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# Hydropower has lost its clean image

Hydropower has traditionally been the cornerstone of Swiss electricity. Logically, it should be underpinning the country's switch from nuclear and fossil fuels. However, it first needs to deal with the damage to its reputation in recent decades.

JÜRIG STEINER

Are the planks under foot shaking in the stiff breeze, or is it mountains that are moving? You are never quite sure which of the two it is on the Triftbrücke – the windy suspension bridge in the Bernese Oberland that spans the mouth of the green Triftsee glacial lake at a dizzying height of 100 metres.

The Triftbrücke is situated in a side valley above Innertkirchen (canton of Berne), 1,700 metres above sea level in one of Switzerland's most tranquil Alpine areas. Anyone with the nerve to stand halfway along the 170-metre-long pedestrian bridge will see a rugged water-soaked mountain basin, at one end of which hangs the remainder of a once-mighty glacier high above. It is a thought-provoking place, because this natural amphitheatre epitomises the controversy surrounding hydropower.

## Rapid transition from glacier to lake

The Trift Glacier, which used to fill the entire basin, receded all of a sudden due to climate change, leading to the formation of the Triftsee lake. Because hikers were no longer able to use the glacier to access the Trifthütte (a mountain hut belonging to the Swiss Alpine Club), the aforementioned suspension bridge was built in 2005. However, the retreating glacier also left behind a unique, pristine mountain landscape.

The Triftsee is attracting consider-

able interest. Local hydropower company Kraftwerke Oberhasli (KWO) would like to use the young body of water to create a reservoir with a 177-metre-high dam that would supply electricity to around 30,000 households.

## Will Switzerland run out of electricity?

Will Switzerland have sufficient and uninterrupted power supplies in future? This question is on many people's lips. Continued growth in electricity demand seems inevitable, with energy group Axpo predicting a 30 per cent rise by 2050.

Conceivably, the switch from nuclear and fossil fuels could drive this growth. Using heat pumps instead of oil-fired boilers to heat buildings, or driving electric instead of petrol cars – this means lower CO<sub>2</sub> emissions but greater electricity consumption. It is hard to gauge the extent to which efficiency gains and behavioural changes can curb demand.

According to a new study by the Federal Office of Energy, Switzerland could experience brief winter power outages from 2025 onwards due to electricity demand outstripping supply. The Federal Council has exacerbated the situation with its decision to abandon talks with the EU on a framework agreement. Consequently, the EU refuses to conclude the electricity agreement that it has already negotiated with Switzerland. As it currently stands, Switzerland will find it harder to obtain emergency supplies from the European grid as a result.

This has opened up a can of worms. KWO plans to produce zero-carbon energy – the type of power needed to cut greenhouse gas emissions. But it would have to desecrate virgin mountain terrain in the process. A small, dogged group of conservationists has raised objections to impede the project, albeit in the knowledge that Switzerland has high-emission gas-fired power plants on stand-by to cover any gaps in power supply – which, in turn, is counter-intuitive to the aim of combating climate change.

There appears to be no way out of this conundrum. Hydropower, once the clean-energy mainstay of Switzerland's self-styled "reservoir of Europe", is having to fight for its green credentials. How has it come to this?

## Driving the economic boom

Switzerland lacks its own natural coal, so hydropower has always been the major energy staple. Yet hydroelectricity only really came into its own in Switzerland during the economic boom of the post-war years. Enormous dams sprang up in the Alps, providing a stable electricity supply that underpinned economic growth.

Thanks to audacious feats of civil engineering in remote corners of the Alps, Switzerland achieved a certain degree of energy independence. Indeed, hydropower accounted for around 90 per cent of Swiss energy in 1970, before the first nuclear



power plants had begun producing electricity.

Amid the hydro zeitgeist of the 1970s, families would drive down to Valais, maybe stop in Sion, then head up to the Hérémence Valley to gawp at the enormous Grande Dixence Dam. The dam's imposing 285-metre-high wall remains the highest building structure in Switzerland. It weighs an incredible 15 million tonnes – more than

the Great Pyramid of Giza – and is enough to withhold the several-kilometre stretch of water in the adjacent lake. Imagine if it burst.

Hydropower gained its appeal thanks to a number of illustrious civil engineers who turned dam construction into a high-performance discipline. For example, the Ticinese Giovanni Lombardi – father of politician Filippo Lombardi (The Centre), who

**The Trift Glacier has melted away to reveal a new, pristine Alpine landscape. A local energy provider wants to build a hydroelectric dam on this very spot. Photo: Keystone (2009)**

also happens to be the president of the Organisation of the Swiss Abroad – made a name for himself in 1965 with the elegantly curved Verzasca Dam, which was pioneering on account of its slimline design. The dam became iconic after James Bond bungee jumped off it in the opening scene of the 1995 film “Goldeneye”. Lombardi, who later built the Gotthard Road Tunnel, provided the benchmark for other spectacular civil engineering feats until his death in 2017.

## The unifying effect of water levies

Besides cementing national pride, hydropower was also the inconspicuous glue that bound Switzerland together. This is because dams generate significant revenue for the Alpine regions, with the municipalities in which they are situated receiving remuneration for use of their water resources – a total of around half a billion Swiss francs a year.

These water levies help to transfer wealth from the economically strong Central Plateau region into the mountains, enabling the Alpine cantons to invest in infrastructure and counteract depopulation. To see how effectively hydropower is able to transcend the urban-rural divide, one only needs to travel to the Bregaglia Valley, where the Zurich-based utility company EWZ, which built the Albigna Dam in the 1950s, remains one of the biggest employers.

## Fierce opposition

However, it is sometimes easy to forget amid the fanfare that hydropower projects were subject to fierce local opposition in the early days. The story of



Marmorera is legendary. It was only after several expropriation proceedings that this Grisons village situated on the Julier Pass was destroyed and flooded to make way for a dam of the same name.

From as early as 1920, there were plans to flood the entire Urseren Valley in the canton of Uri and turn it into a dam. Prompted by power supply shortages, the project got up and running after the Second World War. But the valley community violently resisted, hastening the project's eventual demise.

### "Nuclear subsidiaries in the Alps"

But it is 1986 that is the key year in understanding why hydropower lost its aura. Back then, utility company Kraftwerke Nordwestschweiz scrapped its plan to turn the Greina plateau between Grisons and Ticino into a reservoir – after years of strong resistance from a coalition of conservationists and countryside campaign-

**Heavier than the Great Pyramid of Giza – the enormous Grande Dixence Dam is the highest building structure in Switzerland.** Photo:Keystone

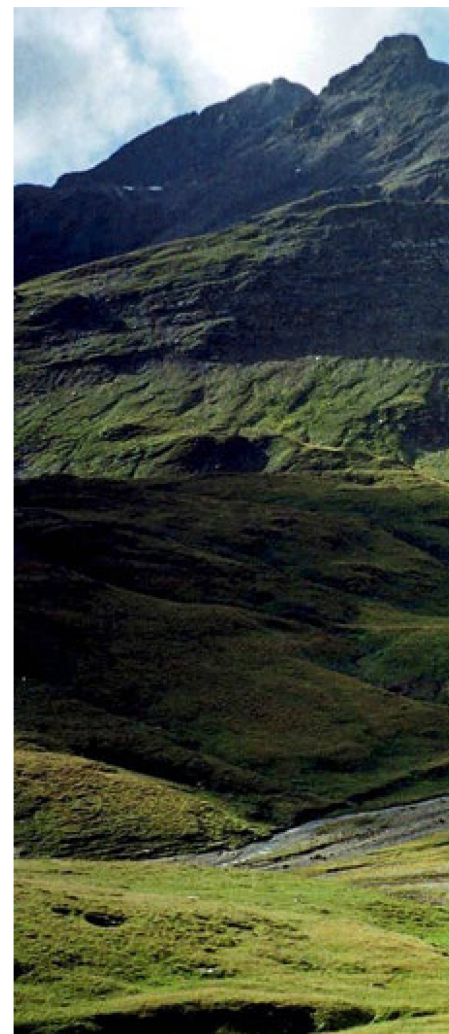
ers on the one hand and local opposition on the other managed to bring this remote Alpine highland to the attention of national policymakers.

Greina became a symbol of environmentalist objections to the hydropower industry's practice of prioritising profits, which had led to a dalliance with the contentious nuclear industry. The drill is as follows. Inexpensive, surplus nuclear energy during off-peak hours is used to pump water up into Switzerland's reservoirs. Hydroelectric plant operators can then produce expensive electricity during peak hours and maximise their profits. Do profit-oriented "nuclear subsidiaries in the Alps", as critics dub the hydropower plants, justify selling off the country's last natural mountain and river landscapes?

### Limits to growth?

Proponents and opponents of hydropower development have disagreed on this fundamental question for over 30 years. The Federal Supreme Court sometimes has to intervene, as in the case of the Grimsel Pass Dam, where attempts to raise the dam wall have been blocked until now.

According to the World Wide Fund for Nature (WWF), 95 per cent of Switzerland's technically feasible hydropower potential is already being exploited. Although the federal government has imposed stricter environmental controls on residual water flows, Switzerland has "long passed" the critical point. The WWF adds that 60 per cent of the country's native fish and crab species have died out or are close to extinction. And yet



hundreds of hydropower upgrades and new builds are still being planned, much of these small-scale. The biggest and therefore most hotly debated of these has been earmarked for the site of the recently shrunk Trift Glacier.

### Increased pressure on hydropower

Since Greina, the picture has become even more complicated. There are two new challenges. Firstly, climate change and glacial melt now mean that water run-off mainly occurs more in the spring than in the summer. Secondly, Swiss policymakers ratcheted up the pressure on hydropower by deciding in the aftermath of the Fukushima reactor disaster to phase out nuclear power and replace it with renewable energy – as part of their commitment to achieve net-zero greenhouse gas emissions.

Is it at all possible to gain even more from hydropower, which currently accounts for just under 60 per cent of Swiss electricity production,



without crossing the environmental red line? “Essentially, yes,” says Rolf Weingartner, professor emeritus of hydrology at the University of Berne. Weingartner has broken down the problem into its constituent parts and put them back together again in order to lend objectivity to an emotive subject.

### A new role for hydropower?

Given that hydropower is virtually CO<sub>2</sub>-neutral, it continues to play an indispensable role in preventing power shortages, particularly in winter when solar power plants are less productive. Global warming is also making us re-evaluate the importance of reservoirs, he explains, because the contribution of meltwater to run-off, mainly in the summer months, will decrease as glaciers recede. Summer water shortages will be the consequence.

In future, overall water run-off will remain more or less at current annual levels. But the seasonal distri-

bution of run-off is becoming less favourable, because both glacier melt and snowmelt are diminishing. “This means we must replace natural Alpine water sources with artificial ones,” says Weingartner. In other words, existing hydropower reservoirs can also help to deliver a sustainable approach to water management in the climate change era by providing a source of water in the hot, dry summer months for things like farm irrigation.

Meanwhile, large-scale photovoltaic plants are now being installed on the walls of dams. The solar panels at Muttsee in the canton of Glarus, for example, will produce electricity all year round because they are at high altitude above the low clouds. Consequently, hydropower has more than one role to play. “Hydropower should not only serve the purpose of generating energy but also help to provide a sustainable answer to water supply issues. This includes the environmentally responsible use of residual wa-

**The Greina plateau situated between Grisons and Ticino was a turning point on the Swiss hydropower map. Conservationists prevented it from being flooded into a reservoir, scuttling a power plant project in 1986. Photo: Keystone**

ter,” says Weingartner, adding that the practice of pitting environmental and economic interests against each other every time there is a new dam project in the pipeline is unhelpful. Weingartner therefore favours a new, holistic approach, not least because glacial melt due to climate change will result in over 1,000 new Alpine lakes that could potentially be used as resources. “We should take it upon ourselves to identify priority areas,” he says. The federal government should divide the Swiss Alps into different zones according to priority: energy production, environmental protection, tourism, or agriculture. This would ensure a physical separation of interests and quell controversies.

Weingartner knows that his hydro peacekeeping vision could be difficult to sustain amid the rough and tumble of Swiss realpolitik. Initially, at least. But as long as its energy consumption continues to rise, Switzerland will have to change tack sooner or later.