



CLIM2POWER Project – Translating Climate Data into Energy Supply Adaptation Guidance

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Climate and weather conditions not only strongly influence energy demand but- with the strong development of the renewable energies - also increasingly electricity generation. The changes of the European energy mix, together with ongoing climate change, raises a number of questions on the adaptation of the energy supply system to its environment.

To address these issues, the CLIM2POWER project aims at translating the latest scientific findings on the medium (seasonal forecast) to long term (climate projections) evolution of the climate into usable information for end-users. For this purpose, we are developing a web-based Climate Service (CS) enabling a visualisation of how climate impacts the energy supply system. The web-service will connect climate data, hydrological models and power generation and energy system models in an interactive layout.

In order to illustrate how climate data can be considered to guide decision making, the CS covers the whole interconnected European electric system complemented with four case-studies reflecting various EU contexts regarding climate, hydrology, socio-economic settings, electricity generation portfolios and energy markets in Portugal, Sweden, Germany-Austria and France. In each case study, the wind, solar and hydro power generation as well as the demand will be simulated from climate data and their effect on the energy system will be analysed. Since the effect of climate is expected to have a major impact on hydropower: a special attention will be paid to the modelling of three river basins: the Douro river basin in Portugal, the Lule älv river basin in Sweden and the Danube river basin in Germany and Austria.

To translate climate data into potential hydropower plant production, different hydrological models (e.g. HEC, SWAT, HBV, COSERO) will be used for each case-study, complemented with information on restrictions in reservoir operation due to non-energy needs (e.g. ecosystem services, flood mitigation or water supply). Wind speeds and solar irradiation are converted to power generation using respective simulation tools. This data will feed power system (e.g. DISPA-SET, MEDEA) and energy system (TIMES) models to assess the optimal operation of electricity generation. Demand for electricity and district heating will be forecast with existing statistical time series analysis approaches which rely, among others, on climate data.

Recent EU initiatives are also developing climate services for the power sector, namely within the Copernicus Climate Change Service (e.g. ECEM, Clim4Energy), within Horizon 2020 (recently started research projects SECLI-FIRM, S2S4E) or within JPI Climate (e.g. MEDSCOPE project). In all these initiatives the focus is on the individual various aspects influencing power generation (solar, wind, hydro resources availability and demand). CLIM2POWER approach is different since it will make energy/power systems models respond better to climate variability in a comprehensive way, delivering holistic system-integrated results to support decision making.