

HYDRO ELECTRICITY IN SOUTH AFRICA

Currently, just over one-third of the world's hydro potential is developed. Realistic hydro potential is greatest in Asia, followed by South America and then Africa. Africa's hydro potential is not evenly spread throughout the continent and varies from enormous hydro potential in countries such as the Democratic Republic of the Congo to water scarce countries such as South Africa. The management of water supplies in South Africa has developed into a science to ensure that it is used to its full potential and to this end; unique partnerships have developed between Eskom and the Department of Water Affairs (DWA).

The first pumped storage power station to be built in South Africa was the Steenbras Power Station that is owned and operated by the City of Cape Town.

Eskom's hydroelectric power stations

Eskom has three types of hydroelectric power stations; conventional reservoir - Gariep and Vanderkloof, run-of-river - Colley Wobbles, First and Second Falls and Ncora and pumped storage schemes - Palmiet, Drakensberg and Ingula. Both Drakensberg and Palmiet pumped storage schemes are joint ventures between the DWA and Eskom. Not only do they generate peaking power for the Eskom national grid, they are also part of systems transferring water to important industrial and metropolitan centres – innovative projects that optimise scarce water resources.

What is hydroelectricity?

In a hydroelectric power station, water stored behind a dam wall or in a river is conveyed to a hydraulic turbine, which is turned by the force of the water. The turbine drives a generator rotor, to which it is coupled by a shaft, thus generating electricity. After the water has completed its task, it is discharged back into the river downstream of the power station.

What is a pumped storage scheme?

Pumped storage schemes store a constant volume of water in their systems, which is “re-used” to generate power. Such schemes consist of two reservoirs, one higher than the other, with the power station situated between the two. Reversible pump-turbines pump water from the lower reservoir to the upper one during periods of low electricity demand – when electricity is available from coal and nuclear base-load stations. When power is required during peak periods, the pump-turbines are switched to the generating mode. The water in the upper reservoir is allowed to flow back to the lower reservoir, through the pump turbines, thus generating electricity.

Environmental achievements and partnerships

Every effort is made to manage these hydroelectric power stations in a sustainable manner, as demonstrated by the Blue Planet Prize awarded to the Palmiet Pumped Storage Scheme by the International Hydro Power Association in 2003. The Blue Planet Prize is for schemes demonstrating technical, economic, social and environmental good practice – and excellence in one or more of these aspects.

The Drakensberg Pumped Storage Scheme is part of a water transfer scheme from the Thukela River across to the Vaal Triangle – The Tugela-Vaal Scheme and major environmental considerations were undertaken during the construction phase of the project which preserve the area today. The Palmiet Pumped Storage Scheme transfers water from the Palmiet River catchment to Cape Town. Palmiet is located in the Kogelberg Biosphere Reserve, the heart of the Cape Floral Kingdom and the first biosphere in South Africa. Eskom was a signatory to the application for biosphere status from UNESCO and is committed to upholding the principles of MAB (Man and Biosphere) in supporting the biodiversity of this unique fynbos region.

The Ingula Pumped Storage Scheme commissioned in 2016 spans the escarpment of the Little Drakensberg, and straddles the provincial boundary of the Free State and KwaZulu-Natal. Conservation of the wetlands, grassland and escarpment forest at Ingula - all critical habitats - was of utmost importance. These habitats ensure sustained water supply to the project and region, help conserve biodiversity and are home to several endangered species. The Ingula Partnership, between Eskom, BirdLife South Africa and Middelpunt Wetland Trust, was established in March 2004 to protect these habitats and conserve this wetland area. In 2018, a major achievement was the declaration of the 8 000ha Ingula Nature Reserve, surrounding the pumped storage scheme. This secures the biodiversity and ecosystems and the establishment of an internationally recognised sustainable conservation area.

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