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Implications of applying different VAr support technologies in the Eskom transmission network with particular emphasis on the lifecycle cost

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Abstract

Lifecycle cost implications of applying different VAr support technologies in the Eskom Transmission network have been investigated, taking into consideration the following VAr support options:

- Plain capacitor bank.
- Plain capacitor bank with expansion capability.
- De-tuned capacitor bank.
- C-type filter.

The investigation has showed that for a 275kV 150 MVAr capacitor bank, the lifecycle cost of a C-type filter bank is 1, 73 times that of a plain capacitor bank and 1, 31 times that of a de-tuned capacitor bank, evaluated over a 20 years period. This high cost of the C-type filter bank is mainly due to the initial capital cost, as the operational cost of the de-tuned capacitor bank is higher than the other topologies. A change in the dielectric medium used for the capacitor units from PCB to all film dielectric has reduced the operational cost drastically.

The performance of the C-type filter is better during inrush and transient conditions and therefore provides higher reliability. Additionally, a C-type filter has better harmonic performance, and provides harmonic damping over a range of frequencies.