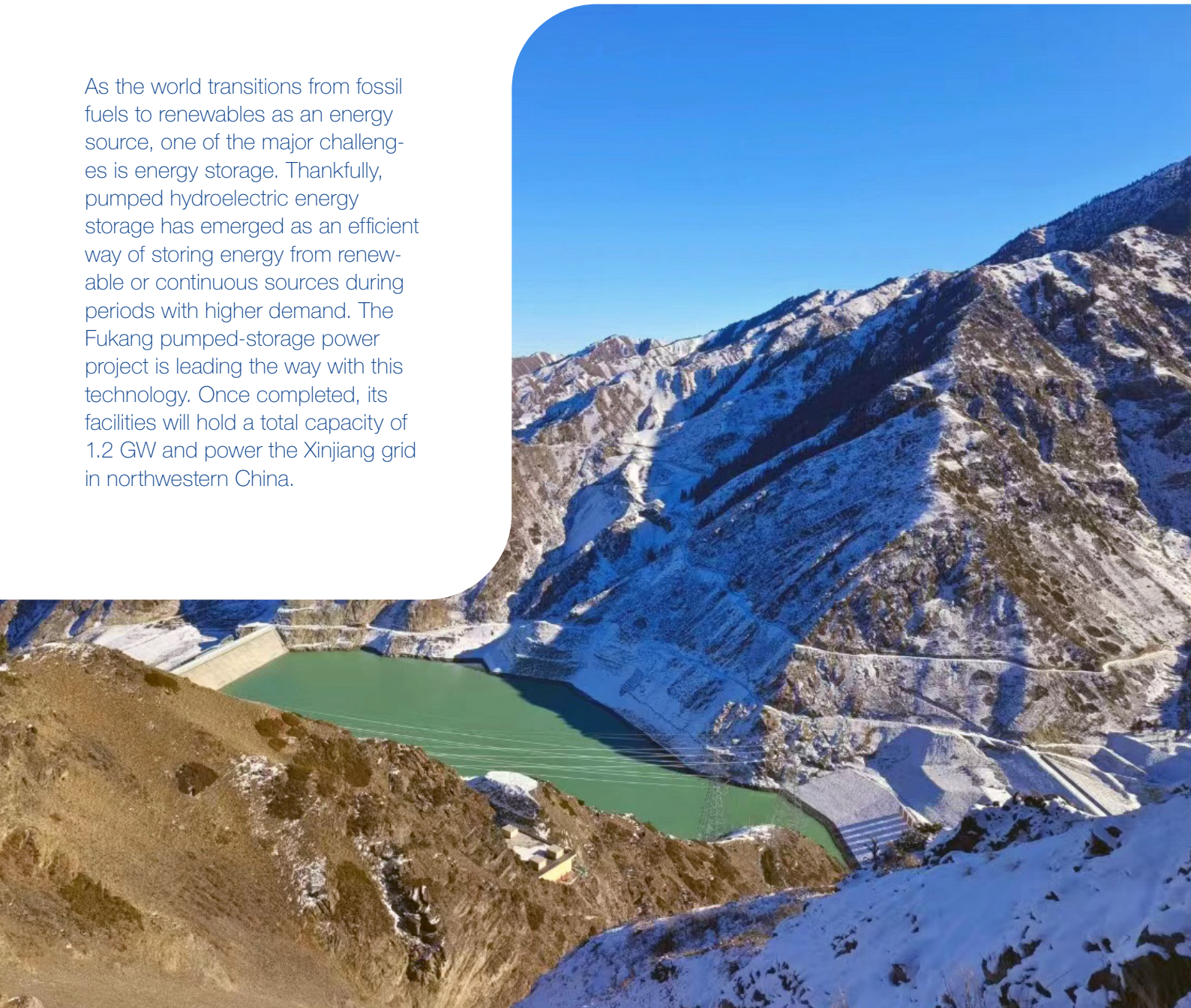
CASE STORY

Efficient performance and lower costs at Fukang pump storage power station

Xinjang, China

As the world transitions from fossil fuels to renewables as an energy source, one of the major challenges is energy storage. Thankfully, pumped hydroelectric energy storage has emerged as an efficient way of storing energy from renewable or continuous sources during periods with higher demand. The Fukang pumped-storage power project is leading the way with this technology. Once completed, its facilities will hold a total capacity of 1.2 GW and power the Xinjiang grid in northwestern China.



The production of renewable energy relies on naturally occurring factors that are outside of our control. Additionally, energy demand is not constant and will vary throughout the day, with the lowest demand occurring overnight. Therefore, there will naturally be periods when energy production exceeds demand. In these instances, the excess energy produced can be used to run pumps in a hydroelectric energy storage facility, moving water from a low reservoir to one at a higher altitude. When energy demand increases again, gravity causes the water to flow through hydro turbines and generate more electricity.

Constructing a pumped hydroelectric energy storage facility requires hilly country. When the State Grid Xinyuan Group, subsidiary of the State Grid Corporation of China (SGCC), decided to build the largest hydroelectric facility in northwestern China, they found a prime spot in the Xinjiang region. Situated within the Fukang Industrial Park, in the Changi Hui Autonomous Prefecture, the Fukang pumped-storage power project is set to enhance the Xinjiang grid's regulation capacity and power supply.

Committing to a clean energy vision

Hydroelectric energy storage plays a key role in the transition to sustainable power systems. By storing excess energy during periods of low demand, it effectively balances supply and demand in the power grid. This technology enhances grid reliability, supports renewable energy integration, and contributes to a cleaner, more resilient energy future.

The Fukang project represents an ambitious endeavour toward achieving this goal. The facility will house an underground powerhouse, upper and lower reservoirs that are connected through a water delivery system, and a ground switch station. With 4 hydro turbines, each rated at 300 MW, the total power output of the facility will be 1,200 MW. With this, the facility is expected to generate 2,410 million kWh per year for the Xinjiang grid.

Hydro turbine operation and heat management

For the hydro turbines to operate efficiently, an oil cooling circuit is used to remove the heat that is produced during electricity generation. The excess heat produced by the 4 hydro turbines is absorbed by lube oil, which must be cooled to the right temperature to adjust its viscosity. Energy efficiency is critical in this step here, as maintaining the right viscosity comes with lower maintenance and operating costs for the plant. Alfa Laval was chosen to supply 22 gasketed plate heat exchangers for the project. Of the 22 heat exchangers installed, a mix of 12 T15 and 10 T10 units were used to handle a total heat load of 11,900 kW.

A power solution for the future

Pumped hydroelectric energy storage is the largest capacity form of grid-energy storage with the potential to support a new renewable energy system. The SGCC's new facility in Xinjiang is expected to offset 165,000 tons of coal, which translates to 1,800 tons of SO2 and 496,000 tons of CO2 emissions per year. And, with the support of energy efficient heat exchangers, the Fukang pump storage power station will be able to reliably achieve all of that at a lower cost. The compact nature of a gasketed plate heat exchanger made it possible to reduce the plant footprint, fitting perfectly into the existing module.

Now more than ever, it is vital for energy storage facilities to perform at the highest level, with energy conservation and pollution at the front of their agenda.

Emissions savings
496,000 tonnes/year

Energy savings
2,410 million kWh/year

Fossil fuel savings
165,000 tonnes of coal

Alfa Laval reserves the right to change specifications without prior notification.