

## **New build transmission article**

For Engineering News

While the construction of Eskom's three new power stations has captured public attention, a vital part of the new build programme has gone almost unnoticed - the huge project to strengthen the country's national grid as these new plants are linked into the network.

In addition to linking up the giant coal-fired plants Medupi and Kusile, and the pumped storage station Ingula, Eskom's new build programme includes a number of initiatives to strengthen the grid by installing additional transmission lines and upgrading existing ones.

This is a significant investment. So far Eskom has spent R21bn on transmission projects, and this will increase to R34.5bn by the time the build programme is completed.

Since the start of the build programme, Eskom has installed some 5 200 km of new transmission lines, and substations with a transfer capability of more than 24 000MVA.

While most of these high-voltage lines are 400kV (400 000 volts), a significant portion of the new lines are higher capacity 765kV, which provides better transfer capability of bulk power over long distances such as to centres in KwaZulu-Natal and the Western Cape.

The integration of the new Medupi power station outside Lephalale is mainly via the 400kV network to Rustenburg and Polokwane. However, one of the lines is built at 765kV but will be operated at 400kV in the interim. This gives Eskom the flexibility of upgrading to 765kV in future.

Kusile in Mpumalanga and Ingula in the Drakensberg will be linked to the grid mainly via existing 400kV networks, as both are in close proximity to established networks and load centres.

Since 2007 in excess of 1 560 km of 765kV power line has been constructed and handed to the various transmission grids to maintain and operate. Most are operated at 765kV but there are a few exceptions such as the link between Majuba and Umfolozi in KZN where the line is being operated at 400kV until the rest of the 765kV infrastructure is in place.

By 2016 the 765kV network will stretch from the power stations in Mpumalanga to the Western Cape. The 765kV team is currently busy with the section between Beaufort West and Ceres, which will be completed in the current financial year. Construction on the remaining portion from Ceres to Cape Town start early in 2014 and will take two years to complete.

These projects each have their own challenges. In the Klerksdorp area the erection of towers was complicated by undermining - the area was dotted with shallow coal mines about 100 years old for which there were no mining maps. Between Orkney and Parys the team encountered extensive waterlogged areas, and in the Northern Cape they found huge amounts of shallow rock.

The team is currently working on the challenges posed by mountains in the Western Cape as they plan the completion of the 765kV transmission line to Cape Town. Access in the mountains is extremely difficult for construction vehicles and getting heavy cranes and concrete trucks to tower positions will be hugely problematic.

So far the team has built more than 3 000 towers along the various routes carrying the new transmission lines. The materials used include nearly 79 000 tons of structural steel and more than 100 000 tons of concrete foundations.

While rolling out 765kV power lines at an unprecedented rate, Eskom has maintained a safety record of which it is proud. Since 2009 there has been a consistent improvement in the lost-time injury rate due to continuous management interventions and Eskom has maintained a remarkable record for a high risk industry such as line construction. In addition the team has on a number of occasions achieved 3 million man-hours without a lost time incident.



*Guyed V suspension tower*



*Cross-rope suspension tower*