The power plants owned by Linth Limmern AG (KLL), a partner company of the canton of Glarus and of Axpo, renovated the Tierfehd substation as part of the Linthal 2015 project. The existing switchyard was taken out of service and replaced with a new, gas-insulated switchgear. For ABB Switzerland, the area of station automation and protection was responsible for the Tiger project.

Project
The initial expansion phase at the Tierfehd site began in 2009. After 40 years of operation, all the power transmission and auxiliary power supply facilities needed to be completely overhauled. In addition, the production systems are being expanded with a pumped storage plant with a capacity of 140 MW at Tierfehd. A further pump storage plant with a capacity of 1000 MW (Linthal 2015) is under construction. The infrastructure of the electrical energy systems has been expanded accordingly.

With the completion of the 220 kV and 50 kV switchgears on April 28, 2010, the Glärnisch Ost high-voltage line was connected to the GIS system. At the same time, trial operation was begun for the main components for auxiliary and emergency power. Simultaneously, the existing equipment in the cavern and the operating building were connected to the new station.

In August 2010, dismantling of the existing switchyards began. This meant that construction work on the connecting canal between the two lakes could be continued and completed.

Starting in October 2010, the 9.5 kV and 16 kV systems were first installed in the cavern, and the 16 kV system was then installed in the operating building. On the construction side, the prerequisites for retrofitting the 380 kV switchgear and the network coupling were satisfied.

ABB solution
As part of the TIGER project, ABB supplied two autonomous station automation systems – one for the 380/220/ 50 kV high-voltage switchgear with subsystems and one for the 16/9.5 kV medium-voltage switchgears, which also have subsystems. Communication in accordance with IEC 61850 was implemented for the station automation.
The following ABB protective devices cover the area of protection:

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED 670</td>
<td>Differential protection and distance protection</td>
</tr>
<tr>
<td>REBS000Sys</td>
<td>Busbar protection</td>
</tr>
<tr>
<td>REL670</td>
<td>Distance protection and reactivation</td>
</tr>
<tr>
<td>RET670</td>
<td>Differential protection</td>
</tr>
<tr>
<td>REF545</td>
<td>Independent maximum power time protection, busbar protection and control</td>
</tr>
<tr>
<td>REM545</td>
<td>Independent maximum power time protection and control</td>
</tr>
<tr>
<td>REC 670</td>
<td>Field control</td>
</tr>
<tr>
<td>SIEMENS 7UT635</td>
<td>Differential protection</td>
</tr>
</tbody>
</table>

**ABB scope of supply**

- Supply of protection and control cabinets with Relion® devices for the 220 kV GIS gas-insulated switchgear, 12 ELK-14 switch panels in a double busbar configuration.
- Supply of protection and control cabinets for the 50/110 kV GIS gas-insulated switchgear, 7 switch panels, coupling and dual slitting as a DS switchyard with portals for 220 and 380 kV, breakers and arresters.
- Supply of protection and control cabinets for the 380 kV GIS gas-insulated switchgear, 5 switch panels, coupling and slitting, double busbar configuration.
- Supply of two complete station control systems.
- Supply of the entire safety technology equipment for the voltage levels 380/220/50/16/9.5 kV
- Integration of the auxiliary power supply systems and the main and associated plants including emergency power input and battery installations.
- Project management, engineering, manufacturing, checks and commissioning.

**Linthal 2015**

With the Linthal 2015 expansion project, KLL aims to increase the capacity of the Linth-Limmern power station. In the final phase, the new pumped storage plant will increase the capacity of the existing power plant by 1,000 MW to 1,480 MW.

In this expansion phase, ABB will again be responsible for the protection and station automation. Commissioning is scheduled for 2015.

**Customer feedback**

«With ABB’s TIGER project, we had an expert and reliable partner with comprehensive know-how and local ties (Swiss site). Thanks to the excellent and professional project management, costs and deadlines were largely maintained. During the project, we greatly appreciated the constructive and cooperative collaboration.» Stefan Eckert, project manager at Axpo.

For more information please contact:

**ABB Switzerland Ltd**  
**Power Systems**  
Bruggerstrasse 72  
CH-5400 Baden, Switzerland  
Phone: +41 58 585 77 44  
Fax: +41 58 585 55 77  
E-Mail: substation.automation@ch.abb.com  

www.abb.com/substationautomation