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Small Flex

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First insights on the production flexibility at the KWGO Power Plant

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Context

The aim of the SMALLFLEX project is to investigate how small-hydropower plants (SHP) can provide **winter peak energy** and **ancillary services**, whilst remaining **eco-compatible.** The 15 MW Gletsch-Oberwald Power Plant, owned by FMV and commissioned at the end of 2017, has been selected as pilot site.

Source : Bulletin Electrosuisse, 02.2019, "Acceptation de l'énergie hydraulique alpine».

Project organization

Available storage for the first campaign

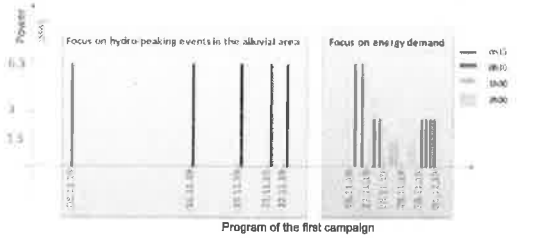
For the first campaign of this project, the settling basin and the forebay tank, connected by two gates, have been used providing a storage volume of **3'700 m³**. This part of the identified storage allows to maintain a minimum available net head of 282 m required for a comfortable operation of the Pelton turbines.

Settling Basin of KWGO

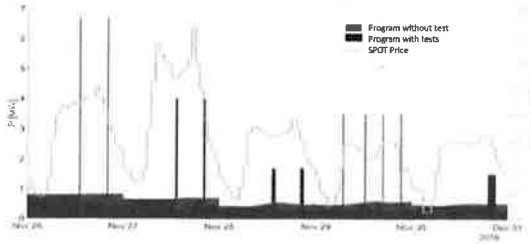
Forebay tank of KWGO

First campaign objectives & method

In November 2018, during three weeks, the competences of the research team have been gathered to explore experimentally the flexibility of KWGO. The first two weeks have been dedicated to induce 5 hydro-peaking events to monitor the impact in the downstream alluvial area. The last week was devoted to generate **several production peaks** taking into account the **energy demand** and the available storage.

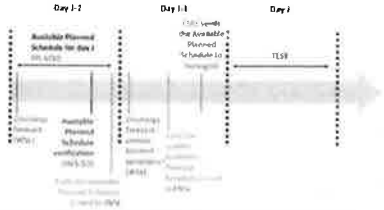


Program of the first campaign



Focus on the program of the 3rd week of the 1st campaign with/without the test & SPOT price.

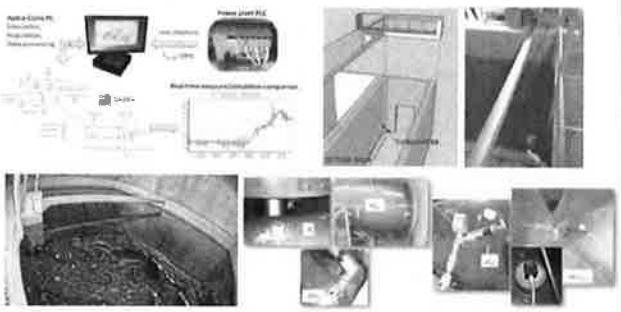
According to the discharge forecast and the available storage, a schedule for each day of test has been systematically prepared by the research team and sent to FMV.



Workflow for the 3rd week of test during the 1st SmallFLEX campaign

Monitoring in the power plant during the tests

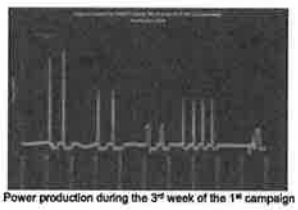
Since the acceptance tests of the turbines in July 2018, the HydroClone developed by PVE, partner of the project, is installed in the power plant. This monitoring system records all operating parameters of the power plant and provides access, from numerical simulation, to non-measured quantities. In parallel, a turbidimeter to monitor the sediments in the settling basin, a camera to supervise the free surface level in the forebay tank and several sensors on the turbine casing have been installed by HES-SO and EPFL PL-LCH.



Monitoring in the power plant : Hydroclone, turbidimeter, camera and several sensors.

Analysis

During the five days, the planned and effective productions show a minimum difference of around 1%. Through the use of the storage, the energy production has been increased of more than 40% for the five days considered[1].



Power production during the 3rd week of the 1st campaign

1. Zordan et al., Introducing flexibility in small hydropower plants, HYDRO 2019, Porto, Portugal

Conclusion and perspective

This first campaign demonstrated the possibility to use the settling basin and the forebay tank as a storage during periods of low discharge to maximize the energy production and the income adjusting the peak according to the SPOT price.
A second campaign is planned in 2020, doubling the available storage using part of the headrace tunnel of the power plant.

Acknowledgements

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Contributors

Hes·so EPFL
Power Vision Engineering

SCCER SoE FMV