



Tapping hidden hydropower potential in Swiss Alpine catchments in the context of the planned nuclear power phase out

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In its Energy Strategy 2050, Switzerland is revising its energy perspectives with a strong focus on renewable sources of energy and in particular hydropower. In this context, the Swiss Government funded a number of competence centers for energy research (SCCERs), including one on the Supply of Energy (SCCER-SoE), which develops fundamental research and innovative solutions in geoenergies and hydropower .

Hydropower is already the major energy source in Switzerland, corresponding to approximately 55% of the total national electricity production (which was 69 TWh in 2014). The Energy Strategy 2050 foresees at least a net increase by 1.53 TWh/year in average hydrological conditions, in a context where almost all major river systems are already exploited and a straightforward application of recent environmental laws will impact (reduce) current hydropower production.

In this contribution, we present the roadmap of the SCCER-SoE and an overview of our strategy to unravel currently non-exploited hydropower potential, in particular in river systems that are already used for hydropower production. The aim is hereby to quantify non-exploited natural flows, unnecessary water spills or storage volume deficits, whilst considering non-conventional approaches to water resources valuation and management.

Such a better understanding of the current potential is paramount to justify future scenarios of adaptation of the existing hydropower infrastructure combining the increase of storage capacity with new connections between existing reservoirs, heightening or strengthening existing dams, increasing the operational volume of natural lakes (including new glacier lakes), or by building new dams. Tapping hidden potential shall also require operational changes to benefit from new flow patterns emerging under an evolving climate and in particular in the context of the ongoing glacier retreat. The paper shall present a broad view over the mentioned issues and first conclusions of ongoing research at the country scale.