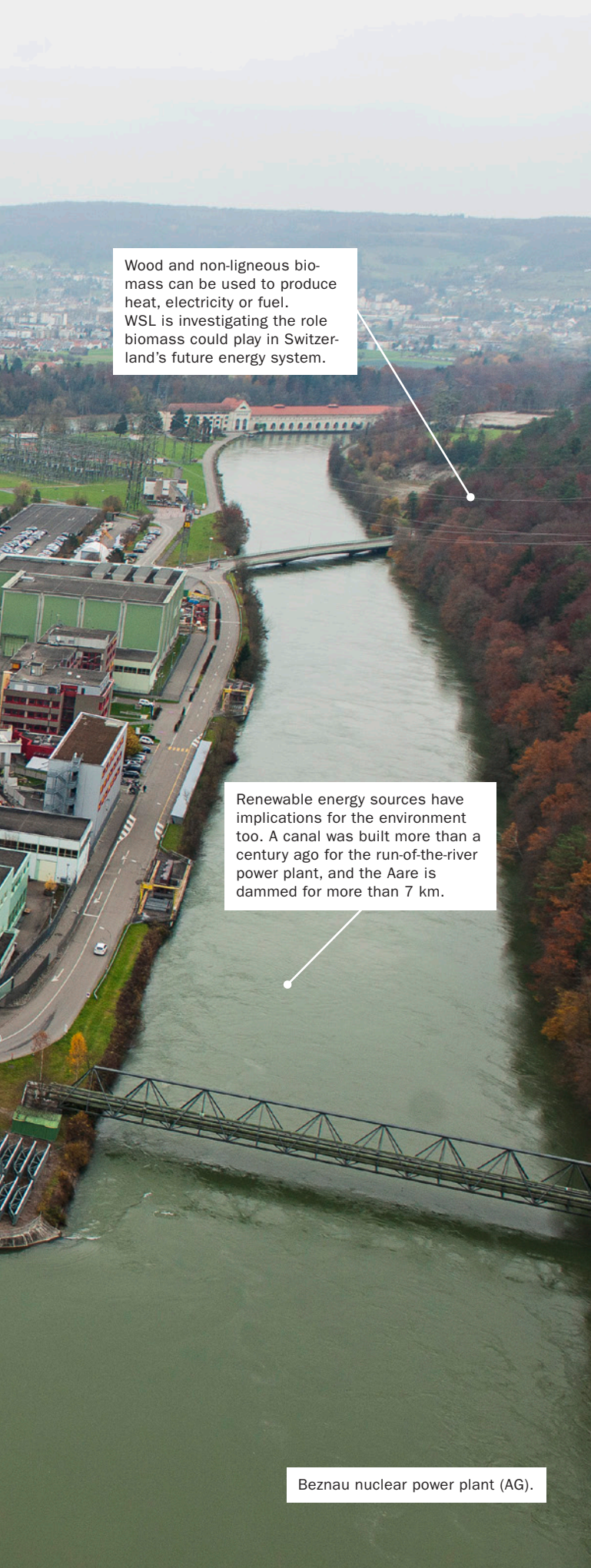


FOCUS Withdrawal from nuclear energy is forcing Switzerland to completely restructure its energy system. WSL is exploring the risks and opportunities of this generational project.

# What kind of energy transition do we want?

About 40 % of Swiss electricity comes from nuclear power plants. Under Energy Strategy 2050, this must be cut or replaced by energy from renewable sources.





Wood and non-ligneous biomass can be used to produce heat, electricity or fuel. WSL is investigating the role biomass could play in Switzerland's future energy system.

Renewable energy sources have implications for the environment too. A canal was built more than a century ago for the run-of-the-river power plant, and the Aare is dammed for more than 7 km.

Beznau nuclear power plant (AG).

In the aftermath of the Fukushima disaster, everything started to move very quickly: the Swiss Federal Council put together its Energy Strategy 2050, which committed to a withdrawal from nuclear energy, and parliament gave the move its blessing. Together, the five nuclear power plants in Switzerland produce roughly 26 terawatt hours (TWh) of electricity per year, which accounts for about 40 % of Swiss electricity production. The Federal Council aims to fill the gap through savings and the use of alternative – particularly non-fossil fuel – energy sources. To attain this goal by 2050, around 110 km<sup>2</sup> of photovoltaic systems will need to be built (equivalent to two thirds of the surface area of Liechtenstein), as well as 1,000 new wind turbines and at least a dozen geothermal plants. It is a project that will span generations.

### **Very little research on the impacts**

The government has recognized that a better understanding of the situation is required if energy change is to be successful. To remedy this, it invested around CHF 250 million in energy research between 2013 and 2016. Seven competence centers, two National Research Programs (NRP 70 and 71) and 24 Swiss National Science Foundation professorships have been investigating new technologies and the restructuring of the electricity grid, as well as looking into economic and legal questions. WSL researchers are participating in three competence centers and the National Research Programs.

With such a considerable endeavor, it makes sense to review the potential risks and conflicts that might arise from energy transfer, and to determine whether wood, wind,



Energy of the future, or wasted land and a blight on the landscape? Opinions differ on wind and solar power plants – including the oldest solar energy plant in Europe, which was built on an alpine field on Mont-Soleil (Canton Bern).

sun and water resources are actually sufficient. To this end, WSL and Eawag launched the Energy Change Impact research program in 2014. The ETH Board granted it CHF 1.5 million from the energy research budget in the period up to 2016.

### **Making informed decisions**

The goal of the program is to show the public, government and business the conditions under which the energy system will be restructured. Various WSL projects will investigate the potential of alternative energy sources. But with global warming in mind, will there be enough water to supply the new hydroelectric power stations? What sort of timber reserves can our forests offer in different cultivation scenarios? Other projects are examining the positive and negative effects of the technology on the environment, economy, and society. Regional economic locations, for example, benefit from wood production, but biodiversity might suffer depending on the kind of cultivation used. Or, if it is used wisely, it could even increase.

“The decision on which technology to use should be made in the knowledge of the implications for society and the environment,” stresses Christoph Hegg, Deputy Director of WSL. “Very few of the projects supported by government funds have this focus”, he notes. The Energy Change Impact program is a step in the right direction. In any case, the additional financing will run out in 2017, at which point WSL will have to finance its projects entirely from its own budget or acquire external funding elsewhere. And yet, it is precisely impact research that would allow to act preventively and to minimize risks. The Energy Change Impact program offers politics and society a small window into the future and opens up potential roads towards energy transition that will enable them to go in the direction they want, well informed.

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More information on the Energy Change Impact program: [www.wsl.ch/more/energychange-impact-en](http://www.wsl.ch/more/energychange-impact-en)