

Eskom's third decade

Into the darkness

At the outbreak of war in 1939, the first set of three boilers for extensions to Congella power station (Congella 2) was about to be imported from Great Britain when the British government commandeered it for use in the war effort. In 1943, the ship carrying the replacement set was sunk by a German submarine. Eventually, in 1946, Congella 2 received its boilers and was commissioned, adding a further 40MW capacity to Durban's electricity supply.

The extra supply came in handy, for although electricity demand dipped in 1943 (for only the second time in ESCOM's history), by 1944, when an Allied victory seemed certain, demand increased by 3.3% and by 6.6% the following year. Indeed, fuel and spare parts shortages (during the first part of the war) had placed strain on the system, and ESCOM was hard pressed to meet demand and had to rely on small generators belonging to ISCOR, municipalities, and even the Rand Water Board to keep the system running.

In January 1945, Vaal power station began producing electricity. This power station was built to "feed into the grid system of the Commission and the Victoria Falls and Transvaal power Company, Limited" (1938 Annual Report, p. 6). While it did indeed contribute to the Rand network, it also supplied much-needed power to new goldfields that were springing up in the Free State.

The post-war years saw renewed economic activity and growth, and ESCOM was increasingly called on to beef up its supply to smaller municipalities.

In 1946, the decision was made to build a power station at Worcester in the Cape (this became known as the Hex River station) to strengthen supply to the Western Cape and electrify the railway line from Belville to Touws River (and later to Beaufort West). Also, in 1946, the East London municipality asked ESCOM to augment its supply, and in 1947, an agreement was reached, according to which ESCOM acquired the West Bank power station. The following year, ESCOM extended its reach in the Eastern Cape by acquiring the King William's Town and the Alice municipal undertakings; and together with East London, these three power stations formed the nucleus of what was later called the Border undertaking.

In 1948, ESCOM's finances were in good shape to effect the long-anticipated expropriation of the VFP. ESCOM's capital stood at over £30 million, and total assets exceeded total liabilities by more than £10 million.

There was one major problem to overcome, though; the exact expropriation date was in dispute. The 1922 Electricity Act was ambiguous, and depending on how the law was interpreted, the date could range from November 1947 to November 1950. Dr Van der Bijl was keen to expedite the expropriation and directly appealed to Prime Minister Smuts in a 1944 letter, arguing that early expropriation would save the gold mines £2 million per year. Smuts was unmoved and restated the government's opinion that the later date was the correct one. The gold mining industry had also done its sums and was behind van der Bijl in his quest for early expropriation. In January 1947, Sir Ernest Oppenheimer, Chairman of Anglo American, wrote to Dr Van der Bijl, urging him to expedite the expropriation. He even offered some shrewd advice: "Make an offer to the shareholders at a price slightly above the ruling market price: I have a hunch that this would be cheaper than dealing with [Bernard] Price."

As things turned out, Dr Van der Bijl negotiated with Bernard Price (Chairman of the VFP), and after months of wrangling an agreement, a formal agreement was signed on 16 June 1948, according to which ESCOM would pay the VFP £14.5 million and commit to protecting the interests of VFP staff affected by the takeover.

At the time, it was South Africa's biggest merger and one financed by a public loan of £15 million, which was oversubscribed within hours. ESCOM acquired four power stations (Rosherville, Simmerpan, Vereeniging, and Brakpan) with a total generating capacity of 298MW. It also acquired 2 100km of transmission lines, 1 444km of pilot and telephone lines, as well as 1 000 transformers, 18 distribution substations, and 304 consumer substations.

Although the VFP had valued its assets at £14 million, ESCOM reckoned that their replacement value would be almost double that amount. ESCOM also increased its staff complement of 1 692 to 7 850 people.

While the takeover of the VFP was arguably far-sighted and in the interests

of securing a prosperous future for South Africa, events happening simultaneously in the political arena did not bode well for the country. On 26 May 1948, DF Malan's Herenigde National Party was voted into power by a whites-only electorate. The National Party, as it came to be called in 1951, won only 41.63% of the vote, but the electoral system at the time was constituency-based, and the "first past the post" principle meant that votes in rural areas were worth far more than urban ones.

In the end, it took only 443 719 South Africans to put the country on an inexorable path of racial repression. Apartheid, a rather innocuous word meaning separateness, would take on a more sinister meaning, as the already marginalised black community found themselves, at best, patronised and, at worst, exploited and suppressed. Although Dr Van der Bijl was himself apolitical, he was a patriot who had given up great career prospects in the United States to be of service to his homeland. It is tempting to imagine that he found the racist ideology of apartheid objectionable and that the fateful 1948 elections had contributed to his untimely passing on 2 December 1948 of cancer.

At his funeral, opposition parliamentarian, Sir De Villiers Graaf, described Dr Van der Bijl as "the father of our industrial revolution, the master builder who evolved our whole economic structure".

Albert Jacobs, ESCOM's chief engineer and a commissioner since 1926, took over as Chairman at the beginning of 1949. After the end of the war, ESCOM was faced with a dual challenge: strong industrial demand within South Africa and worldwide shortages in power station plant equipment. In 1949, the Rand Undertaking – an area which accounted for some 80% of South Africa's wealth – experienced severe constraints, and ESCOM consulted the Chamber of Mines to come up with a quota system and emergency rules through which interruptions could be avoided. Meanwhile, ESCOM was furiously planning and designing new power stations, as well as upgrading current stations.

Capital was needed for an ambitious expansion programme, and in 1951, ESCOM secured a \$30 million loan from the International Bank for Reconstruction and Development. The money would help beef up capacity at existing plants as well as pay for the seven new plants that were on order or in advanced stages of planning.

Meanwhile, in early 1950, ESCOM acquired Kimberley's Central power station from De Beers, which became sole supplier to the new Cape Northern Undertaking. This undertaking covered 40 000km² – an area roughly the size of Switzerland – and brought home the point that, as a national power utility, ESCOM had an obligation to supply electricity to remote areas. Hence, in December 1951, the Rural Electrification Department was established to provide power to small consumers outside municipal supply areas.

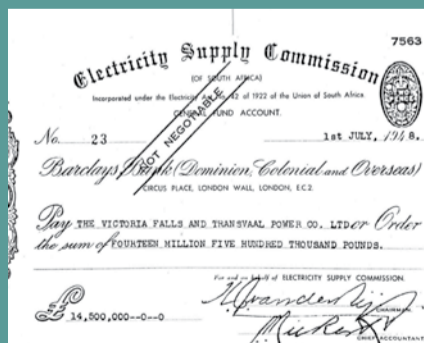
In 1952, Albert Jacobs retired and passed the baton onto Dr JT Hattingh, ESCOM's consulting engineer and a commissioner since 1949. Jacobs had the satisfaction of presiding over the commissioning of Hex River power station, for whose overall design and layout he had personally been responsible. The station's first generator and boiler were commissioned in May 1952, and according to a well-known European supplier of steam turbines, it was the best power station design and layout he had seen anywhere in the world.



AM Jacobs

Did you know!?

- In 1947, England's king and queen, along with the princesses Elizabeth (now the Queen of England) and Margaret, visited ESCOM House.
- In 1948, ESCOM bought the VFP for £14 500 000.
- Between 1945 and 1955, the capacity of ESCOM power stations more than doubled.
- In 1946, ESCOM sold 5 000 million units of electricity (about 2% of today's yearly sales).
- The ESCOM Pension Fund was established in 1950.
- 1943 was only the second year in which ESCOM experienced a decrease in electricity demand (by 1.2%). The first was in 1931.
- The Vaal power station, commissioned in 1945, was the first ESCOM station



situated in the Free State.

- Klip power station was meant to have sufficient coal for 40 years, but in 1948 (just eight years after it had been commissioned), an ESCOM brochure admitted that "the time is approaching when Klip will have to look further afield for its fuel".
- In the early 1940s, ESCOM contributed £124 875 towards the cost of the Vaalbank Dam, which gave it the right to draw 84 megalitres of water per day from the Vaal River – an adequate supply of cooling water for both Klip and Vaal power stations.
- On completion in 1945, Vaal power station's cooling towers stood 72m high, making them taller than ESCOM House and the tallest structures in South Africa at the time.
- The ESCOM Annual Report of 1948 paid tribute to Dr Van der Bijl (on his passing) with these words: "The Commission is his creation and his monument, but it is not only as administrator, industrialist and scientist that Hendrik Johannes van der Bijl will be remembered. His humanity, his kindness and his charm endeared him to everyone, and all who worked with him will remember him with affection."
- In 1949, power shortages led to the suspension of all new applications for connections to the network, with the exception of essential services.



1953
to
1963

Eskom's forth decade

The wonder years

The 1950s were a time of economic prosperity, as the tough war years gave way to unprecedented economic expansion in many parts of the world. South Africa was swept up in this boom, which allowed ESCOM to embark on a period of massive expansion. Consumer goods and, especially, electrical appliances were becoming more available and affordable, and South Africans were eager to join the worldwide rush to plug into a more convenient lifestyle.

There were other, even greater forces at work, driving the demand for electricity in the 1950s. The use of atomic bombs in America's defeat of Japan set off a global rush to harness nuclear energy for peaceful means. In 1951, America's Atomic Energy Commission proved that it was possible to generate electricity from nuclear energy using uranium for fuel. This sparked international demand for uranium, which is found in the same ore structures as gold, and meant that South Africa's sophisticated gold-mining industry was in a good position to exploit this valuable by-product. But extracting uranium is an energy-intensive business, and ESCOM was called on to beef up the Rand Undertaking. ESCOM's answer to the plea for more power was to build Wilge power station at Ogies on the Witbank coalfields – and to build it at record speed! Such was the haste of the construction that they did not bother to build boiler houses, which meant that the first eight boilers stood exposed to the elements.

Thanks to its abundant reserves of uranium, South Africa was drawn into the international nuclear community, and the government sought to make the most of the situation.

From 1954 onwards, ESCOM's Chairman, Dr JT Hattingh, sat on numerous committees that investigated the possibility of using nuclear energy for industrial purposes. Although there were plenty of interest and enthusiasm for nuclear energy at the time (similar perhaps to the current push for renewable energy), Dr Hattingh remained phlegmatic. He retained this cautious approach to nuclear power throughout his tenure as Chairman and instead pushed ahead with unprecedented expansion to South Africa's coal-powered generation fleet.

When, in 1957, the Special Commission into the Application of Nuclear Power asked him whether ESCOM ever deemed it necessary to implement power cuts due to a shortage of coal, his answer was "No".

The Chairman did not take into account the fact that coal mining for the supply of South Africa's voracious power stations came at a terrible price paid in human lives and limbs. The accident rate in South African coal mines was one of the highest in the world. On 21 January

1960, 431 miners were trapped when a large chunk of the Coalbrook North section of the Clydesdale Colliery in the northern Free State collapsed. Highveld and Taaibos were entirely dependent on the Clydesdale Colliery, and so emergency measures were undertaken to get them running at full steam. Although ESCOM managed to avert any major disruption to the network, the human cost was staggering.



A Mining Safety Committee was formed, and it did indeed put safety first by closing down dangerous collieries – which meant significant cuts to the power supply. Consumers had to make do with less, and the gold-mining industry took a big hit.

Meanwhile, the attitude of the State towards the majority of the country's citizens was causing increasing upheaval. The Defiance Campaign began in 1952, followed by the adoption of the "Freedom Charter" in 1955. In March 1961, the recently formed Pan African Congress (PAC) protested against the hated pass laws, which severely limited the freedom of movement of African people. Protests spread throughout the country, though the government was not ready to undo apartheid just yet.

Fortunately for ESCOM, the ANC and the PAC did not perceive South Africa's power utility as a legitimate target, and so, for the moment, things carried on more or less as normal. "Normal" was, in this case, rather extraordinary, as ESCOM achieved extraordinary growth. From 1952 to 1959, eight new power stations went into commission: Hex River, Vierfontein, Umgeni, Wilge, Salt River 2, West Bank 2, Taaibos, and Highveld. Additional capacity was added to Central, Colenso, Klip, Vaal, Vereeniging, and Witbank.

Vierfontein, the first power station to be commissioned in 1953, was situated in the Free State and supplied both the Klerksdorp/Kimberley area and the Free State goldfields – three generators dedicated to the former and the remaining nine to the latter. Cape Town received a boost to its supply when Salt River 2 began operations in 1955. East

London's West Bank 2 added 85MW to that town's supply in 1956.

It became apparent that, with the bigger power stations, the standard generator size of the time had to be upped from 30MW to 60MW.

This necessitated switching to pulverised fuel (PF) firing. Although PF had been used in Congella in 1928, the performance of the station was compromised by what was really experimental technology. But PF technology had matured by the 1950s and was used in the second phase of the Wilge power station. It was also used in Taaibos and Highveld power stations. Taaibos, commissioned in 1954, was situated in Sasolburg in the Free State and was built to satisfy the growing industrial demand in the Vaal Triangle. Highveld, adjacent to Taaibos, was commissioned five years later and, like Taaibos, boasted an installed capacity of 480MW.

Increased transmission was necessary, as ESCOM sought to supply the Free State goldfields with electricity from the Taaibos/Highveld complex. New technology allowed for higher transmission voltages, and 275kV (the standard at the time was 132kV) was decided on. This meant that ESCOM could use 300kV class international standard equipment, rerated for an altitude of 1 500m.

In 1945, ESCOM's total generating capacity was 1 217MW; by the end of 1954, it was 2 052MW; and by the end of 1959, it had increased to 3 297MW – a growth of 170% in 14 years. It was an astounding achievement for ESCOM and allowed South Africa to benefit from international demand (driven by the post-war economic boom) for its commodities.

Not only did ESCOM grow its generation capacity in the 1950s, but it also interconnected power stations and extended its transmission system. Furthermore, by March 1961, ESCOM had another 1 265MW of generating capacity on order. By 1960, ESCOM had also extended its supply area to 191 100km². The development of new transmission technology meant that ESCOM was now able to send blocks of power over large distances and could save considerable amounts of money through pooling. Hence, in 1955, generation on the Rand, Eastern Transvaal, and Cape Northern undertakings was pooled. The

Natal Southern and Central undertakings were also pooled that same year.

Another development of the 1950s was the demand from municipalities, many of whom abandoned expensive local generation and bought bulk from ESCOM. In 1945, ESCOM sold 565 million units of electricity to municipalities, and by 1955, that figure had jumped to 2 051 million units.

ESCOM needed more office space, and in 1958, the organisation's head offices moved to ESCOM Centre in Braamfontein. It was only 2km from the city centre; yet many people felt as if ESCOM was moving "into the wilderness". But soon afterwards, Braamfontein became a bustling business district, and ESCOM's move proved prescient.

In 1962, JT Hattingh had reached the end of his term, and ESCOM needed a replacement. Professor Reinhardt Ludwig Straszacker had been a member of ESCOM since 1952 and was well versed regarding the organisation, although he was aware that, as Chairman he would be entering what was for him, as a scientist, uncharted territory: "The engineer must bring the analytical elements into a whole, which is more than the sum of the individual elements. The analytically-inclined person has got to fight for coming back to the synthesis, because the elements themselves are not the end results."

Straszacker would oversee some momentous changes in the organisation, as ESCOM embraced innovation and technology like never before. The start of his tenure coincided with the commissioning of Komati power station. After detailed investigation, it was decided that the abundance of coal in the Highveld of Mpumalanga province (then Eastern Transvaal) made it an ideal area to replace the Vaal Triangle as the centre for generation. Komati power station was situated between Bethal and Middelburg and got its name from the Komati River, although its water, in fact, came from Nootgedacht Dam 65km away. Komati's first unit came online in 1962, and it was completed in 1966, boasting five sets of 100MW each and four of 125MW each, with a final capacity of 1 000MW.

In the next edition ...

The expansion of ESCOM's generation fleet continues apace; the push for nuclear power gathers momentum; some major hydropower projects in the works; and ESCOM establishes a national grid.

Did you know!?

- In 1957, work was done on the Electricity Act, No. 42 of 1922, to change the original Dutch to Afrikaans and to incorporate amendments.
- In 1957, the government appointed a commission of enquiry to look into the use of nuclear energy in South Africa.
- ESCOM'S annual power sales reached 16 billion units in 1960; these sales showed an increase of 133% over a 10-year period.
- ESCOM'S generating capacity was 3 479MW in 1960; today, it is almost 10 times that amount.
- In 1961, ESCOM employed 15 441 people.
- A national power network was established in 1960.
- In the 1950s, South Africa's reserves of uranium made it a major player in the nuclear power industry, and by 1956, the country was producing 3 677 tons of the metal.
- In 1961, South Africa generated 57% of Africa's electricity. Now, that figure is around 66% (Symphony, p. 168).
- Ian McRae was the first resident engineer of Komati power station (commissioned in 1962). He would later become the first Chief Executive of ESCOM.
- In 1954, JT Hattingh predicted that, for "the next 20 or 25 years", nuclear power would be impractical. His prediction proved spot on, and construction on Koeberg power station only began in 1976.

