

Engineering and environmental consultant SSI (part of the Braamhoek Consultants Joint Venture) is currently overseeing one of Eskom's major power generation projects. Due for final completion towards the end of 2013, the Ingula Pumped Storage Scheme is set to contribute power to the national grid during peak hours, SSI's senior branding manager, Robin Hayes, tells Laura Cornish.



Construction in progress at Braamhoek.

Engulfing Ingula

The Ingula Pumped Storage Scheme is situated in the Little Drakensberg mountain range just outside of Ladysmith in KwaZulu-Natal. The design and construction supervision make it a highly esteemed notch on SSI's project belt.

Referred to as a 'peaking power station', Hayes explains that the power station's rated generation capacity of the scheme is nominally 1332MW, with an energy storage capacity of 21 000MWh.

The intention is to produce 1332MW of power during the morning and evening peak hours. "The concept is not unique, and is used to supplement conventional generation capacity across the world," Hayes notes.

The Ingula project will be the third peaking power station in SA, which already includes the Palmiet power station towards Sir Lowry's Pass and the Drakensberg station near Bergville, also in the Drakensberg Mountains.

THE PRINCIPLE BEHIND THE TECHNOLOGY:

The project consists of two major reservoirs and a powerhouse situated 350m below the surface, in the mountain. The upper concrete-faced rockfill dam (CFRD) (Bedford, with a 810m crest length and a 49m height) is situated on the mountain top, and feeds water through the powerhouse, which generates the power.

The powerhouse complex consists of a combined machine and valve hall, a transformer hall and other ancillary tunnels and caverns. The machine hall houses four reversible pump/turbines, coupled directly to generator/motors, each with a rated output of 333MW. The rated generating head is 441m. The water then passes a further 2500m to reach the lower reservoir (Bramhoek) at the bottom of the hill.

The crest length of the lower roller compacted concrete (RCC) dam is 310m and it has a maximum height of 38.6m.

During off-peak hours, thanks to the incorporation of reversible turbines, the water is pumped back up the mountain from the Bramhoek reservoir to the upper Bedford reservoir. The principle behind the design is that kinetic energy is converted into potential energy.

This R20bn project was started in 2004. Commissioning of the first unit is envisaged in early 2013, thereafter commissioning will take place at three-monthly intervals for each subsequent unit, with commissioning of the final unit happening towards the end of 2013.

SSI forms part of the Braamhoek Consultants Joint Venture, which was tasked by Eskom to undertake preliminary feasibility studies, preliminary design, final design and, lastly, site supervision.

“Ingula is a net user of electricity, and its sole purpose is to provide electricity during peak hours when it is needed the most,” Hayes reiterates.

The ancillary work alone is a major component of the entire project, which includes power lines, water treatment works, roads, etc. ■

Underground work at Ingula.

Braamhoek Consultants Joint Venture – SSI, Arcus Gibb and Knight Piesold;

- Underground construction
- CMC/Impregilo Consortium; Bedford and Bramhoek Dams
- Braamhoek Dams Joint Venture
- WBHO, Concor, Edwin Construction and Silver Rock Construction.

