Intraday Forecasts of the Wind Energy Production for Transmission System Grid Nodes

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 - Approximation with Reference Wind Farms
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Introduction





Motivation

TSOs ensure secure network operation. Therefore necessary:

- Load flow calculations
- Consider volatile power production (wind & PV)





Highly suspected redispatch causes:

- Errors in control zone intraday forecasts (15min to 8h)
- Spatially variable wind power production → missing grid node forecast



Method #1 – Approximation with Reference Wind Farms (RWF)



IWES

Method #2 – Generic Power Curve (PC)





Method #3: Combination with Spatial Weights





Experiment Setup





Results – Farm Errors

- Real time measurements → improve unmeasured farms in the first 3 to 4 hours
- Generic power curve does a surprisingly good job
- Best to combine real time supported reference farm forecasts with power curve, but is it significantly better?







Significance of the Improvement

Improvement over all single Wind Farms with the average error of 1000 bootstrap sets with 82 single wind farm errors:





Conclusion

- 3 Methods forecast the production of unmeasured wind :
 - Reference farm method: Extrapolation of single farm forecasts to region
 - Generic Power Curve
 - Combination
- Methods compared: 2.5 years of NWP and 15min power measurements
- Generic power curve ≈ reference farms
- Combination (method #3) results in significant improvement





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