



The BeFORECAST project – wind power forecasting for the Belgian offshore wind farms

Wim Munters¹, Jan Helsen², Johan Meyers³, Geert Smet⁴, Fatih Senkul⁵, Hasan Yazicioglu⁶, and the BeFORECAST consortium*

¹von Karman Institute for Fluid Dynamics, Sint-Genesius-Rode, Belgium

²Vrije Universiteit Brussel, Brussels, Belgium

³KU Leuven, Leuven, Belgium

⁴Royal Meteorological Institute of Belgium, Brussels, Belgium

⁵SABCA, Brussels, Belgium

⁶3E, Brussels, Belgium

*A full list of authors appears at the end of the abstract

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Today, offshore wind energy provides over 10% of the annual electricity consumption in Belgium. The Belgian offshore wind farms have a total capacity of 2.2 GW and, due to the limited area of the Belgian part of the North Sea, these farms feature a capacity density of well over 10 MW/km², which is among the largest of currently operational wind farms globally. In view of ambitions to accelerate the energy transition, Belgian offshore wind capacity will be nearly tripled to almost 6 GW by 2030. As such, the Belgian electricity system will be increasingly characterized by a large penetration of intermittent offshore renewables in which wake interactions between wind turbines play an important role. Therefore, accurate modeling and forecasting of wind farm flows and power extraction is crucial for an efficient and reliable energy system in Belgium.

The overall BeFORECAST project goal is to improve wind power forecasting and flow reconstruction by leveraging offshore measurement campaigns, numerical weather prediction, high-fidelity turbulence-resolving flow simulations, and machine learning techniques. The current contribution highlights the main outcomes of the project as it approaches its closing, including the implementation and testing of a wind farm parameterization in the RMI weather models, offshore measurement campaigns with lidars and drones, flow reconstruction in large-eddy simulations from lidars using 4D-Var techniques, nowcasting of wind ramps and storm events at farm level, and inter-farm wake effects of the upcoming wind farm developments in Belgium.

BeFORECAST consortium: Simone Gremmo (1), Alexandros Palatos-Plexidas (1, 2), Tsvetelina Ivanova (1, 2), Gertjan Glabeke (1), Maxime Lejeune (1), Pieter Mathys (1), Jeroen van Beeck (1),

Stijn Ally (2), Pieter-Jan Daems (2), Jakob Gebel (2), Lesley De Cruz (2, 4), Ahmed Alreweny (3), Nick Janssens (3), Dieter Van den Bleeken (4), Joris Van den Bergh (4), Idir Dehmous (4), Laurent Delobbe (4), Daan Degrauwe (4), Michiel Van Ginderachter (4), Alex Deckmyn (4), Karthik Badarinath (6), Daniele d'Ambrosio (6)