ABSTRACT FOR THE GENERAL PUBLIC

The energy landscape has become increasingly complex in recent years as renewable energy sources are constantly being expanded and integrated into the existing infrastructure to meet the European Union's goal of carbon neutrality by 2050. At the same time, market participants require robust tools not only for predicting tomorrow's prices, but also for quantifying the uncertain future. Hence, this project aims to develop novel approaches to electricity price forecasting (EPF) by developing statistical learning models with probabilistic inputs. The latter will include predictive distributions of such fundamental variables as the demand for electricity or wind and solar generation.

To achieve this, the project offers an integrated approach consisting of three interrelated and performed in parallel tasks: (i) developing and evaluating statistical learning models with probabilistic inputs to compute point predictions of electricity prices, (ii) employing quantile forecasts of explanatory variables as inputs to statistical learning models for generating predictive distributions of electricity prices, and (iii) utilizing probabilistic predictions for decision support and economic evaluation of price forecasts.

The project will primarily contribute to Economic Sciences as it will enable more efficient risk management and decision support. However, the project is interdisciplinary in its nature. By developing novel forecasting methods and advancing data analytics for energy markets, especially statistical learning algorithms, this project will also contribute to the fields of Computational Statistics, Computer Science and Electrical Engineering.