EMHIRES: European Meteorological derived HIgh resolution RES generation time series for present and future scenarios

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The European Union (EU) has a goal of providing at least 27% of the total energy consumption by 2030 from Renewable Energy Sources (RES-E), which could translate into 50% of total electricity production from RES-E. The Energy Union strategy includes the aim of becoming "the number one in renewable", continuing the significant growth of RES-E[1]. The growing share of RES-E increases the stochastic nature of the power system and its study has become an established field in Power System Analysis, leading to improved planning and scheduling tools for the power sector.

The adequate modelling of high RES-E penetration systems crucially depends on accurate representation of their spatial and temporal characterisation. RES-E data inherently bears the risk of being imperfect, inappropriate or incomplete leading to errors in power system studies, overstating or underplaying the possible role of solar and wind energy in the future energy mix [2].

The trend is to use weather derived time series from reanalysis or meteorological models and convert into power using approximations of standard power curves applied for entire market areas. RES-E datasets for assessing the European power system should balance geographical coverage, spatial resolution as well as the time step and period length to capture climatic variability. Care also with technical data of wind turbines; hub height and power curves of each turbine type. However, there currently exists no publicly available robust datasets meeting all these requirements [3].

Here, wind time-series data from MERRA reanalysis [4] at 0.66x0.5 degree resolution is downscaled to site level through cumulative distribution function mapping based on the Weibull distribution and the Global Wind Atlas [5]. Conversion into power is done using power curves and each turbine type characteristics using a reconstructed and homogenized dataset of 2015 [6]. Wind power is upscaled at different aggregated levels to assess data robustness with high resolution ECMWF-products.

We present open access RES-E generation hourly time series for the EU-28 and neighbouring countries at NUTS-1, NUTS-2 for 1986-2015 derived from high resolution resource. It provides a newly and validated methodology useful to standardize and improve the comparability among models and RES-E integration studies.

REFERENCES
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