



## Generating highly resolved seasonal forecasts for hydropower and energy system modelling in the CLIM2POWER project

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Within the CLIM2POWER project, forecasts of the German Climate Forecast System (GCFS2.0) are used to investigate changes in the power production of renewable energies and the European energy system on a seasonal time scale. To translate the climate information into advice for decision makers of the energy sector, a web-based Climate Service (CS) is being developed. Aiming to deliver tailored results, a close collaboration with the end users of the service is encouraged. Possible applications of the CS are demonstrated within four national case studies.

One of the main challenges of the project is to pass the seasonal forecast data through a chain of different models, including hydrological models, impact models, machine learning and energy system models. All of them have different requirements on the input data. To model hydropower of the river basins in the case study regions, a high spatial resolution of the input data (precipitation and temperature) is crucial. For this reason the global seasonal forecasts (currently on  $\sim$ 100 km grid distance) need to be downscaled to a higher resolution permitting to conduct the hydrological forecasts of river runoff.

To transform the global information to regional scale, an empirical-statistical downscaling technique is applied. The EPISODES method is a perfect prognosis approach that relates large-scale predictors to the local-scale predictands followed by the production of synthetic local time series. Within CLIM2POWER, the European reanalysis COSMO-REA6 is chosen to serve as consistent local meteorological information to be used in EPISODES. With a spatial resolution of 6 km it is suitable for hydro modelling and also provides other energy relevant variables like wind speed at hub height.

We present statistically downscaled seasonal forecasts for the CLIM2POWER case study regions generated with EPISODES and evaluate them in terms of forecast skill. The regional forecasts are compared to the global forecasts to be able to access the value of downscaling. Beside this we show the application of the highly resolved forecasts in the model chain to get a first impression of the results our CS will provide.