

1923
to
1933

Eskom's first decade

Electrifying our beloved country

On 1 March 2013 Eskom will celebrate its 90th birthday. Over the next nine months Eskom News will run a series of articles to help raise awareness about Eskom's heritage and build up excitement for the big day. Let us look at the years leading up to, and including, Eskom's first decade.

For South Africans living at the turn of the 19th century, the introduction of electricity must have been as exciting a development as the internet is to our generation today. But, like all new inventions and innovations, it took time before electricity began to impact people's lives in a major way.

The good townspeople of Kimberley were the first in Africa to experience the joys of electric streetlights (1882), and they even managed to beat London to it.

In 1886 an Australian prospector by the name of George Harrison stumbled upon a gold outcrop, in what is now Johannesburg, and declared a claim with the government of the Zuid Afrikaanse Republiek. Harrison is believed to have sold his claim for less than 10 pounds – but in any event he was not heard of or seen again. From then on mining was to be the main driver of development in South Africa as thousands of immigrants flocked to the city of gold seeking their fortune. Johannesburg grew rapidly – within five years of its existence it became South Africa's first city to install an electricity reticulation system, which was powered by steam engines. This is remarkable considering that Cape Town is 200 years older than Johannesburg. Soon the mining companies realised that steam-generated power was inadequate for their needs and they joined forces to build small power stations to supplement the existing supply. In 1906 these smaller undertakings were bought out by the Victoria Falls Power Company (VFP) as the mining bosses sought large centralised power stations as opposed to small dedicated ones.

By 1915 the VFP – so named because of its original aim to harness hydro-electric power from Victoria Falls – had built four thermal power stations (Brakpan, Simmerpan, Rosherville and Vereeniging) with a total installed capacity of 160 megawatts. At around the same time, a system control centre was

established at Simmerpan, which later developed into the ESCOM National Control Centre. Today, this Centre controls the national network, as well as the generating output of all ESCOM power stations. Meanwhile, in 1910, the Transvaal Colonial Government, realising the strategic importance of electricity, passed The Power Act. This piece of legislation defined electricity as a public service, and gave the government the power to expropriate private electricity undertakings after a period of 35 years.

From the earliest days of rail in South Africa, SAR (South African Railways) had been considering the idea of using electricity, as opposed to steam, to power the railways. In 1918 SAR invited a top London engineer by the name of Charles Merz to brief them on the matter. The Merz Report was submitted to Jan Smuts's government in April 1920, which formed a committee to look into how South Africa should proceed with electrification. The findings of this committee led to the passing of the Electricity Act of 1922 which laid the foundations of the development of an electricity supply industry in South Africa to "stimulate the provision, wherever required, of a cheap and abundant supply of electricity". From then on the South African electricity industry would be regulated, controlled, and ultimately run by a parastatal.

One of the principle authors of the Electricity Act was a certain Dr Hendrik Johannes van der Bijl, a brilliant young research scientist whom the Smuts government had appointed to advise them on industrial development.

It was van der Bijl's vision that South Africa should take its rightful place among the world's leading industrialised nations by 1) setting up a reliable, low-cost electricity power supply, and 2) establishing an iron and steel industry.

It was partly thanks to his farsighted vision that the Government Gazette of 6 March 1923 announced the establishment of the

Electricity Supply Commission (ESCOM), effective from 1 March 1923. Dr Van der Bijl's passion for industrialisation was given free expression as he took up the reins as ESCOM's first chairman. This great South African industrialist laid out exactly what he had in mind for his newborn infant.

"There lies before the Electricity Supply Commission a great task and a great opportunity. It will be our endeavour to play our part not as those who follow where others lead, but as pioneers; to foresee the needs of a country fast developing, and by wise anticipation be ever ready to provide power without profit, wherever it may be required." (Dr van der Bijl)

Hendrik van der Bijl
CHAIRMAN

Although the commission held its first meeting in Cape Town (20 March 1923), it soon situated its headquarters on the first storey of Hofman's Building in Johannesburg, before moving to Electricity House in 1924. At that time, railways across the country were being electrified, and ESCOM was tasked with taking over electrification of the Glencoe to Pietermaritzburg rail link, as well as the Cape Town suburban railways. It also began work on the establishment of new power stations in Cape Town, Durban, Sabie and Witbank. Although the VFP, very much the major electricity supplier in the Transvaal, had initially applied to ESCOM to erect a power station at Witbank, Dr van der Bijl opposed the application on the grounds that the VFP did not sell electricity at cost, and that electricity consumers would in effect be enriching VFP shareholders. After some negotiations, and the timely intervention of Prime Minister Smuts himself, a deal was struck whereby ESCOM would own and finance the power station that would be designed, built and operated by the VFP. Witbank power station was commissioned in 1926 and the arrangement turned out

to be a win-win situation for all parties. In that same year a power station was commissioned in Colenso and two years after that Congella and Salt River 1 coal-fired power stations were commissioned.

In 1925 ESCOM erected the Malieveldspruit hydro station as a temporary measure while a bigger hydro station was being built at the Sabie River Gorge, which eventually became operational halfway through 1927. These two power stations were the first to be built and used by ESCOM.

In spite of a worldwide economic depression in 1929, ESCOM still enjoyed strong demand – with sales of 800 million units that year.

In response to the increased demand, two additional sets of 20MW were commissioned at Witbank power station, bringing its total capacity to 100MW. Witbank was now the largest power station in the country, producing the cheapest electricity in the world. And ESCOM's construction of Doornpoort Dam (in the Great Olifants River) meant Witbank now enjoyed abundant water and electricity supply, allowing for the development of the coal-mining industry in the surrounding area. ESCOM also designed and installed a street lighting system for the town that became an international showpiece.

In 1932 South African mining received a major boost when the discovery of gold-fields near Randfontein coincided with a steep rise in the gold price. It became clear that ESCOM would have to build new power stations to satisfy the increasing demand of the gold mines. But first there were two major obstacles to be overcome: the VFP had a virtual monopoly on electricity supply to the gold-mines; and there was a serious shortage of water near the Rand.

In next month's edition we look at how ESCOM solved these issues and built the largest power station in the southern hemisphere.

Did you know???

- Kimberley had street lights before London. Kimberley installed 16 electric street lights in 1882.
- The Victoria Falls Power Company (VFP) was so-named because of its original intention to source hydro-electric power from Victoria Falls.
- The Transvaal Power Act of 1910 gave the state the authority to expropriate an undertaking (power company) 37 years (later shortened to 35 plus 2 years notice) after granting it a license to operate.
- In 1929 ESCOM sold 800 million units of electricity. Now, ESKOM gets through that in about a day and a half. (ESKOM now sells around 220 000 million units – or 275 times as much as it did in 1929)
- The Sabie River Gorge hydro station, completed in 1927, was the first power station to be designed by ESCOM engineers.
- ESCOM employed its first cleaner in 1924; his name was Alfred and he was paid 4 pounds a month. (Roughly R1 800 in today's terms).
- In 1924 an employee received a bicycle allowance of 7 shillings and 6 pence; and ESCOM granted a car allowance of 12 pounds a month.
- In its first year ESCOM sold 80 million units of electricity (1 unit = 1 kilowatt-hour)
- In 1914, a senior engineer at the VFP could earn as much as 2 000 pounds a year – almost R1m in today's money.
- In 1920 Dr H.J. van der Bijl was appointed as a scientific and technical adviser to the government – he was 33.
- Congella power station (commissioned in 1928) was one of the first in the world to use pulverised-fuel.
- South Africa's first power station pooling agreement came about in 1932 when ESCOM's Salt River 1 and Cape Town's Dock Road power stations were interconnected and run as a single entity.
- ESCOM's first power station was Malievelde – a temporary hydroelectric station built on the Sabie River in 1925 while the Sabie power station was being completed.
- The South African Iron and Steel Corporation (ISCOR), another van der Bijl brainchild, was established in 1928.
- In his role as a technical advisor to government (before ESCOM was founded) Dr van der Bijl dealt with such diverse matters as weights and measures; metrification; and allaying fears regarding the glucose content in South African jam exports.



Eskom's second decade

All that glitters is gold



In 1932 South African mining received a major boost when the discovery of gold-fields near Randfontein coincided with a steep rise in the gold price. It became clear that ESCOM would have to build new power stations to satisfy the increasing demand of the gold mines. But first there were two major obstacles to be overcome: the VFP had a virtual monopoly on electricity supply to the gold-mines; and there was a serious shortage of water near the Rand.

In 1933 ESCOM put its finances on the front foot by floating loans (by public subscription) worth £3m. The South African public showed confidence in the organisation; the loans were over-subscribed before closing, and ESCOM repaid £2 250 000 to the government. The following year ESCOM raised another loan for £6 750 000 (again by public subscription and which was again oversubscribed) and settled its outstanding debt to government, which at that time stood at £5 750 000. In just 11 years ESCOM had repaid its £8m debt to government and from then on raised capital via public subscriptions within South Africa. This was no small achievement given that the two government loans were redeemable in 1954 and 1979. The 1933 Annual Report proudly notes that "as a result of the repayment of the above loans the saving to the Commission's consumers, calculated over the period of these loans, will exceed £5 750 000." Although it could raise the capital, ESCOM did not have the expertise to build and run a massive power station; that was something only the VFP could handle. But the VFP was a private company whose central purpose was to generate profits for shareholders. ESCOM, on the other hand, was set up to "stimulate the provision of a cheap and abundant supply of electricity", and was run for the good of the South African public.

Dr van der Bijl was adamant that any further expansion to the grid should be financed and owned by ESCOM so that the country as a whole, and not private shareholders, would benefit from economic development. In the 1933 Annual Report, mention is made that in March 1934 ESCOM applied, and received, permission from the Minister of Commerce and Industries to establish "an undertaking for the supply of

electricity on the Witwatersrand and in the adjoining areas."

The license for the undertaking, which became known as the Rand Extension Undertaking and ultimately covered an area stretching from Delmas in the east to Klerksdorp in the west, was ceded to the VFP. This meant that ESCOM would provide the capital for the VFP to design, build and run substations and transmission lines in this 29 000 square kilometre area. It was also noted in the 1933 Annual Report that the Minister had approved the establishment of a "generating station in the Vereeniging District of the Transvaal". This was the Klip power station, which was to be designed and built by the VFP, and financed by ESCOM. In the event the VFP teamed up with Charles Merz's firm of consulting engineers (Merz & McLellan) in the design of the power station. However, the water shortage problem was to be solved by a leading South African engineer, Dr FE Kanthack, who was appointed the Civil Consulting Engineer on the project. Thanks to Dr Kanthack's innovative cooling towers only 1% of the total flow of water would be lost to evaporation, and the meagre flow of the Klip River would not be overly taxed.

Meanwhile in 1934, in the Cape, the Salt River power station more than doubled in size when two 20 MW sets were added. The following year a further 20 MW (with a generating voltage of 33 kV) set was added bringing its overall generating capacity to 90 MW. By 1938 the Cape Municipality had completed their own power station, Table Bay, which then became part of a pooling agreement with Salt River, which was relegated to a peak load system.

The pooling system demonstrated the advantages of interconnected power stations and centralised control, and proved the farsightedness of the Electricity

Act which had envisaged ESCOM as a co-ordinator of electricity suppliers.

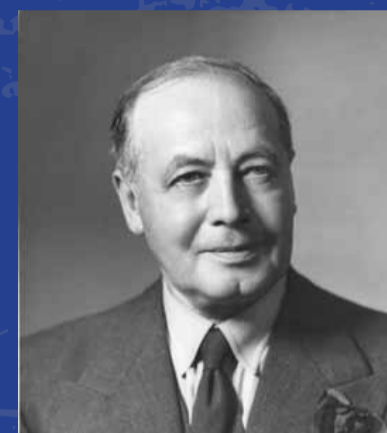
In 1938 work began on the Vaal power station, which was situated just south of Vereeniging, and was the first ESCOM station in the Orange Free State (now known as the Free State). Similar to Klip, the Vaal power station was to be financed by ESCOM, but built and run by the VFP.

In 1939 ESCOM decided to beef up Durban's power supply by building a second power station at Congella. Advances in technology meant that the new power station's boilers would boast steam pressures of 4.3 MPa (which is 42 times atmospheric pressure), as opposed to the existing norm of 1.9 MPa. Congella was also the first power station to have an electrical generator with a capacity of 40 MW (as opposed to 33 MW) and like Salt River, the generating voltage was racked up to 33 kV. Unfortunately, some key equipment needed to be imported from Britain, and when the Second World War broke out later that year Congella's first set and three boilers were commandeered for Earley power station in Great Britain, which supplied power for war industries.

Although many Afrikaners thought South Africa should fight on the side of Germany, Jan Smuts, who swept to power soon after the outbreak of war, persuaded the majority of whites to get behind Britain and the allies. With South Africa's economy now geared for war, Prime Minister Smuts wasted no time in asking Dr van der Bijl to join the cabinet and take over the position of Director-General of War Supplies. Van der Bijl accepted the position but refused a cabinet post for fear of being embroiled in party politics. "At present I have no enemies that I know of, but if I join the Cabinet I shall immediately have 40% of the population against me..." The revealing quotation suggests that Dr van der Bijl's seemingly neutral views

betray a typical white attitude of the time, that when it came to politics and power, blacks did not count.

Nonetheless Dr van der Bijl performed his duties with such distinction that Smuts extended his control to the manufacture of all necessities in the country, including military and civilian necessities alike. **Chief Engineer Albert Jacobs took on the day-to-day job of running ESCOM whilst van der Bijl got behind the war effort. The experience must have stood Albert Jacobs in good stead for his eventual promotion to Chairman in 1948.**



Klip power station was commissioned early in 1940; just months after war had been declared in Europe. The station consisted of twelve 33 MW units and four 7 MW house sets. At 424 MW it was the largest power station in the Southern Hemisphere and four times the size of Witbank. It was also more economical than Witbank and proved once and for all that a large power station situated on a coal mine was the answer to cheap power.

In the next edition...the end of war sees major expansion for ESCOM; Dr van der Bijl seeks to save money for South African consumers by expediting the expropriation of the VFP; and trouble at sea.

Did you know???

- In 1935 ESCOM appointed Frenchman, and Boer War veteran, Raoul Martin to manage the Sabie River power station. ESCOM gave Martin a rifle so that he could defend himself from Sabie's plentiful population of lions.
- ESCOM's first newsletter, ESCOM Magazine, was published in 1936. In 1938 it enjoyed a national paid circulation of 22 000 copies.
- In 1937 ESCOM House, situated in Johannesburg, was opened by Prime Minister Jan Smuts. At 21 storeys (72 meters in height) it was South Africa's tallest building. The Carlton Centre, currently South Africa's tallest building, is more than three times taller at 223m.
- In 1937 ESCOM sold 2 500 million units of electricity, a mere 1.13% of what the organisation currently sells in a year.
- In 1937 ESCOM pioneered the use of concrete pylons for its distribution system. The use of concrete helped reduce cost and improve safety.
- Power generation technology has some of its roots in shipping, hence terminology like 'fleet', 'cladding', 'gantries', 'bilges', and 'sumps'.
- In the early 1930s discarded locomotive boiler tubes were used for transmission line pylons between Pietermaritzburg and Cato Ridge. (1934 Annual Report)
- The Vaal power station, begun in 1938, was ESCOM's first power station to be situated in the Orange Free State (now known as the Free State). (pg. 94 Symphony)
- In 1935 the average electricity use of the domestic ESCOM consumer was 1030 units (kw hours) per year. Today households use at least 10 times that amount. (1935 Annual Report)
- In 1941 mention was made for the first time of a Pension Fund in the Annual Report.
- In order to save on resources such as paper, the annual reports during the Second World War (1939-1945) were kept as brief as possible and did not contain photographs.
- During the Second World War the VFP manufactured weaponry at its Rosherville workshops. (pg. 95 Symphony)
- In 1937 ESCOM House boasted a 'Hall of Achievement' which consisted of a permanent display of "approved domestic electrical appliances from different countries, to encourage the domestic use of electricity and to facilitate selection by prospective buyers." (1936 Annual Report). The Annual Report does not mention if the electric can opener (invented in 1931) was one such appliance on display.
- In 1938 ESCOM arranged 'electric cooking' demonstrations at ESCOM House which were attended by, among others, domestic science pupils. (1938 Annual Report)
- In 1940 one 40 000 kW set and three 200 000 lbs/hr boilers were being completed in Great Britain when ESCOM agreed to release them to the British Government to aid them in their war effort. Britain, in turn, agreed to prioritise the manufacture of replacements.
- In 1937 Klip power station achieved a thermal efficiency of 21.7%. By contrast, Medupi, on completion, would enjoy a thermal efficiency of 40%.
- Dr van der Bijl declined a cabinet post in 1939 because he did not want to waste time, as he put it, "making conciliatory and tactful speeches".
- Dr van der Bijl signed off the Annual Reports with this flourish: "By Order of the Commission, I have the honour to be, Sir, Your obedient servant."
- Dr FE Kanthack's innovative design for the Klip power station cooling towers helped to limit the use of river water. These structures cooled water by evaporating only 1% of the total flow. (pg. 92 Symphony)
- At the outbreak of war in Europe in 1939 special measures were taken to safeguard the continued supply of electricity...at certain centres employees enrolled into military units to augment regular guards at power stations and substations.

