

Future efficiency of run of the river hydropower schemes based on climate change scenarios: case study in UK catchments

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Run-of-the-River (ROR) hydropower schemes are expected to be importantly affected by climate change as they rely in the availability of river flow to generate energy. As temperature and precipitation are expected to vary in the future, the hydrological cycle will also undergo changes. Therefore, climate models based on complex physical atmospheric interactions have been developed to simulate future climate scenarios considering the atmosphere's greenhouse gas concentrations. These scenarios are classified according to the Representative Concentration Pathways (RCP) that are generated according to the concentration of greenhouse gases. This study evaluates possible scenarios for selected ROR hydropower schemes within the UK, considering three different RCPs: 2.6, 4.5 and 8.5 W/m² for 2100 relative to pre-industrial values. The study sites cover different climate, land cover, topographic and hydropower scheme characteristics representative of the UK's heterogeneity. Precipitation and temperature outputs from state-of-the-art Regional Climate Models (RCMs) from the Euro-CORDEX project are used as input for a HEC-HMS hydrological model to simulate the future river flow available. Both uncorrected and bias-corrected RCM simulations are analyzed. The results of this project provide an insight of the possible effects of climate change towards the generation of power from the ROR hydropower schemes according to the different RCP scenarios and contrasts the results obtained from uncorrected and bias-corrected RCMs. This analysis can aid on the adaptation to climate change as well as the planning of future ROR schemes in the region.