Short term wind energy production forecasts by means of economic loss functions minimization

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The proposed approach relies on the simple following statement: it is more relevant for a wind energy producer to minimize the cost induced by the forecast error instead of minimizing the forecast error itself.

We use economic loss functions calibrated on the Spanish energy market, and compare several strategies, based on non-linear regression, local quantile regression and minimization of the expected loss function.

The latest technique relies on state of the art non-parametric estimators of conditional probability distribution functions (cpdf) of energy production at a wind farm, given the wind speed forecasts of a deterministic meteorological model. In this case, no assumption is made about the shape of the underlying laws.

We show that in terms of RMSE, the production forecasts provided by usual regression techniques are better, but in terms of economical performance, the minimization of the economical loss function gives much improved results. The economical benefits of ensemble versus deterministic wind speed forecasts are also assessed.