

Pumped storage power plant sets new standards after commissioning

An ideal supplement to wind energy

Pumped storage plants are ingenious hybrids. They can produce electricity in turbine mode, or store energy when in pumping mode. Here, the new pumped storage plant, Kops II, in Austria is setting new standards: Within seconds, it can feed up to 180 MW of energy into the grid during peak loads, or remove up to 150 MW of unused energy from the grid for storage. Kops II has been connected to the power grid since the beginning of 2009.

The Kopswerk, located in Austria's Vorarlberg mountains, is one of the largest pumped storage plants in Europe and the largest power station in the network of Austrian energy provider, Vorarlberger Illwerke. Kops II supplies so-called "regulating energy" to the European market. As a result of the increasing utilization of intermittent wind and solar energy, there is also a rise in demand for balancing energy that has to be available within only a few minutes.

Kops II has three machine sets, each rated at 150 MW for pumping mode and 180 MW for turbine mode. Each set consists of a Pelton turbine, a motor generator, a starting converter, and a storage pump. For good reasons, Kops II uses separate machine sets with individual pumps and turbines rather than conventional pump-turbines: The machine sets are designed to operate with short hydraulic circuits, while the storage pump and the turbine can operate simultaneously. A certain amount of water is channeled to the turbine and generates electricity. As a result, the machine set is able to absorb just the amount of electricity available from the grid. The pump always works with 150 MW. If the grid provides only 100 MW of excess capacity, the turbine is fed with exactly the amount of water, which

is necessary to compensate for this 50 MW difference.

Depending on the actual demand, up to 180 MW of energy can be fed into the grid within seconds during peak turbine operation, while up to 150 MW of surplus energy can be removed from the grid during pumping operations. Thanks to its short hydraulic circuit, Kops II can vary its operating modes to produce a turbine output of 180 MW or 150 MW of pumping power –

thereby adapting perfectly to the grid's current load requirements. This also means that wind power stations can be more efficiently supported, because fluctuating wind speeds produce either too much or too little electricity.

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Kops Reservoir – the mighty concrete dam wall of the mountain reservoir in Vorarlberg, Austria.

