ESCOM's fifth decade

And then there was one

1963 - 1973

ESCOM was mourning the passing of the company's second and third chairmen, AM Jacobs and Dr JT Hattingh, both of whom died in 1963. In that year, ESCOM also said goodbye to the Sabie River power station (ESCOM's first permanent power station) after Sabie Undertaking had been incorporated into Witbank Undertaking. But, as Frank Herbert said, "there is no real ending. It's just the place where you stop the story". In 1963, ESCOM continued apace as the organisation set about meeting burgeoning demand.

Ingagane power station (near Newcastle in KZN) was commissioned in 1963 and consisted of five 100 MW sets. At this stage, the Rand and Natal systems were not yet linked, and so Ingagane was connected to the Southern Natal system. Work had also begun on the construction of three major power stations: Camden, Grootvlei, and Hendrina. These three stations began commercial service in 1967, 1969, and 1970, respectively. They all used 200 MW sets, which were "technological dinosaurs" (dinosaurs were around about 220 million years ago and lasted for about 160 million years before dying out). The problem with these sets was that they did not make use of the latest power generation technology in reheat cycles and were, thus, costlier to build and less reliable than those that did boast this cutting-edge technology.

Hendrina power station was South Africa's last to use non-reheat generation sets. It had a turbine hall that was 500m long, and some staff even used bicycles to get around. Hendrina got its coal from the nearby Optimum Colliery, South Africa's first large-scale open-cast coal mine. Quality coal was exported, and a washing plant separated out discarded (lower-grade) coal, which was burnt by Hendrina. ESCOM shared in the large profits generated by exporting the coal, which meant that Hendrina's average coal price was kept very low – the cheapest on ESCOM's system. However, there was a price to be paid, as the low-grade coal contained abrasive stone that put wear on the mills and the boilers. Improved mining (and generation) techniques eventually sorted out the problem.

The reheat technology was finally used at Arnot power station, which began commercial service in 1971. As a result of this improved technology, steam pressure increased from 10 MPa to 16 MPa, while steam temperature decreased from 538°C to 510°C. The lower temperature meant that less specialised steel could be used in the boiler, which led to cost savings and an impressive (for its day) efficiency of 33%. At around the same time, ESCOM also built Grootvlei power station, near Balfour. Grootvlei had to get its water from the already heavily taxed Vaal Dam, and thus, it was the obvious choice for South Africa's first dry-cooling towers.

For ESCOM, the late 1960s and early 1970s saw the dream of a national grid come to fruition at last.

Transmission technology had advanced sufficiently so that long transmission lines of 275kV and 400kV were now viable. ESCOM went to great lengths to plan an interconnected network. The massive difference between coal costs in the Cape and the Eastern Transvaal (R2 a ton versus R7 a ton) was a big factor in pushing things forward. In 1969, ESCOM began constructing the network in 300km stages. By August 1970, the transmission line running from Camden power station (near Ermelo) to Cape Town had been completed. It took a little longer to connect the Natal and Transvaal systems, as the Orange River Project caused shortages of steel and cement. But a 400kV line linking Camden and Ingagane was completed in October 1971. A 1971 amendment to the Electricity Act gave ESCOM the authority to amalgamate the power resources of two or more undertakings and to supply electricity from one undertaking to another. This paved the way for the establishment of the Central Generating Undertaking (CGU) on 1 January 1972, that enabled ESCOM to operate all its power stations and other power plants as an integrated system. However, it was only in ESCOM's 50th year (1973), after extending the network to the Eastern Cape, that a national grid was finally achieved. All ESCOM's power stations were transferred from the regional undertakings to the CGU.

ESCOM could now afford to decommission some older stations, and hence, Brakpan, the VFP's first power station, was closed in 1970. Rosherville, which had also produced compressed air, was decommissioned in 1966 and turned into a central workshop complex. From now on, the mines made their own compressed air. Meanwhile, Simmerpan, which had been the VFP's control centre since 1912, received a revamp in 1968. It was now the control centre for the entire country's grid and featured world-leading communications technology. South Africa had shown that a national grid was the best way to utilise power resources for the benefit of the entire country. The next step would obviously have been to connect the entire region. This is yet to happen in any meaningful sense, but back in 1964, the South African Parliament recognised the opportunity of regional power integration. The Electricity Act was amended to authorise ESCOM to supply electricity in bulk to "adjoining territories". So it was that, in 1967, Lesotho received ESCOM power via an 88kV line from Ladybrand in the then Orange Free State. The border town of Ressano Garcia in Mozambique received ESCOM power in 1969, and in 1972, a 275kV line, supplying 20 MW, began sending electricity to the capital, Lourenço Marques (now Maputo). Swaziland began receiving ESCOM power in 1973.

Plans were also afoot to send power in the other direction. However, things were progressing more smoothly with a local hydro-electric project. In 1966, excavations began on the Hendrik Verwoerd Hydro Station (now known as Gariep Hydro Station). Five years later (1971), the station started feeding power onto the grid. On completion, Hendrik Verwoerd would add 360 MW to the grid and auseful back-up in the event of emergencies and peak demand.

Unfortunately, South Africa is not well suited to the development of hydro-electric power, and when it comes to finding alternatives to coal, nuclear provides better potential. In the early 1960s, the government had already approved an atomic energy research and development programme, and this received a boost when a research reactor, known as Safari and supplied by the US, was installed at Pelindaba. Scientists and engineers were sent overseas for training, and research continued under the auspices of the Atomic Energy Board (AEB).

In 1966, ESCOM purchased the farm Dynefontein, 30km outside of Cape Town, as a possible site for a nuclear power station. In 1972, the decision was made to construct Koeberg nuclear power station on that very site. Today, Koeberg continues to supply the country with 1 840 MW of energy.

Meanwhile, the 1960s saw high levels of growth for the South African economy and a steep increase in the demand for power. In 1970, sales rose by 10,7%, the highest surge since 1955. In 1971, ESCOM needed R175 million for its expansion programme, but there was a world shortage of capital, interest rates were high, and South Africa's reputation as a racist state meant increasing isolation from capital markets. Bringing down the cost of power was being eroded by the high cost of borrowing. The solution was the 1971 Electricity Amendment Act, which allowed ESCOM to raise capital from its own revenue resulting in ESCOM setting up a Capital Development Fund (CDF). The CDF meant that tariffs could be used to build up capital and, thus, protect consumers from large increases in the future. •

1963 to 1973

1963 was a sad year for ESCOM. The second as well as the third chairperson, AM Jacobs, and DR JT Hattingh, passed away.

ESCOM's Medical Aid Society was inaugurated in **1971**.

In **1969**, ESCOM appointed Marie Talitha Potgieter, the first female pupil electrical engineer, at the Umgeni Test Department (Natal Undertaking).

In **1966**, South Africa introduced its first dry-cooling towers at Grootvlei power station. <

The national grid was completed in **1973** and boasted a 25 000km network of power lines.

ESCOM's capital expenditure in **1970** was R163,9 million, R98,2 million of which was spent on new power stations and power station extensions. In 2012, annual capital expenditure was around R19 billion.

DID YOU KNOW?

Work on the Cabora Bassa hydro-electric power scheme began in October 1969. In spite of tough terrain and an ongoing guerrilla war, most of the work was complete by 1975, and supplies from Cabora Bassa started flowing in late **1976**. >

In **1972**, electricity sales to the mining industry comprised 35% of ESCOM's total sales; in 2012, mining accounted for only 14,5% of total sales.

There were 92 students on ESCOM bursaries in **1970**. Currently, Eskom has almost 6 000 learners on bursaries.

Sabie River power station (ESCOM's first power station) was decommissioned in **1963**. <

In September **1969**, ESCOM and the Portuguese government signed an agreement for the building of the Cabora Bassa hydro-electric scheme on the Zambezi River in Mozambique.

The Electricity Amendment Act of **1971** allowed ESCOM to group together the generating stations of two or more of its undertakings. This paved the way for the establishment of the Central Generating Undertaking in January **1972**.

In **1964**, the Electricity Act was amended so that ESCOM could supply "adjoining territories" (neighbouring countries).

ESCOM stopped producing compressed air when it decommissioned Rosherville power station in **1966** and turned the site into a central workshop complex. v

ESCOM's **1968** Annual Report makes the case for transmitting electricity from coal-rich areas (that is, Mpumalanga) by means of high-voltage transmission lines, rather than transporting coal by rail to distant power stations.