A new method to estimate the uncertainty of AEP of offshore wind power plants applied to Horns Rev 1 - DTU Orbit (01/05/2019)

A new method to estimate the uncertainty of AEP of offshore wind power plants applied to Horns Rev 1

The present article proposes a framework for validation of stationary wake models that wind developers can use to predict the energy production of a wind power plant more accurately. The application of this framework provides a new way to quantify the uncertainty of annual energy production predictions. Additionally this methodology enables the fair comparison of different wake models. Furthermore the methodology enables the estimation of how much information can be obtain from a measurement dataset to quantify model inadequacy. In the present work the proposed framework is applied to the Horns Rev 1 offshore wind power plant. The model uncertainty of a modified N. O. Jensen wake model under uncertain undisturbed flow conditions was studied. Evidence of model inadequacy is found in terms of a bias in the predicted AEP distribution. It was found that the use of the official power curve compensates the errors in the wake model, as a consequence a larger uncertainty of the overall model is predicted. Furthermore a study of wake model benchmarking based on filtered flow cases indicates that measurement uncertainty in the wind speed and wind direction is large enough to obtain any evidence of model inaccuracy even for the simplest wake models.

General information
Publication status: Published
Organisations: Department of Wind Energy, Aeroelastic Design, Fluid Mechanics, Wind Turbines
Contributors: Murcia, J. P., Réthoré, P., Hansen, K. S., Natarajan, A., Sørensen, J. D.
Pages: 161-165
Publication date: 2015

Host publication information
Title of host publication: Scientific Proceedings. EWEA Annual Conference and Exhibition 2015
Publisher: European Wind Energy Association (EWEA)
ISBN (Print): 9782930670003
Keywords: Uncertainty quantification, Offshore wind power plant, Power predictions, Wake model, SCADA data reanalysis
Electronic versions: EWEA_paper_jumu.pdf
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2015 › Research › peer-review