

## NEW CAPACITOR BANKS AT LUCKHOFF SUB STATION

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Black economic empowerment (BEE) company Alstom Power Systems has been awarded a contract to install three new 400 kV series capacitor banks at Luckhoff substation in the Free State, by Eskom Holdings' transmission division. The series capacitor banks, an upgrade on the existing banks, will improve Eskom's power transfer ability.

Alstom Power Systems is part of Alstom SA, the legal entity created for the restructuring of equity in Alstom South Africa. This restructuring will increase the black-empowerment equity stake to 42%. The capacitor banks project is one of the first to be carried out by the new company.

The contract was awarded at the beginning of September last year and is scheduled for completion at the end of July. Besides increasing power transfer capacity, the new installation will replace the existing 28-year-old capacitor banks.

The company will supply the three new capacitor banks, rated at 400 kV and 2 000 A and comprising two banks of about 570 MVar and one bank of about 530 MVar. The new banks, sourced from GE Industrial Systems, a leader in series capacitor banks technology, will reportedly be the first fuseless MOV-protected series capacitor banks in Southern Africa.

Alstom Power Systems will also supply the bulk of the remaining equipment, comprising nine single-phase bypass breakers, 27 single-pole 400 kV disconnectors, three capacitive voltage transformers and nine surge arrestors.

The circuit breakers will be equipped with hydraulic instead of spring mechanisms to enable them to function under the particularly arduous switching duties required. The banks will be installed on three separate existing 400 kV overhead transmission lines – one slightly shorter than the others.

"In order to optimise load sharing between the lines, the compensation and current ratings have been adjusted and upgraded accordingly," explains project manager Malcom Bye.

The previous compensation levels were about 46,4% for all three, whereas the new values are about 52% for the shorter line and in the region of 55% for the other two, while the current ratings have been upgraded from 1 410 A to 2 000 A.

Johannesburg-based Power Systems Dynamics (PSD) MD Sep Boshoff says that a major advantage of the gapless system on the new capacitor banks is that there is no delay of reinsertion when external faults occur.

PSD is a specialist power electrical system engineering consultancy appointed by Alstom on the contract. "There is simply an increase in the bypass impedance that directs the load current back to the capacitor, resulting in improved system transient stability," says Boshoff.

"In addition, the capacitor itself requires fewer transient voltage capabilities, thereby achieving reduced rating and lower costs. "Furthermore, the post fault clearing voltage in a gapless system is lower, resulting in system components being less stressed," Boshoff concludes.