

ELECTRICITY FROM THE ANDES

World's first hybrid hydroelectric-solar power station supplies electricity for national park



PROFILE

Client:
Tompkins Conservation foundation

Industry:
Tourism, conservation NGO

Special characteristics:
World's first hybrid hydroelectric-solar power station

Region, country:
Patagonia, Chile

THE BACKGROUND

In large areas of Patagonia, intensive livestock farming on dry, sandy ground has led to desertification. The Tompkins foundation set up by outdoor pioneers Kristine and Douglas Tompkins wants to change this. It supports the restoration of native grasslands by buying up and rewilding land that was previously used for farming. This is how the overgrazed Chacabuco Valley became "Patagonia Park", now covering more than 300,000 hectares of grass-covered steppe, forest, wetland and mountains.



THE CHALLENGE

The aim is for tourists in Patagonia Park to experience Patagonia's natural landscape while travelling as sustainably as possible. This is made possible by the sustainable "Estancia Valle Chacabuco" lodge, with a restaurant, campsites, walking trails, a visitor centre and a museum. However, the national park is a long way from civilisation and therefore far from the closest utility grid.

The power requirements of the park's facilities have to date been provided by diesel generators – an expensive and environmentally damaging solution. But diesel generators don't just use expensive fossil fuels – they are also disadvantageous as the start-up times mean they often have to run for a longer period than that for which the electricity is required. As a result they often operate at low efficiency levels.

As Patagonian rivers are massively swollen by heavy rainfall and snowmelt from the Andes during winter and spring, it made sense to use hydropower. To this end, the park features two micro-turbines with

AC connection to convert the power of the water into electricity. In summer, however, the rivers run dry, so the power of the sun has to be harnessed instead. An photovoltaic system was therefore installed in the project. In total, the hydroelectric-photovoltaic power plant has a power output of 115 kilowatts. Excess electricity needs to be stored temporarily in a battery storage system.

Requirements for a storage solution:

- High storability with many guaranteed cycles for sustainable provision
- Uncomplicated installation and synergy with the water turbines and photovoltaic system in the microgrid



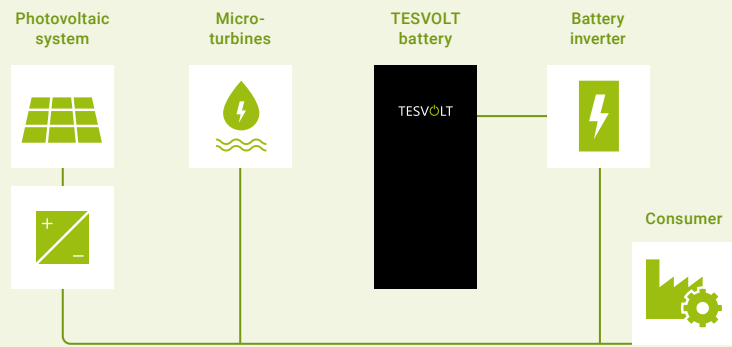
MICROGRID



OFF-GRID

THE SOLUTION

Combining run-of-the-river hydroelectricity and photovoltaics in one microgrid is a huge technical challenge. Which is why the specialists at SyR Energía in Argentina took on installation of the systems in Patagonia Park. SyR Energía are experts in renewable energies and microgrids. The storage system they installed was the TESVOLT off-grid storage system TS 48 V. This now performs its task in the project with an output power of 54 kW and an energy content of 144 kWh.



»We are very excited about the construction of the most advanced hydroelectric-solar microgrid in Chile, which will continue to provide clean power for the park for many years to come. This alternative energy system minimises the park's carbon footprint and so helps combat climate change.»

Carolina Morgado, Executive Director of Tompkins Conservation Chile

»Given that the park is so remote, it was extremely important to install installation components of high quality that therefore require minimum maintenance. We therefore decided to install storage systems from Tesvolt, who lead the field in terms of quality. It has certainly paid off.»

Gonzalo Rodriguez, Engineer at SyR Energía

THE ADVANTAGES

With this new microgrid, the national park is now powered entirely through renewable energies. The diesel generators are still there, but will only be used as a last resort. Further benefits of the TESVOLT battery storage system:

- **Safe and long-lasting**

The system boasts an above-average lifespan of up to 30 years thanks to extremely robust Samsung battery cells and a one-of-a-kind battery management system. This optimises cells not only within a single module, but also between modules within a cabinet.

- **Expandable**

TESVOLT systems can be expanded or exchanged at any time – not just after the first few months of operation but even many years later.

- **Powerful and responsive**

Thanks to the battery management system, TESVOLT's storage systems make the energy they accumulate fully available. TESVOLT storage systems are 1C-capable, meaning they can be fully charged or discharged within an hour with the proper configuration. As a result, even high-performance consumers can be kept running when the sun isn't providing enough power.

PROJECT: FACTS AND FIGURES

Storage system	TS 48 V
Energy content	144 kWh
Discharge power	54 kW
Cell	Lithium NMC prismatic (Samsung SDI)
Efficiency (battery)	Up to 98%
Cycles	6,000–8,000 (0.5C to 1C cycles, at 23°C +/-5°C with 100% depth of discharge)
Operating temperature	-10°C to 50°C
Battery inverter	SMA Sunny Island
Installer	SyR Energía