from Eskom and saw to the distribution thereof itself.

All assets and supply rights have been transferred by the government to Kescor.

Kescor is a non-profit organisation being run on business principals, ploughing back all surpluses to expand the network and to keep tariff increases as low as possible.

A KaNgwane Electricity Trust (KET) has been established to represent the interests of the consumers. It holds 50 per cent of Kescor, with Eskom holding the remaining 50 per cent. Both parties have equal representation on the Kescor Board. The trustees of the KET have been appointed by the KaNgwane Government.

The KaNgwane Government has decided that the subsidy currently given to domestic users will be phased out over a two year period to achieve an economically viable electricity supply. The money now used for electricity subsidies can then be utilised for other local developments, such as water supply projects.

KESCOR

"Not only will this project benefit the local inhabitants personally, but their participation in the informal sector and demand for electrically powered appliances and machines will have a positive impact in the rest of the economy," Mr Mabuza said.

This initiative falls within Eskom's stated vision of Electricity for All i.e. that electricity be supplied on an economic basis to as many people as possible.

"Our goal is to make 52 000 points available by the end of the century so that every householder in KaNgwane will have the opportunity of switching on a light. But this must be on a cost-economical basis," said Mr George van der Merwe, Kescor's General Manager.

Before the agreement only 5 000 homes in the homeland have been equipped with electricity.

The establishment of Kescor could herald major benefits for Lowveld Electrical.

The first black bursar of the North Eastern Transvaal Region of Eskom started his studies at the beginning of February this year. Mr Gert Madonsela decided to study the B.Sc. Eng (Elec.) degree. He initially became interested in Eskom after he attended a show on careers at his school, Thembisile High, last year. Gert then applied for a bursary at NETR which was granted to him. Gert is studying at the University of Cape Town. Mr Gert Madonsela (left) receives his bursary contract from the Manager: Human Resources of NETR, Mr Joep Joubert.

Numbipark is nog 'n mylpaal

HAZYVIEW — Die aanskakeling van elektrisiteit by Numbipark op Saterdag 3 November was in twee opsigte uniek.

Daar is vir die eerste keer in Eskom kort betonpale gebruik om die elektrisiteit in die dorpie aan te lê.

Dit was ook die eerste keer in die geskiedenis van die Noordoos-Transvaalstreek dat die vooraf-betaalde meterstelsel in 'n blanke dorp gebruik is.

Die pale is gedurende Desember 1989 ontwikkel toe daar 'n behoefte vir die ontwikkeling van plaaslike "ligte" en goedkoop betonpale vasgestel is. Die pale moes ook geskik wees vir die gebruik van boudelgeleier.

Die pale is ontwikkel in die tyd toe Numbipark se projek ter sprake gekom het. Tesame met Lydenburg-distrik en Markontwikkeling is die pale as 'n alternatiewe en goedkoper struktuur aanvaar.

Omdat die pale korter is - hulle is net 7 m teenoor die gewone lengte van 9 m - dra dit ook by dat die omgewing nie versteur word nie. Dit smelt saam met die natuur en die inwoners het nog steeds die natuurskoon van voorheen.

Omdat dit 'n vakansiedorp is, is die meeste van die inwoners nie baie daar nie. Met die vooraf-betaalde meterstelsel hoef hulle nie bekommerd te wees oor maandelikse uitgawes nie.

Hulle koop hul krag teen wat hulle dit nodig kry. Die hoeveelheid eenhede, waarvoor hulle betaal het, word op 'n magnetiese kaartjie gestoor. Die kaartjie word in die meter by die huis gedruk. Die klante kan dophou hoeveel eenhede hy gebruik en wanneer dit nodig word, gaan koop hulle weer en 'n nuwe kaartjie word uitgereik.

Die diens sal deur mev. Sannie Meyer verskaf word. Sy en haar man, Danie, is opsigters by Numbipark.

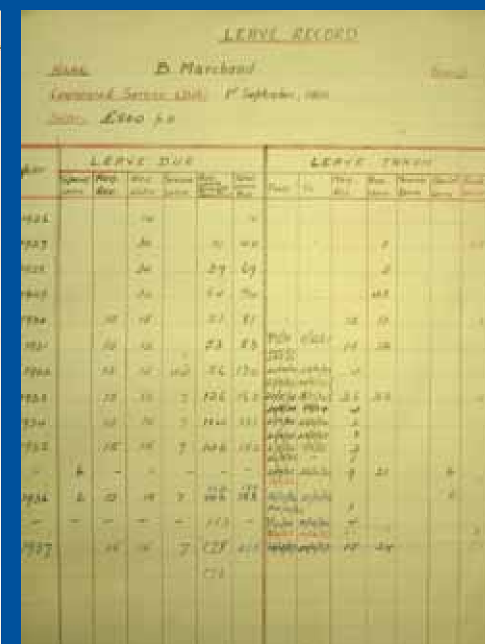
Tydens die aanskakeling op Saterdag 3 November was al wat inwoner is by die geleentheid.

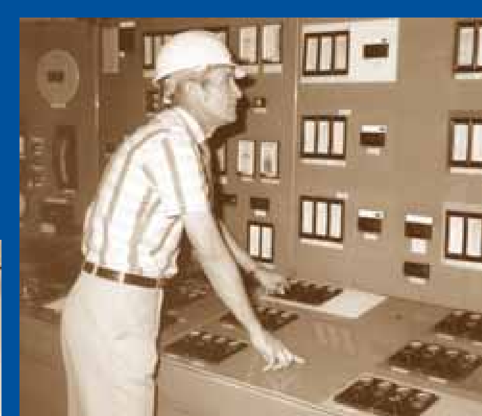
Mnr. Gideon de Beer, van die ontwikkelaars van die dorp, het gesê dat die aanskakeling 'n groot geleentheid is en die Lydenburg-distrik se personeel bedank vir hul goeie diens.

Leon van Nierop, 'n bekende radio- en TV-persoonlikheid, het namens die inwoners gepraat. Hy het 'n huis daar. Vir hom is dit 'n groot geleentheid, want hy kan nou sy woordwerker inprop wanneer hy sy verhale oor die rustigheid van die Laeveld wil kom skryf.

ESKOM

Dit is die pale wat by Numbipark gebruik is. Piet van Rooyen van die Lydenburg-distrik kyk hier na die lyn.





Supplement to The Lowvelder, Lydenburg News, Letaba Herald, Phalaborwa Herald, Northern Review, Friday, December 7, 1990

A challenge for Nst District

NELSPRUIT District is one of four districts in the North Eastern Transvaal Region. The district office is situated in Hope Street, Nelspruit. The district has four depots situated in Nelspruit, Barberton and Malelane to respond to their customer requirements.

The district covers an area of 10 427 square kilometres and it presently serves 3 482 customers. The market for the particular area is agricultural, mining (gold mines) and industries - Manganese Metal, Sappi and Transvaal Sugar Refinery.

A future challenge for the district is to supply electricity to all who can afford it by penetrating markets and to increase the existing market.

A total of 3 631 km of high voltage overhead lines are used to supply electricity to their customers. All factors considered they endeavour to supply electricity with minimum interruptions. They are proud to present a supply availability of 99.98 per cent (distribution) and 99.71 per cent on reticulation. To achieve this standard of maintenance the cost to Nelspruit District is R1 399 km of line.

Nelspruit District is headquartered in this modern building in Hope Street, Nelspruit.

Previously the "old" building in Brown Street was the headquarters.

Mrs Batsie Lotter is the friendly lady who handles accounts at Nelspruit District.

Landmeet eerste

NOTS is die eerste streek in die RSA om die Global Positioning System vir opmetings te gebruik. Die Soutpan/Venetia 132kV-lyn was die eerste proefkonyn.

Die metode werk met satelliete en die satelliete stuur seine uit. Dit word deur 'n instrument, wat op die grond staan, opgevang. As gevolg van die seine kan die posisies en hoogte bo seevlak presies met 'n akkuraatheid van millimeters bepaal word.

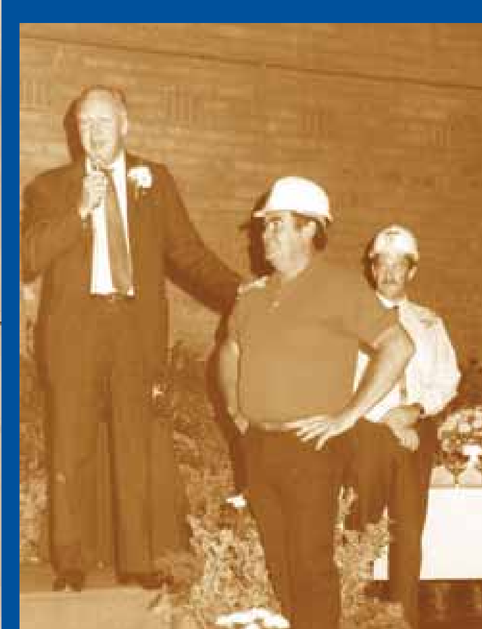
Die metode is al suksesvol deur Eskom in Swaziland gebruik.

Die GPS-metode is weens verskeie faktore soos werkdruk, moeilike opmetingsomstandighede, tydbesparing, koste-effektiwiteit, goeie eindresultate en terugvoer oorweeg.

Met die nuwe metode het dit Landmeet 'n week geneem om 100 km kontrole vas te stel teenoor die 12 weke op die bestaande metode.

'n Besparing van sowat R15 000 is met die nuwe metode teweeggebring. Die totale koste aan die GPS-metode was R40 000 en die bestaande koste sou sowat R55 000 beloop het.

Tyd en geld is die vernaamste voordele van die metode, wat 'n nuwe era ingelui het.

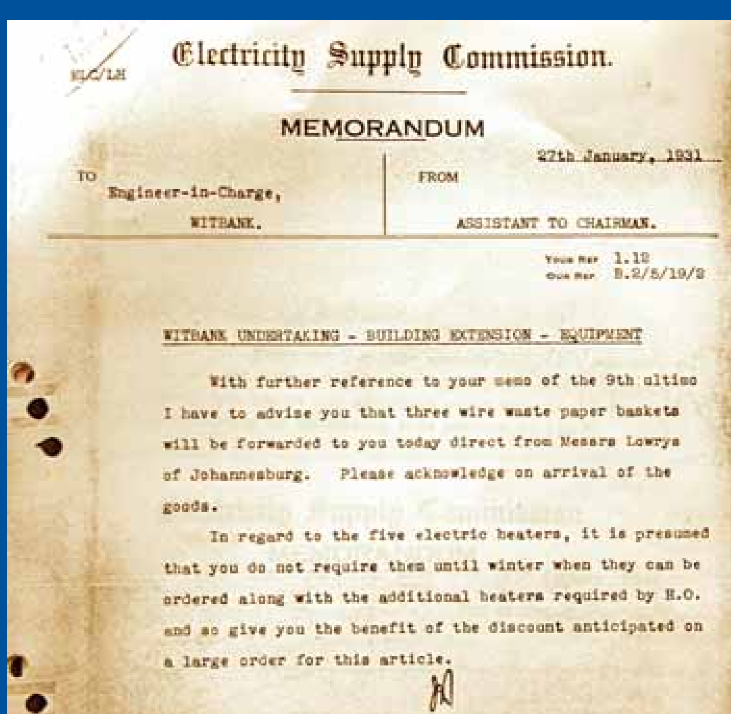


8 Smuts Avenue, Witbank

THE GREAT WITBANK STATION

ELECTRICAL POWER UNIVERSAL ON THE WITBANK COLLIERIES

THE LOWEST CHARGES IN THE WORLD



Electricity Supply Commission.

MEMORANDUM

27th January, 1931

TO Engineer-in-Charge, WITBANK.

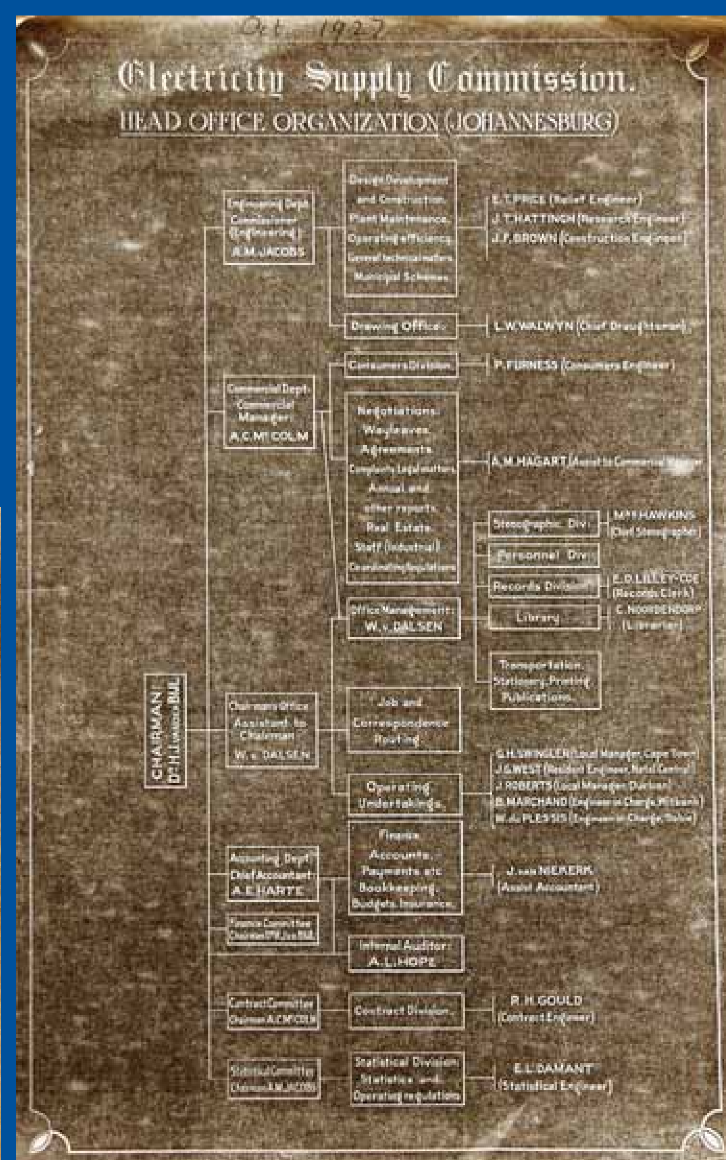
FROM ASSISTANT TO CHAIRMAN.

Your Ref 1.12
Our Ref B.2/5/19/2

WITBANK UNDERTAKING - BUILDING EXTENSION - EQUIPMENT

With further reference to your memo of the 9th ultimo I have to advise you that three wire waste paper baskets will be forwarded to you today direct from Messrs Lowrys of Johannesburg. Please acknowledge on arrival of the goods.

In regard to the five electric heaters, it is presumed that you do not require them until winter when they can be ordered along with the additional heaters required by H.O. and so give you the benefit of the discount anticipated on a large order for this article.



CHEAP POWER AT WITBANK.

Last week we published an interesting article entitled "Cheap Electric Power."

This week we are supplementing this article with another, detailing the new rates and also a plan showing the new reticulation system and proposed extensions.

We are indebted to the "South African Engineer" for the article and block, both of which we feel sure will prove of interest to our readers.

In view of the Middelburg Municipality opening up negotiations with the E.S.C. for a supply of current, we hope our readers will carefully follow the figures and information given.

The Electricity Act of 1922, which established the Commission, was the outcome of a general recognition that cheap electric energy is a factor of vital importance to industrial development. The Commission, being fully alive to the suitability of Witbank as a centre for the generation of electric power on a large scale, and to the inducement which the production of an abundant supply of electricity there at a cheap price would afford to industrial development and to railway electrification, took, as one of its first considerations, the prospects of a station in the vicinity of Witbank, and began an examination of the power possibilities of that area.

AGREEMENT WITH THE VICTORIA FALLS POWER CO.

While the Commission's investigations were still in progress, the Victoria Falls and Transvaal Power Co., Ltd., applied to the Electricity Control Board for an amendment of its licence to enable it to erect a power station at Witbank to supplement its power supply for the gold mining industry on the Witwatersrand. The Commission opposed the application in the form in which it was presented, and, as a result of subsequent negotiations, arrangements were concluded and approved by the Control Board which not only made provision for meeting the additional power requirements of the gold mines with a guarantee of certain definite benefits to the mining groups, but also secured for the Witbank area the full advantage of the cheap power tariff that should be obtainable by consumers in close proximity to a large modern power station situated in an area where an abundant supply of cheap coal is available.

CAPACITY OF THE STATION.

A general description of the Witbank Power Station has already appeared in this paper, and brief reference only need, therefore, be made thereto in this article.

The present plant consists of three main generating sets of 20,000 k.w. each and 12 boilers each of a normal capacity of 70,000 lbs. of steam per hour. The boilers have been arranged so as to facilitate any work in connection with the low temperature carbonisation of coal which may be considered in future. The undertaking was placed in commercial operation in July, 1927, and it has already been decided to instal a fourth 20,000 k.w. generating set and three additional boilers, thereby bringing the total installed capacity up to 60,000 k.w.

THE COMMISSION'S NETWORK.

The Commission's electric supply network in the Witbank area consists of three systems of overhead lines and underground cables giving supply at 33,000, 2,200 and 380/220 volts, three-phase alternating current at a periodicity of 50 cycles per second.

The 33,000 volt system consists of about eight miles of underground cable and approximately 20 miles of overhead lines. The cable is of the paper insulated, lead covered and armoured type, with a carrying capacity of about 4,000 k.v.a., and is used for connecting up the major industrial supplies in the municipal area. The 33,000 volt overhead lines connect up the collieries and other industries within the 6 mile radius, and are run on steel tubular poles spaced about 300 feet apart, the conductors being supported on pin type porcelain insulators at the intermediate poles and triple disc type at straining points. Each line has a capacity of about 5,000 k.v.a.

Three overhead lines are being gradually extended as the demand for energy increases.

Within the municipal area the step-down transformer stations are of the indoor type, but the collieries and other consumers outside the municipal area are given supply through outdoor type transformer stations. In certain cases the supply is given direct at 33,000 volts, the consumer providing his own transformers and housing, and the Commission giving a discount from the maximum demand and unit charge to cover transformer losses.

THE MUNICIPAL SERVICE.

The 2,200 volt system radiates from the Witbank Municipal Sub-station, and its function is to provide for power supplies of from about 15 k.v.a. to 150 k.v.a. in the municipal area. Underground cables are used in the central portion of the township and overhead lines outside.

The township reticulation system for lighting and small power supplies is carried overhead on steel tubular poles, these poles also carrying the street lighting wires and lamps. The system has been extended to include every street in the township, and has sufficient carrying capacity to provide current for small motors, heating and cooking stoves, etc., in addition to ordinary house lighting. Current is supplied from this system at rates which compare very favourably with those of any of the large towns of the Union, and the Commission has arranged facilities for house wiring to be done on the hire-purchase system if required.

THE NEW TARIFF IN DETAIL.

Under the Electricity Act, the Commission is required to sell electricity at cost, and to this end any profits remaining after meeting interest and redemption charges and after making a contribution to the reserve fund for betterment purposes, goes to reduce the price charged for current, and in this connection it is pleasing to note a reduction in the Witbank charges from £6 to £5 16s. per k.v.a. of maximum demand per annum, plus 0.06 pence per unit of electricity supplied.

The average cost per unit at various load factors and power factors is shown in the following schedule:—

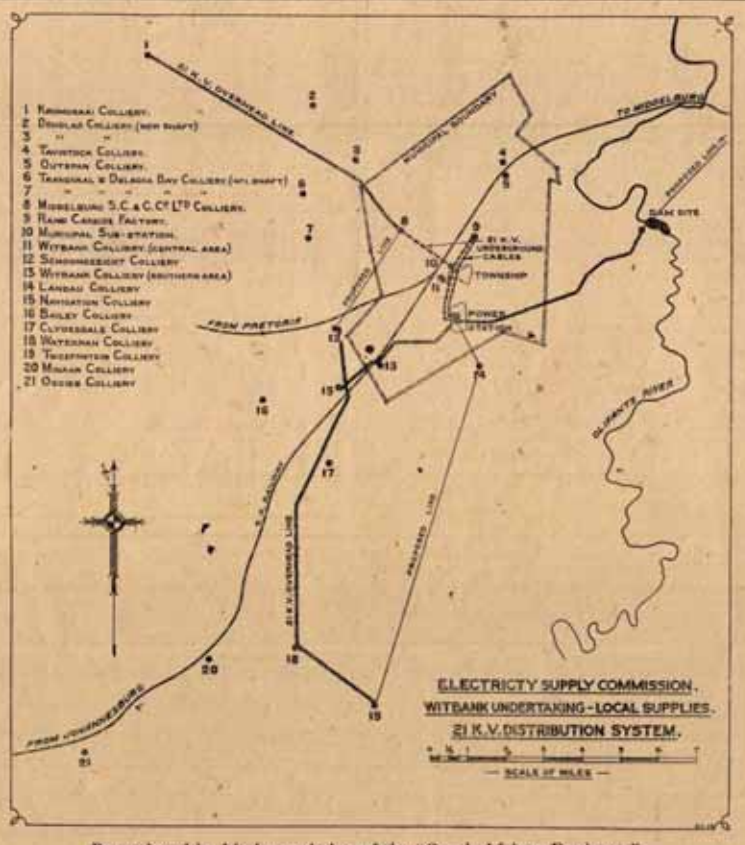
Load Factor %	87 P.F.	85 P.F.	83 P.F.	Units P.F
70	1.135	1.002	0.897	0.814
65	0.921	0.814	0.730	0.662
60	0.778	0.689	0.619	0.563
55	0.676	0.598	0.538	0.490
50	0.599	0.531	0.479	0.437
45	0.491	0.437	0.395	0.361
40	0.445	0.374	0.339	0.311
35	0.368	0.329	0.299	0.275
30	0.329	0.296	0.268	0.248
25	0.299	0.269	0.246	0.228
100	0.275	0.249	0.228	0.211

COMPARISON WITH HYDRO-ELECTRICITY.

The cost of supply from the Witbank station is so low that it compares very favourably with that from large hydro-electric stations in America. For instance, we understand the Niagara Electric Service Corporation's rate for general power is 8.5 per h.p. demanded per year for a supply of 25 h.p. or over. At 84.86 to the £, this equals approximately £5 10s. per k.w. per year. The demand is taken as 100 per cent. of the connected load.

Comparing this with the charge of £5 10s. per k.v.a., plus 0.06d. per unit at Witbank, it will be found that, whilst at the higher load factors the Niagara charges are slightly more favourable, the advantage is with the Witbank tariff at the lower load factors. The fact that the Commission's tariff is based on k.v.a. instead of k.w. is offset by the fact that the Niagara demand is taken as 100 per cent. of the connected load.

We believe special rates, somewhat lower than those of the E.S.C., are given at Niagara for very large supplies, but in this connection it should be remembered that, as the Commission is required under the Act to sell electricity at cost, the natural tendency will be towards a reduction in tariffs as the various undertakings develop, and it is to be expected that with the installation of the fourth generating set, and as a result of a continued growth of load in the district, a further reduction in the Witbank charges will be possible. Further, it must not be forgotten that we are comparing the cost of supply from a steam-driven station with that from a hydro-electric station.—The South African Engineer.



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NEW RETICULATION SYSTEM AND PROPOSED EXTENSIONS.

In the top right hand corner of the above plan will be seen the proposed new line which is only 12½ miles from Middelburg. No. 1 on the top is Kromdraai Colliery which is about the same distance as Middelburg's proposed line.

THE LATE MRS. McLEES.

Widespread regret was expressed when it became known that Mrs. Edith Ann McLees, wife of our respected townsman, Mr. J. P. McLees, had passed away on Friday, August 3rd, at the Middelburg Hospital.

The deceased lady, who was well-known and loved by everyone, had lived in Middelburg for over 20 years.

In Church-work until some little time back she had been an arduous worker and for many years her life was spent in unselfish actions for the benefit of her fellow citizens. A keen follower of tennis in her earlier days, she more than held her own in the singles, while in the doubles in partnership with Mr. H. Lacey, Jr., some hectic struggles were witnessed on the local courts. Although a woman of many parts and connected with various organisations, owing to her retiring disposition, she did not come much before the public eye, but the results of her efforts will remain in the memories of those who knew her intimately.

The funeral took place on Sunday afternoon in the Middelburg cemetery in the presence of a large gathering of old friends and acquaintances.

At the graveside the committal service was conducted by Archdeacon H. S. Sharpe, Director of Native Missions in the Transvaal. The pall bearers were Messrs. J. Cox, Jno. Campbell, E. Crewe, P. Edwards, H. Lacey, Jr., and P. Robertson. The chief mourner was the widower (Mr. J. P. McLees).

After the pronouncing of the Benediction, Mr. P. Robertson, on behalf of Mr. McLees, expressed thanks and appreciation for the many kind messages of sympathy in his hour of anguish. He added that, irrespective of denominations, deceased, in her quiet, unassuming way, had done much to alleviate the sufferings of the poor and needy, while during the dark days of the influenza epidemic, she was never found wanting.

Each summer's night, when the stars shine bright,
We may revel in rapture pure,
But winter's season brings cogent reason
For Woods' Great Peppermint Cure.
For influenza, coughs and colds
Prompt relief we sure all assure—
Get the best at first and avert the worst
With Woods' Great Peppermint Cure

THREE WAYS OF DRIVING A CAR

Some Points Worth Memorising

There are broadly three types of driving: just driving; driving to get somewhere; and driving for fun, emphasis being placed upon the word "fun," as it can mean much in certain circumstances.

Each type has its most fitting time and place, as well as the appropriate mood and suitable frame of mind on the part of the driver.

Concerning the first method (written R.S.L. in the "Autocar") one sits in a motor-car, treads upon certain pedals, occasionally toys with the gear lever, and holds the wheel suitably. The mildness of this description is warranted by the lack of exhilaration from any own point of view, to be gained from so handling a car. Yet very many people drive much in this fashion, and appear to derive enjoyment from it; may they still contrive to find amusement in such methods.

The second driving aspect referred to requires little explanation. One is compelled to go from one place to another, possibly in a minimum of time. Obviously only one course of action is called for, and for the time being the car becomes a pleasant substitute for the railway train; enjoyment of the fresh air and the scenery on the way is purely incidental.

It is when writing of the third kind of driving that I become most enthusiastic—when considering "driving for fun."

Now "fun" as applied to driving a car is not necessarily synonymous with speed; merely to tread upon the accelerator on a broad, main highway is not "fun" to my way of thinking, besides being liable to prove expensive as matters are arranged at present.

"Fun" consist in handling a car, in attempting to develop over it a complete mastery in narrow by-ways, to be able to check a skid in grease, rutted lanes almost before it begins to affect the machine. In taking countless by-lane bends at a round pace, close in to one's proper side, and clipping the grass, yet travelling at such a speed and with such a degree of control as to be able to pull up with the very minimum of lost effort and delay should occasion so demand.

Fun of this brand lies in changing early and well on approaching a hill, in taking the bends as they wind upward one above the other, close in and in smooth sweeps; in changing down over sections of narrow lanes, letting the engine rev. and incidentally providing oneself with an additional brake in case of emergency.

Much amusement can be gained by seeking out by-ways where lead after lead and sharp, twisting hills of unknown gradient and lay-out call for frequent gear changes and serve to develop one's various abilities; over such roads with the gears in use, sometimes slipping a right-hand clutch on the off-side where visibility ahead makes such procedure perfectly safe, the enthusiastic driver can experience a real and easily obtained thrill from his motoring.

RAVAGING RINGWORMS.

ZAM-BUK Drives Out Pain and Kills Itchy Ravaging Disease.

Further reports of remarkable cures in cases which defy skilled medical treatment are convincing proof of Zam-Buk's exceptional powers. No ordinary ointment has the record of Zam-Buk or the same soothing, healing and antiseptic virtues.

Mr. J. J. Botha, Dwarsweg, P.O. Vosrburg, C.P., whose Zam-Buk recently cured of a serious skin disease and muscular rheumatism, writes: "I was a terrible sight with ringworms on my cheeks. The disease spread rapidly until my face was absolutely covered with nattery painful sores. Work was out of the question, and many sleepless nights left me in a low physical condition.

"I had doctor's treatment and tried many different ointments, but there was no improvement. One day a friend spoke about Zam-Buk in such high terms that I was persuaded to get a box. From the first application of this balm I knew I had at last hit upon the one real skin cure. Before one box of Zam-Buk was finished, the nattery sores had all dried up. As I kept on, new healthy skin grew and Zam-Buk completely removed all trace of disease.

"When I was stricken with severe rheumatic pains in my legs, and could only walk about with the aid of sticks, my wife reminded me about Zam-Buk. She got me to rub it in for eight days, when the pains were all gone. We are never without a box in our home, it is a wonderful all-round remedy.

Zam-Buk quickly soothes and heals sore, chapped hands, cuts, burns, eczema, ulcers, piles, cold-sores, ringworm, bad legs and poisoned wounds. "Rub it in" for aches, pains, stiffness, strains, rheumatism and bandages. Zam-Buk 1s. 6d. or 5s. 3d. (family size). Zam-Buk Medicinal Soap 1s. per tablet. All chemists and stores.

A small advt. in this paper will sell anything, buy anything, find anything

DO YOU ENJOY YOUR FOOD?

Poor Appetite Due to Indigestion.

Every healthy person should have a natural desire for food at meal times; this desire shows that the digestion is in working order. If you have no appetite when meal times come round you may be sure that nature is warning you that your digestion requires attention. It is no use forcing yourself to eat; unless you can digest it, food merely clogs the system. Then other troubles develop; flatulence, acidity, excruciating pains in the chest or back.

These symptoms of a disordered digestion mean that the blood has become impoverished. Poor blood directly affects the processes of nutrition, the action of the gastric glands is diminished, and the muscular action of the stomach weakened. Nothing will more promptly restore digestive efficiency than good blood, and nothing will more surely make good blood than Dr. Williams' pink pills. The new, rich blood created by these pills strengthens weak nerves, stimulates the tired muscles, and awakens to normal activity the glands that supply the digestive fluids.

The first sign you will notice after beginning Dr. Williams' pink pills will be a better appetite; you will be hungry, and you will be able to digest the food you eat.

So begin Dr. Williams' pink pills now. All dealers sell them, or direct from Dr. Williams' Medicine Co., P.O. Box 604, Cape Town; 3s. 3d. for one bottle, or six for 18s., post free.

POOR LIGHT CONNECTION.

Inefficient lights on new and repainted cars often can be traced to poor connection, caused by paint or varnish which acts as an insulator. Care should be taken in the re-assembly of all new paint jobs to see that all light wire plugs and sockets are clean, to avoid this sort of trouble.

Tickling in the Throat.

Even the slightest tickling or hoarseness in the throat may be the forerunner of a dangerous illness. Stop it at once with Chamberlain's Cough Remedy. For sale by all dealers.

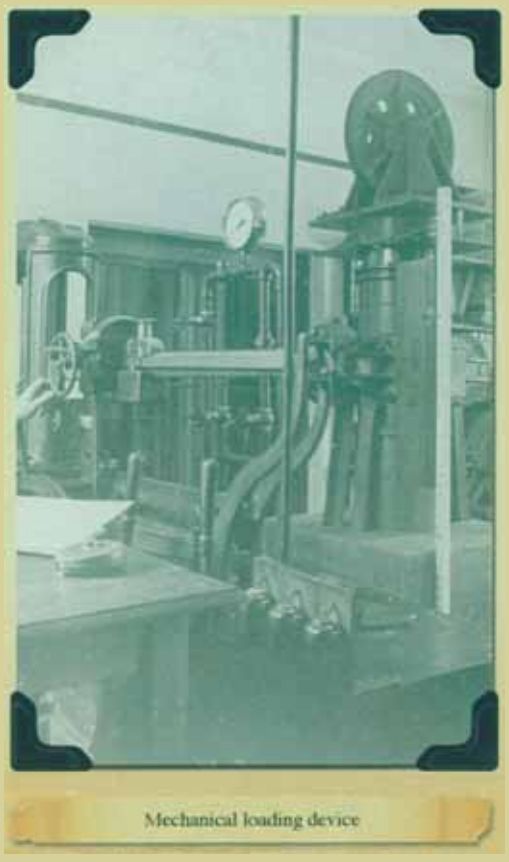
Start lifting the A frame

A frame in place

Attending to caved-in hole in vlei area

The pole is up and standing

Bethal / Standerton 88kV line



Mechanical loading device

Checking that the X-arm is level

Full tension McIntyre joint (¾ full tension)

Stringing winches

Hand dug stay hole

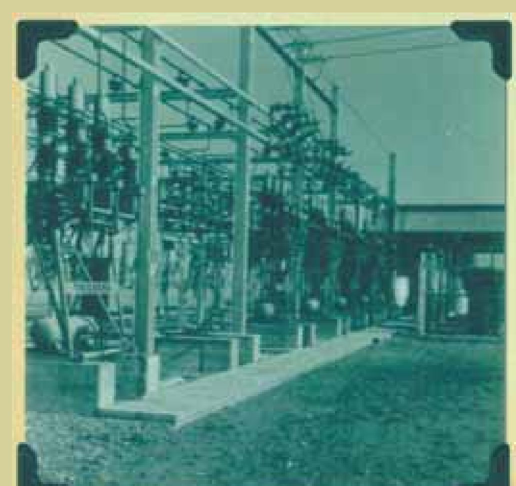
45 ton hand made off stay

Hooking the insulators

Connecting jumpers

132kV Line trap and coupling capacitor

132kV feeder bay



Wildebees Substation 22kV yards

SOUTH AFRICAN

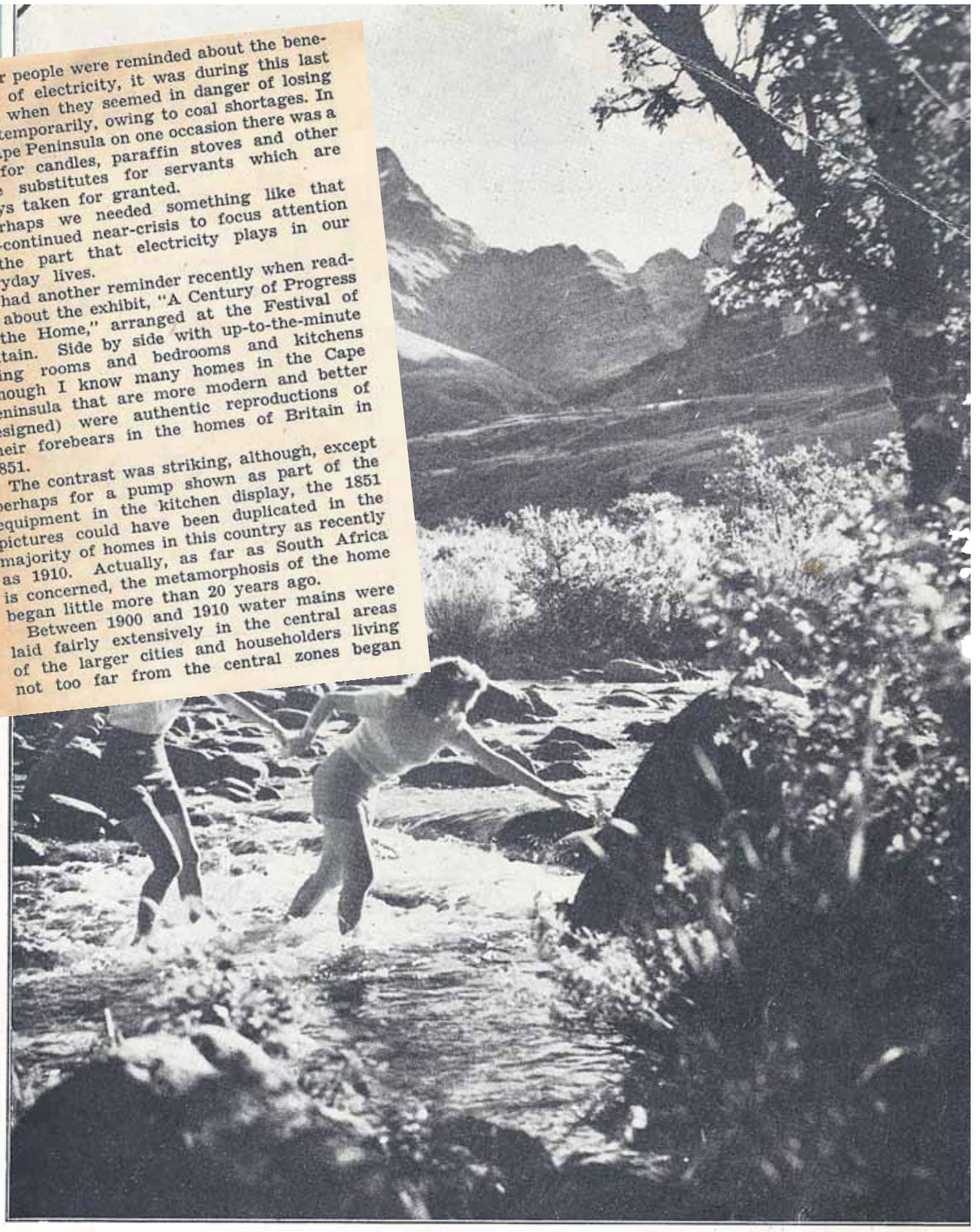
IF ever people were reminded about the benefits of electricity, it was during this last winter when they seemed in danger of losing them temporarily, owing to coal shortages. In the Cape Peninsula on one occasion there was a rush for candles, paraffin stoves and other feeble substitutes for servants which are always taken for granted.

Perhaps we needed something like that long-continued near-crisis to focus attention on the part that electricity plays in our everyday lives.

I had another reminder recently when reading about the exhibit, "A Century of Progress in the Home," arranged at the Festival of Britain. Side by side with up-to-the-minute living rooms and bedrooms and kitchens (though I know many homes in the Cape Peninsula that are more modern and better designed) were authentic reproductions of their forebears in the homes of Britain in 1851.

The contrast was striking, although, except perhaps for a pump shown as part of the equipment in the kitchen display, the 1851 pictures could have been duplicated in the majority of homes in this country as recently as 1910. Actually, as far as South Africa is concerned, the metamorphosis of the home began little more than 20 years ago.

Between 1900 and 1910 water mains were laid fairly extensively in the central areas of the larger cities and householders living not too far from the central zones began



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S.A.R. & H. Photo

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Zero Harm

We make it happen!

"Every day, every decision, every action. Safety is personal and part of me."

Zero Fatalities • ***Zero*** Lost-time Injuries • ***Zero*** Medicals • ***Zero*** Environmentals • ***Zero*** Tolerance

Eskom

In this publication we pay tribute to our fellow Eskom Guardians who made the impossible possible. May their legacy live on for future generations to come.

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