



Reducing water consumption: Eskom

Eskom is a large consumer of freshwater in South Africa, accounting for approximately 1.5% of the country's total consumption annually. Eskom power stations run constantly, supplying in excess of 95% of South Africa's electrical energy and more than half of the electricity used on the African continent. Without water, this output would not be possible.

Eskom uses raw water, which is put through extensive purification and treatment before entering the production processes. The salinity of the raw water dictates the volume of effluents that are produced during the treatment process. During 2004, Eskom used 277.6 million cubic meters of water for electricity generation, mainly at its coal-fired power stations.

The water catchment areas in which many of Eskom's power stations were built are relatively water scarce, necessitating the need for inter-basin transfers. Over the years, various water supply schemes have been constructed to supply the necessary water to the power stations. These schemes consist of dams, pipelines, pumping stations and reservoirs and are inter-linked and operated as a system.

It is expected that Eskom's water consumption will increase over the next 10 years, due to increased demand for electricity. Water use targets in terms of liters of water used per unit of electricity sent out are set for each power station every year. The water targets are linked to the Eskom Sustainability Index contained in performance compacts, which are in turn linked to business unit and individual performance bonuses. The targets are benchmarked against historical as well as theoretical water consumption for each particular type of plant.

Over the last two decades Eskom has introduced a number of innovative technologies to save water. These include dry cooling, desalination of polluted mine water for use at the power stations, and technical improvements on treatment regimes to maximize the beneficial use of water. In so doing, more than two hundred million liters of water are saved every day.

- **Dry Cooling Technology**- Dry-cooling technology does not rely on evaporative cooling for the functioning of the main systems. As a result, overall power station water use is approximately 15 times lower than a conventional wet-cooled power station. This water conservation effort results in an estimated combined savings of over 200 Ml/day, or in excess of 70 million m³/annum.
- **Desalination** - Where power station design permits, Eskom has endorsed a policy of zero liquid effluent discharge (ZLED) at its wet cooled stations. In terms of the ZLED policy, water is cascaded from good to poor quality uses until all pollutants are finally captured in the ash dams. The objective is to dispose of the maximum mass of salts with the smallest possible volume of water without compromising the ability of the ash to encapsulate the salt load imposed.
- **Water Infrastructure** - Eskom has over the past 40 years contributed to the development of an extensive network of pipelines and dams with the South African Department of Water Affairs and Forestry (DWAF), especially on the Mpumalanga Highveld. This has been done through partnering with DWAF in either directly contributing to the infrastructure development financially or by joint involvement in projects. These projects, primarily aimed at providing a secure water supply to the power stations and their associated collieries, has had a significant impact on the viability of supplying water to both industries in the area and water for domestic use.
- **Water Metering and Monitoring** - The DWAF measures the water they supply to the power stations at the boundary of the power station terrace. Eskom and DWAF have adopted a metering procedure which has seen the implementation of revenue class meters that measure to a level of accuracy of 0.5%. This is an improvement on the previously accepted 5% level of accuracy.
- **Demand Side Management** - Electricity demand side management as practiced in Eskom endeavors to integrate the demand and supply side options to find the lowest cost options for the provision of electricity. Although water conservation has not been the primary motive for these initiatives, there have been water savings spin-offs. For every kilowatt-hour of electricity that is saved, approximately 1.26 liters of water is also saved on average.



- International Co-operation - Eskom is a participant in the Southern African Power Pool, which allows for the trading of electricity between countries in Southern Africa. This means that Eskom can import electricity from neighboring countries to meet increased demands. Since the electricity generated in the countries to the north of South Africa is mainly from hydro power stations, e.g., Cahora Bassa in Mozambique, the importation of this electricity effectively reduces the utilization of South Africa's water resources for electricity generation.

The quantity of energy produced between 1993 and 2004 has increased by 43%, as opposed to an increase in water consumption by 27%. This improved water use efficiency equates to a cumulative savings of 1,400 million m³ over the period if compared to the quantity of water that would have been used if these power stations were of the wet cooled type. This is approximately five times Eskom's average water use per annum.

Eskom's water conservation initiatives, i.e., dry cooling, ZLED and the focus on the judicious use of water at all facilities, have resulted in a significant reduction in the overall specific water consumption over the years, from approximately 2.85 l/kWh in 1980 to 1.26 l/USO in 2004.

Access to water and water availability remains a key factor in ensuring the sustainability of development in southern Africa. The efforts by Eskom to use this precious resource more efficiently are an integral part of the company's commitment to sustainable development.

Further information

- Download the complete case study ( [197 kb](#)/ [528 kb](#))
- [Eskom](#)