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Using seasonal forecast for energy production: SHYMAT climate service, a small hydropower management and assessment tool

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In small hydropower plants management, the operation feasibility is subjected to the Run-of-River (RoR) flow which is also depending on a high variability in water availability. The management has to accomplish with some particular operation conditions of the plant but also some environmental flow requirements. Normally hydropower plants managers use historical information of inflows in order to predict the production of energy. Although some forecast models have been already proposed and applied in the small hydropower production field, there are still an existing gap to link the results of the forecast with the decision support process.

In the framework of the H2020 project CLARA (Climate forecast enabled knowledge services) a climate service was developed in a co-generation process, bridging the gap between data providers who provides climate-impact data on one side, and managers and policy makers on the other side. The result is SHYMAT (Small Hydropower Management and Assessment Tool), a technological solution for the integrated management of RoR plants which offers a scalable and automatically updated database accessible through an administration panel and a web end user interface.

The pilot area is a three RoR system in the Poqueira River (southern Spain) where inflow is highly variable due to the irregularity in precipitation and snow cover duration in the contributing basin. The service combines past hydro-meteorological and forecast climate data stored with operation data for the particular plant in order to give the user a) a global view of the hydrological state of the basin, from measurements and a physically based hydrological model; b) a comparison of current information with past data; c) the expected operability of the RoR plant; d) information about the accomplishment of environmental flow requirements and water flow spill; e) the expected energy production.

SHYMAT is easy and fully scalable to new systems thanks to the administration panel and the topology panel. The service is addressed to technicians in charge of the control operation center of this kind of plants and managers at the regional administrative headquarters of hydropower companies. Energy market operators, river basin authorities and consultants can be also potential users.

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