

ALPIQ

Hydropower from the River Aare
Renewable energy from the region



Switzerland: Country of hydropower

The generation of energy from hydropower has a long tradition in Switzerland – and also a future. Hydropower is CO₂-free, renewable and economical. With its numerous hydroelectric power stations, Alpiq has been fostering the

environmentally-friendly form of energy generation for over one hundred years. The three Alpiq Hydro Aare AG run-of-river power stations in Flumenthal, Ruppoldingen and Gösgen use the power of the River Aare to generate electricity.

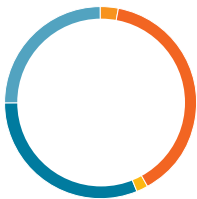
Alpiq Hydro Aare AG

Alpiq Hydro Aare AG was founded in the year 2000 as a fully-owned subsidiary of Alpiq Holding AG. Today it occupies around 25 employees. The three power stations Flumenthal, Ruppoldingen and Gösgen have an annual output of over 550 million kWh of electrical energy.

The role of hydropower

Unlike almost no other country in Europe, with its topography and climatic conditions Switzerland is predestined for energy generation from hydropower. With a share of almost 60 percent, hydropower makes the largest contribution to the Swiss electricity supply. Alpiq generates in Switzerland around 50 percent of its energy from hydropower. Whereby, Alpiq Hydro Aare AG assumes an important role. The three power stations Flumenthal, Ruppoldingen and Gösgen together generate enough energy to supply electricity to around 150 000 households.

Electricity mix Switzerland



Conventional thermal and other power stations	3%
Nuclear energy	39%
Waste, biomass, biogas, solar, wind	1.9%
Storage power stations	31.2%
Run-of-river power stations	24.9%

Certified power stations on the River Aare

Environmental protection is high on Alpiq's list of priorities: The three hydroelectric power stations are certified by TÜV and produce verifiable "electricity from 100 percent renewable energy". In addition, in 2010 the Ruppoldingen power station was awarded the much coveted "naturemade star" certificate, which satisfies the highest of ecological requirements worldwide.



Generating electricity from hydropower

The Flumenthal, Ruppoldingen and Gösgen hydroelectric power stations make use of the high volumes of water in the River Aare to

generate electricity. In the power house, state-of-the-art technology is used to convert waterpower into electricity.

Paths for fish and boats

The near-natural bypass waterways and the ascending aids for fish, sometimes referred to as fish ladders, provide a link for fish and other small creatures between the water biospheres above and below the power station. Thanks to specially created luring currents, the fish are able to find the entrance to the fish ladder and can thus overcome the weir. The boats that travel on the River Aare can cross the weir using special boat transport equipment.

The three hydroelectric power stations of Alpiq Hydro Aare AG are so called run-of-river power stations. Using just a very small head, the kinetic energy of large volumes of water is used to generate electrical energy. To enable the head to be put to optimal use, the river is dammed. The energy that can be generated in a hydroelectric power station is dependent on the volume of water and the head of the water. Thanks to increased flow conditions in the River Aare during the summer months, on average more electricity can be generated than in winter.

Turbine as heart

Several turbine and generator groups are installed in the power house. With their propeller-type adjustable blades, Kaplan turbines are particularly suitable for run-of-river power plants since they achieve a high efficiency even with varying heads and water volumes. The dammed water flows through the turbine and causes it to rotate. The energy thus created is transformed in the generator into electricity and subsequently fed into the electricity grid. The electricity is then transmitted via the grid to the consumer.



In harmony with nature

Power station construction and environmental concerns do not necessarily need to contradict each other. Alpiq is actively engaged with this in mind. Thus renaturation measures around the

Ruppoldingen power station have led to a significant increase in the number of animal and plant species.

Kingfisher and beaver

Alpiq's ecological measures are showing effect: Many animal species could be preserved or have even newly settled along the banks of the River Aare. Amongst others, the kingfisher has found adequate room for its nests in the river banks and also the beaver has recently returned to the Aare.

Virtually no other energy source is so sustainable, environmentally friendly and at the same time economical as hydropower. However, the use of hydropower is also associated with intrusions into nature. Alpiq attempts to keep these at a minimum and to compensate in the best way possible.

Renaturation measures

Whilst building and operating its power stations, Alpiq places great value on the ecological balance. The Ruppoldingen power station is considered to be a prime example for the environmentally compatible use of hydropower. During the construction between 1996 and 2000, Alpiq invested about 20 million Swiss Francs in over 300 ecological surrogate and compensatory measures. Next to an enlargement of the alluvial forest to a total of 5.2 hectares, shallow water zones, islands and natural development areas were set up over a stretch of 8.4 kilometres that serve as a habitat for animals and plants as well as a resting and breeding place for aquatic birds.

Bypass watercourse

The 1200 metre long and 10 to 20 metre wide near-naturally designed stream is unique. In it, numerous aquatic animals have taken up settlement.

Modern technology in action

Since 1896, Alpiq has been using the power of the River Aare to generate electricity. In recent years the three power stations belonging to Alpiq Hydro Aare AG were completely renewed.

Thanks to the latest technology they now produce 116 million kWh of additional electricity. This corresponds to the electricity supply for up to 30 000 households.

Aarestrom

Aarestrom is eco-friendly electricity from the Aare region. It comes from renewable, CO₂-free hydropower and is produced in the three power stations of Alpiq Hydro Aare AG. Aarestrom was set up in 2001 by Alpiq as producer and a.en (Aare Energie AG) and eug (Elektra Untergäu) as distribution partners. With a small surcharge per kWh, which flows into a fund, renewable energies in the Olten region are promoted.

Flumenthal

The Flumenthal power station was constructed in 1970 as part of the second Jurassic water correction. It regulates the water level of the Aare between the lake of Biel and the city of Solothurn and hence protects the region from flooding. Thanks to the new turbines, which were installed during the complete renewal between 2006 and 2009, six percent more electricity can be generated.

Ruppoldingen

The old run-of-river power plant, dating back to 1896, was replaced by a new construction in the year 2000. Equipped with two bulb turbines, production could be tripled. During the renewal of the plant many environmental measures were implemented. The ecological development is continuously documented and assessed by experts in the course of periodical environmental monitoring.

Gösgen

Built in 1917, the power plant in Gösgen with its annual output of 300 million kWh is one of the largest run-of-river power stations on the Aare. It was completely renewed between 1997 and 2000 and now produces 12 percent more electricity with the same volume of water. In 2004 a new fish ladder was put into operation at the Winznau weir.

Alpiq Hydro Aare AG power stations in figures.

	Flumenthal	Ruppoldingen	Gösgen
Type	Run-of-river power plant	Run-of-river power plant	Run-of-river power plant
Launch	1970/2009	2000	1917/2000
Construction time	4 years	4 years	4 years
Total flow capacity	395 m ³ /s	475 m ³ /s	380 m ³ /s
Head of water	6.2 – 8.5 m	4 – 6.5 m	13.1 – 17.4 m
Back water level	426 m.a.s.l.	397.2 – 398.4 m.a.s.l.	388.14 m.a.s.l.
Max. capacity	25 MW	21.1 MW	48.5 MW
Turbines	3 bulb turbines	2 bulb turbines	5 Kaplan turbines
Blade wheel diameter	4.35 m	5.9 m	3.6 m
Flow rate/machine	132 m ³ /s	275 m ³ /s	4 x 79 and 1 x 65 m ³ /s
Average annual production	146 million kWh	115 million kWh	300 million kWh



Experience hydropower for yourself

Would you like to experience on site how electricity is generated from the overwhelming power of the Aare?

Are you curious about what the inside of a power station looks like? Then come and visit us and participate in one of our fascinating guided tours.

Contact for guided tours


T +41 62 286 71 11
F +41 62 286 73 73
www.alpiq.ch

Free guided tours

In the Aare power stations visitors are warmly welcome at any time following prior notification by telephone. Groups of at least six people and school classes, have the possibility to take part in a free 90-minute tour with a lot of interesting background information.

Insights and outlooks

Never mind whether in Flumenthal, Ruppoldingen or Gösigen: a guided tour of a power station is well worthwhile. In each of the three power stations guests are offered fascinating insights into the world of hydropower. But there are also a lot of exciting discoveries to be made outside the walls of the power plants. The hiking trails alongside the lovely banks of the Aare or the nature studies path near Ruppoldingen, are great places for excursions.



Alpiq Hydro Aare AG
Aarburgerstrasse 264
4618 Boningen
T +41 62 787 69 11
F +41 62 787 69 65

www.alpiq.ch