Voltage control and power oscillation damping in 220 kV network by means of SVC

Since 1983, PowerNet of Victoria, Australia has operated two Static Var Compensators (SVC) on their 220 kV transmission network, supplied and installed by ABB. These compensators are rated at 60 Mvar inductive to 100 Mvar capacitive and are dynamically variable.

The SVC are part of the Rowville terminal station which is located in the Melbourne suburban area. The SVC provide dynamic voltage control and damping of power oscillations in the network. PowerNet already has old synchronous condensers, connected to other parts of the 220 kV network, which have slower response. The SVC are typical examples of upgrading of technology (static thyristor controlled equipment instead of rotating machinery) and the subsequent gains of superior performance as well as improved operating economy. Thus the owner has reported the following main reasons for investing in SVC:

- A saving in investment cost as compared with investing in new synchronous condensers
- Less expected maintenance costs with SVC
- Faster speed of response with SVC than with synchronous condensers, bringing increased dynamic stability of the network as a benefit.

For years, power system damping had been a limiting factor of power transmission in the network in question. With the two ABB SVC in operation, the damping of power oscillations has improved considerably, thereby enabling increased power transmission over the network: (1)

- The Latrobe Valley - Melbourne transmission capability has increased by approximately 600 MW
- The Victorian export capability to New South Wales has increased by up to 300 MW
- The Victorian import capability has increased by up to 200 MW.

Furthermore, the control of the Melbourne area voltage has improved.

Technical Data SVC (valid per one installation)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Controlled voltage</td>
<td>220 kV</td>
</tr>
<tr>
<td>Dynamic rating</td>
<td>60 Mvar inductive to 100 Mvar capacitive</td>
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<tr>
<td>Control system</td>
<td>Voltage and power oscillations control</td>
</tr>
<tr>
<td>Thyristor valves</td>
<td>Water-cooled thyristor valves with magnetic triggering</td>
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</tbody>
</table>

(1) Ref.: R.L. Bolden: Use of stabilising signals on static compensators to enhance the damping of power systems. Capricornia Institute, Symposium on Static Var Systems, November 1985
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