Energy transition: Bodies of water in conflict between protection and use

February 27, 2023 | Andri Bryner, Claudia Carle
Topics: Biodiversity | Ecosystems | Society | Climate Change & Energy

The looming energy crisis has increased the pressure to push ahead with the energy transition in Switzerland. The parliamentarians will also debate this issue in the spring session, which is about to begin. The use of water bodies plays an important role here. Two Eawag researchers explain the risks to water systems arising from the use of potential that still exists and how the conflicts are to be assessed.

Mr Schmid, you are a group leader in the Surface Waters department at Eawag and have been working on the effects of hydropower utilisation on water bodies for years. The pressure to generate even more energy from Swiss hydropower is currently very high. What are the consequences for our water bodies?

Martin Schmid: Hydropower has already led to major changes in many Swiss watercourses compared to their natural state and has thus severely impaired the basis for life of fish and other aquatic life. In residual water stretches, a large part of the natural run-off is missing, and downstream of the return lines from hydroelectric power plants, unnatural fluctuations in run-off cause organisms to become stranded or washed away. Weirs impede connectivity along the bodies of water. With the further expansion of hydropower, water bodies will be even more affected by such impacts.

Moreover, hydropower is not the only factor having an impact on water bodies. Structures for flood protection, chemical pollution and, increasingly, climate change are further stress factors. Numerous species have already become extinct in Swiss water bodies due to these stresses. Of the remaining fish species and the insects living in water bodies, more than half are considered to be endangered or potentially endangered. In view of these figures, one has to think very carefully about whether the living

organisms in the water bodies can be expected to bear any further stress.

> Martin Schmid: “One has to think very carefully about whether the living organisms in the water bodies can be expected to bear any further stress.”

However, with regard to residual water flows, there are efforts to relax the implementation of the minimum requirements of the Water Protection Act in order not to “lose” a single kilowatt-hour. Is there actually any room for manoeuvre from the point of view of water protection?

Adequate residual water is necessary for fish and other creatures to survive and reproduce in the water bodies. In addition, there are other functions that water bodies with insufficient residual water flows can no longer fulfil, such as feeding groundwater reserves or serving as recreational areas for the population. The ecology in residual water stretches is already severely impaired today and is coming under additional pressure due to climate change. From the point of view of water protection, it is therefore of great importance that at least the legally prescribed residual water flows are maintained. From a scientific point of view, it would also be desirable to have dynamic residual water flows whose variability corresponds to the natural dynamics of a body of water.

Another demand is to raise the dams of existing reservoirs so that more water and more electricity can be shifted from summer to winter. Is this a good solution from the point of view of water research?

In the case of most Swiss watercourses, climate change will mean that run-off will be significantly higher in winter and significantly lower in summer. The expansion of seasonal storage will further increase this effect. However, it has not yet been sufficiently studied how this will affect the ecosystems of the affected water bodies upstream and downstream of the dams.

> Martin Schmid: “In the larger lakes, there is still enormous potential for the use of heat without any expected negative effects on the lake ecology."

A hitherto little-used possibility for energy generation is to extract heat from the lakes in winter and thus replace fossil fuels. Are there limits to this use, for example because it has a negative impact on the lake as a habitat?

In Switzerland, heat from lakes is increasingly being used for heating in heating networks. In the larger Swiss lakes, there is still enormous potential for this, which can be exploited without any expected negative effects on the lake ecology. It therefore certainly makes sense to further expand this regional and renewable energy source. Of course, the possible consequences for the water bodies must be assessed in each case as part of the concession procedure. On the one hand, the local effects caused by the construction of the required pipelines must be considered, and on the other hand, possible changes in the temperature and mixing behaviour of the lakes that may result from the heat extraction.

Could we not also utilise the rivers or groundwater much more as suppliers of heat?

Yes, the larger rivers in the Swiss plateau also have considerable potential for heat utilisation. However, the more time that goes by, the less suitable they are for cooling purposes, as climate change means that water temperatures in many places are increasingly above the tolerance limits of some species . Alpine streams, on the other hand, are less suitable for heating purposes because of their low flows and low temperatures in winter.

Groundwater is already used as a heat source in many places today. Care must certainly be taken to ensure that there are no excessive temperature changes in the long term, especially if the groundwater is used as a drinking water supply. Groundwater could also be an attractive seasonal heat reservoir, which is used for cooling in summer and heating in winter.

“We have enough space to protect our landscapes and natural resources and still be renewable”

Karin Ingold, Eawag group leader and Professor at the Institute of Political Science at the University of Bern, researches the processes and instruments of how energy policy is carried out in Switzerland. How does she see the conflicts in connection with the advanced energy transition?

At present, there is a lot of pressure to generate even more energy from hydropower as quickly as possible. How real is the danger of democratic processes being violated?

Karin Ingold: In Switzerland, there are sufficient direct democratic and legal instruments for making one’s voice heard. But it is an illusion to think that these resources would be available to all. It takes labour, knowledge, money and also time to be able to “activate” such resources.

Are landscape and environmental protection being played off against the energy transition in some cases?

Yes, that is the case. But I am convinced – and various research projects have shown this – that even in the small country of Switzerland we would have enough space to protect our landscapes and natural resources and still be renewable. However, this requires a nationwide view of where spaces are designated for the various objectives.

Would the federal government have to detach itself more from the wishes and limited perspectives of the cantons and communes for a nationwide view in order to achieve the energy transition?

Überlandstrasse 133
CH-8600 Dübendorf
T +41 58 765 55 11
F +41 58 765 50 28
info@eawag.ch
www.eawag.ch
eawag aquatic research

Through our federalism, we would have the potential to test different solutions and propagate those that were successful. However, this requires a lively exchange about such “best practices” between the cantons, and also between the cantons, communes and the federal government. In my opinion, there is still too little dialogue at all levels. It may be that this takes time, and it seems that we are moving (too) slowly. But the “policy of small steps” is a characteristic of the Swiss system. It stands for steady learning rather than radical political innovation.

How high is society’s acceptance of the energy transition and how do you measure that?

Social acceptance has many components. In general, there is a very high level of acceptance of the energy transition. This is measured, for example, in the Credit Suisse Worry Barometer or at regular intervals at the ballot box, where the people clearly approved the new energy package in 2017.But when it comes to changing one’s behaviour, or changing one’s heating system or private transport, these decisions are not just dependent on ideology or general will. Therefore, there may well be a discrepancy between individual acceptance and individual behavioural change.

Cover pictures: Water bodies and the species living in them are exposed to numerous sources of stress, of which hydropower is only one. (Photo: Alessandro Della Bella, Eawag)

Swiss federalism offers the potential of testing different solutions for the energy transition and propagating the successful ones. But this needs more dialogue than has occurred so far. (Photo: Keystone)

Related Links

Eawag research focus “Energy and Climate Change”

Energy research projects at Eawag

NFP 71 “Acceptance of renewable energy

Interview with Eawag researcher Christine Weber (German) «Die Biodiversität von Kleingewässern ist nicht austauschbar»

Contact

Martin Schmid

Tel. +41 58 765 2193

martin.schmid@eawag.ch

Karin Ingold
Group Leader, Group: PEGO
Tel. +41 58 765 5676
karin.ingold@eawag.ch

Claudia Carle
Science editor
Tel. +41 58 765 5946
claudia.carle@eawag.ch

Andri Bryner
Media officer
Tel. +41 58 765 5104
andri.bryner@eawag.ch

https://www.eawag.ch/en/info/portal/news/news-archive/archive-detail/energy-transition-bodies-of-water-in-conflict-between-protection-and-use