

1973 - 1983

To an ESCOM planner in the 1960s and 1970s, the idea that South Africa could end up with too much power capacity must have seemed laughable. Putting aside the post-Second World War boom, the 1970s saw the biggest growth in electricity consumption in South Africa's history. In 1973, demand grew by 12% and by 13% the following year. The average annual growth for ESCOM's sixth decade was almost 9%.

Growing international pressure towards South Africa's apartheid government seemed only to harden its resolve. In spite of growing isolation, there was still strong global demand for South Africa's gold, minerals, iron ore, steel, and coal. What South Africa lacked were oil and gas. Thus it was that ESCOM relied so heavily on coal and, particularly, low-grade coal (or "black-painted" rock as some power station operators called it).

So the 1970s saw ever bigger coal-fired power stations popping up in the Mpumalanga veld. Arnot had begun commercial service in 1971, and it was becoming apparent that its 350 MW sets (massive for the time) would be too small for future stations. With an annual growth in power demand of 9%, ESCOM would need to double capacity every eight years, which translated to a further 10 000 MW by 1980.

Kriel was the first of the "six-packs" (so-called because of their six tall, and very prominent, boiler houses) and featured new "once-through" technology, where steam "bypasses the turbine while the boiler is warmed up or when the turbine is shut down".

From the start, there were challenges in getting the most out of Kriel, which was once ESCOM's biggest power station. The boilers were susceptible to slagging, and new mill foundations had to be built when the heavy milling

machinery created dangerous vibrations. On completion, in 1979, Kriel consisted of six sets of 500 MW each and was one of the largest coal-fired power stations in the southern hemisphere, as well as being of the world's first to receive its coal from a fully mechanised coal mine.

Meanwhile, Duvha, like Kriel, was a "six-pack" power station, with separate housing for its turbine generators. Unlike Kriel, the boilers were of a conventional design and used natural circulation and not once-through. Kriel began commercial operation in 1979 and, on completion (in 1983), boasted six sets of 500 MW each. It was distinctive for its boiler house superstructure – constructed from concrete in order to reduce lead time and capital costs amid a world shortage of steel.

Duvha Power Station was the third and final "six-pack" and was built near Witbank in Mpumalanga. It, too, used a "once-through" boiler technology, but instead of six 500 MW sets, it consisted of six 600 MW sets.

The boilers proved more reliable than Kriel's, but there were still challenges, particularly of an environmental nature. The precipitators on Duvha's first three units did not reduce emissions to acceptable levels, and the pollution problem was only solved in 1984 when the offending units were retrofitted with pulse-jet fabric filter plants – a world first. Another first for Duvha came in the form of a man by the name of Ehud Matya – ESCOM's first black power station manager.

In the 1970s, ESCOM's environmental challenges paled into insignificance compared to the crisis that it faced on 5 December 1975. An interconnected transmission system, while preferable, had its risks, and faults could spread to the entire country. This is exactly what happened on that particular day, when a relay malfunctioned at the Hydra substation near De Aar. Much of the country went without power for 24 hours, and ESCOM had to rethink its transmission system. In 1976, ESCOM addressed the problem by building two gas turbine stations, one near Cape Town and the other near East London. The year 1976 saw the completion of Hendrina power station and Gariep (then Hendrik Verwoerd) hydro power station (Arnot had been completed the previous year).

ESCOM itself was not a capitalist enterprise, and in the 1970s, many South Africans began to see it as inefficient, especially when the price of electricity started to rise. The problem was that ESCOM had to finance most of its own growth. At the same time, ESCOM feared that if it did not expand, the country would run out of power. In 1977, consumers were paying 166% more for electricity than in 1971.

Unsurprisingly, the move to Megawatt Park in 1977 was not greeted favourably by the public, who saw it as an example of ESCOM's wasteful expenditure. The upshot of all this was that, in 1977, the Minister of Economic Affairs asked the Board of

Trade and Industries to investigate the supply of electricity in South Africa.

ESCOM cooperated with the board to seek the best solution for the utility and for the South African economy. In the end, ESCOM did away with the Central General Undertaking (CGU) and modernised its accounting system. Although the Capital Development Fund (CDF) and ESCOM's insistence on large reserve plant margins came under attack, they were ultimately defended by the government, which shouldered some of the blame for the sharp price increases. ESCOM defended its spending on expansion by arguing that, without it, South Africa would have faced not only an oil shortage crisis, but an electricity shortage crisis, too. In 1979, Jan H Smith, ESCOM's General Manager at the time, lambasted the Board of Trade and Industry for their use of the word "profit". Then, as now, the term is a potentially misleading one, given that ESCOM's profits do not enrich private investors, but are used to expand South Africa's electricity system.

In 1980, the chairman of ESCOM, Reinhardt Strasacker, retired, and it was the same Jan H Smith who grasped the baton. Smith, who raised tortoises as pets because he admired their tenacity, was known for being a "man in a hurry". He was nicknamed "Mr Kilowatt-hour", a reference to his ability to reduce



complex planning issues to the effect they would have on the cost of a kilowatt-hour of electricity.

Unfortunately for ESCOM, although Smith was famous for being a top-class planner, he overestimated South Africa's future electricity needs. He was not helped by the fact that there were delays in the building of Koeberg, and the power from Cahora Bassa (then called Cabora Bassa) was so unreliable as to be arguably worse than no supply at all. With sanctions starting to bite, it was feared that ESCOM would be unable to complete Koeberg at all, and so certain planning schools of thought discounted nuclear power from the equation. The upshot was that ESCOM urgently began building more power stations in anticipation of continued high growth in demand. The early 1980s saw construction begin on Lethabo, Matimba, and Kendal power stations. This would add almost 12 000 MW to the system and create a problem that seemed almost unthinkable at the time: what to do with masses of excess electricity. •

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DID YOU KNOW?

In 1976, in an attempt to empower black artisans, ESCOM created the Artisan Recognition and Training Scheme. This allowed black artisan assistants to be trained up to artisan level.



▲ The boilers for **Kriel Power Station** (first commercial service: 1976) – at 60 m high, with a furnace cross section of 20 m by 15 m, and containing 9 000 t of steel – were by far ESCOM's biggest at the time.

ESCOM moved its head office to Megawatt Park in 1977.

Kriel Power Station (completed in 1979) was one of the first coal-fired power stations in the world to receive its coal from a fully mechanised coal mine.

The chimney of **Matla Power Station** (first unit commissioned in 1979) had to be demolished when it was discovered that a supervisor had been stealing the reinforcing rods and selling them as scrap.

In the early 1980s, the production of one unit of electricity used up about two and a half litres of water. Twenty years later, average water usage was less than half that amount.

Between 1950 and 1980, ESCOM increased its share of the electricity market in southern African from 71% to over 93%.



▲ Duvha Power Station (first unit completed in 1980) boasted the largest opencast colliery and the largest free-standing concrete structures (chimneys) in the southern hemisphere.



Between 1930 and 1980, the annual percentage growth in the demand for ESCOM's electricity exceeded South Africa's growth rate in every single year, but for one. The 1980 Annual Report put this phenomenon down to "increasing industrialisation".

The Drakensberg Pumped-storage Scheme (commissioned in 1981) was constructed entirely underground. ▼



From 1973 to 1982, ESCOM averaged an annualised growth in electricity of almost 9%.



Jan H Smith, chairman of ESCOM from 1980 to 1985, raised tortoises as pets because he admired their tenacity. Unlike his pets, he was known for "always being in a hurry". ▼