Swiss hydropower concession renewal: Does sustainability assessments lead to the status quo, upgrading, abandoning or decommissioning existing installations?

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Voegeli Guillaume, HTW Chur and University of Geneva, guillaume.voegeli@htwchur.ch
Gaudard Ludovic, University of Geneva and Imperial College London, ludovic.gaudard@unige.ch

Abstract

All around the world, sustainability assessment increasingly became a key tool in project planning and ex-ante evaluation in recent decades. It provides decision-makers with relevant information and analysis, including project-related evaluations of miscellaneous impacts in the environmental, social and economic domains. Sustainability assessment is essentially made in the case of storage hydropower plants (SHPPs) due to the intrinsic characteristics of the latter. Indeed, SHPPs imply relatively large and long-lasting infrastructure, are investment intensive and may have very large impacts on the social, socio-economic and environmental surroundings, through e.g. displacement of people, changes in local economic opportunities or flooding of the natural habitat confined in the reservoir area.

The future of hydropower is all the most important to achieve the Swiss energy strategy 2050. Indeed, on average, more than 55% of the Swiss electricity generation comes from this technology. The share is expected to slightly increase with the planned phase-out of nuclear power. On the other hand, in an imminent future, an increasing number of SHPPs in the Swiss Alps are coming to the end of their water rights (concession).

This upcoming situation is expected to open a *window of opportunity* for various options to be implemented, namely 1) investments for operation maintenance, 2) retrofitting to a change in installed capacity, 3) abandoning of infrastructure with security requirements and 4) decommissioning and removal of infrastructure. A sound decision should be made, as the water right can last up to 80 years (e.g. in Swiss mountain cantons), and could at the same time jeopardize the energy transition.

In this study, we identify and investigate the four choices for one specific project in the canton of Ticino, Switzerland. We use a list of hydropower sustainability criteria that is elaborated through a deep literature review and expert consulting. We then coordinate the criteria and project-related expected impacts through a series of indicators. We compare each option on the basis of a Monte Carlo modelling. It is performed to consider uncertainties about the indicators, the choice of sustainability and decision-making criteria.