



The role of glacier retreat for Swiss hydropower production

The Swiss glaciers are continuously losing mass, with the positive effect of ensuring high water yields during hot summer months. But how much of the **Swiss hydropower production (HP)** relies on water released by **glacier mass loss**, i.e. on water that cannot be replenished by precipitation in the coming decades?

A team of hydrologists, glaciologists and hydraulic engineers produced the **first Swiss-wide quantification** for the share of annual HP that directly relies on the waters released by glacier mass loss.

Their key motivation was to understand the implications of past and future glacier mass loss for the **Swiss Energy Strategy 2050**, which plans a net HP increase of between 1.5 and 3.2 TWh yr⁻¹.

This novel analysis required compiling the most recent data sets on Swiss water resources and hydropower infrastructure, and on the glacier mass evolution in the past and in the future.

Key results

- Swiss HP schemes use the water from an area of 39'740 km² (93% of Switzerland) to produce on average 35.7 TWh yr⁻¹
- Glacier water is used on average in 12 HP stages before leaving Switzerland, with a

maximum of 30 production stages for water flowing down the Rhine to Basel

- **Entire Switzerland:** Since 1980, HP from glacier mass loss corresponds to around **1.4 TWh yr⁻¹ or 4%** of the annual production, with a projected reduction to 0.9 TWh yr⁻¹ by 2040 – 2060 and to 0.4 TWh yr⁻¹ by 2070 – 2090
- **Rhone (upstream lake Geneva):** HP from glacier mass loss since 1980 \approx 0.8 TWh yr⁻¹; this share will most likely only slightly decrease by 2040-2060 and reduce to around 0.4 TWh yr⁻¹ by 2070 – 2090
- **Rhine (at Basel):** HP from glacier mass loss since 1980 \approx 0.3 TWh yr⁻¹; projected reduction to 0.1 TWh yr⁻¹ by 2040-2060 and to 0.02 TWh yr⁻¹ by 2070 – 2090

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¹ <http://www.sccer-soe.ch/en/aboutus/roadmaps/>