

DESCRIPTION FOR THE GENERAL PUBLIC

Electricity price forecasting (EPF) is a branch of forecasting on the interface of econometrics/statistics and electrical engineering, which focuses on predicting the spot and forward prices in wholesale electricity markets. Its beginnings can be traced back to the early 1990s, when power sector deregulation led to the introduction of competitive markets in the UK and Scandinavia. The changes quickly spread throughout Europe and North America, and nowadays – in many countries worldwide – electricity is traded under market rules using spot and derivative contracts.

Over the last 25 years, a variety of methods and ideas have been tried for EPF. However, the unprecedented expansion of renewable generation (RES) and active demand side management (DSM) on one hand, and machine learning (ML) advances as well as the increase of computational power on the other, have recently provided the impulse and – the much needed – technical possibilities to cross the frontiers of today’s electricity price forecasting.

It is exactly the aim of the CrossFIT project to go beyond the state-of-the-art and bring EPF to a new level of relevance. The research will be conducted in four directions, which apart from a few preliminary studies, have not been addressed in the literature so far:

- The first will build on the recent advances in deep learning (i.e., the use of multilayer neural nets, that have the potential to forecast seasonal time series) and statistical learning (e.g., regularization algorithms, which penalize overfitting and favor parsimonious models) to provide better performing models, able to extract useful information in the era of Big Data (i.e., big in terms of volume, variety and velocity).
- The second will utilize very recent concepts of averaging forecasts of the same (or different) models across a set of calibration windows. The idea originating in macroeconometrics (selecting estimation windows in the presence of structural breaks), has been applied in EPF only this year. But this approach has yet much more to offer.
- The third will deal with ensemble forecasts, which have been ignored by the EPF literature, but are well motivated by practical considerations. Here, the difficulty lies mainly in the complexity of the econometric apparatus needed to develop forecasting models and tools to evaluate these *de facto* multivariate predictions.
- Finally, the fourth will look at prediction errors from a completely different perspective. The focus will be not on the errors themselves, but on the financial impact of these errors. This will provide us with measures that better reflect what is really important for companies operating in the power market, not abstract mathematical objects.