Preface

On behalf of the European Academy of Wind Energy (EAWE) and WindEurope (formerly the European Wind Energy Association EWEA), we hereby have the pleasure of presenting the Scientific Proceedings of the WindEurope Conference 2018.

Global Wind Summit 2018 (WindEurope Conference & WindEnergy Hamburg) took place in Hamburg on 25-28 September 2018. It is one of the largest and most important meeting places of the wind energy community. This year’s conference has featured 50 thematic sessions with a total of more than 500 speakers. As in previous years, the sessions mixed industrial content with scientific works, in order to increase the visibility of relevant scientific research and to facilitate an interchange of ideas between industry and academia.

In continuation of the successful agreement between WindEurope and IOP Publishing, the scientific contributions of the WindEurope Conference 2018 are published in the Journal of Physics: Conference Series, an Open Access journal managed by the Institute of Physics (IOP). All papers in this volume originate from scientific contributions presented at WindEurope Conference 2018, and have been peer-reviewed in order to ensure strict, international standards, coordinated by the Scientific Proceedings Editors and aided by the EAWE Wind Europe Scientific Committee.

New this year was the possibility for every accepted scientific abstract to submit a paper for the Scientific Proceedings. In previous years only the scientific papers presented in oral sessions were given this opportunity, but this year authors could submit a manuscript also for accepted scientific poster presentations. We believe this is an important development that benefits our community, and that greatly increases the attractiveness of WindEurope Conference. In particular, this guarantees long-term storage and easy electronic reference of conference papers, and we thank WindEurope for making this possible. Of course this positive development has also meant a much higher workload than previously. This year, a total of 46 original papers were submitted, of which 40 were eventually accepted for publication.

The papers were roughly organized in eight topics, which were handled by the following Section Editors:

- Ola Carlson, Chalmers University of Technology, Sweden: Integrating wind into the energy system
- Emilio Gomez-Lazaro, University of Castilla-La-Mancha, Spain: Digitalization
- Johan Meyers, KU Leuven, Belgium: Assessing the wind resource and turbine performance
- Michael Muskulus, Norwegian University of Science and Technology NTNU, Norway: End of life issues Environmental impacts, social acceptance & spatial planning Health & safety

1 http://www.eawe.eu/
Vasilis Riziotis, National Technical University of Athens NTUA, Greece:
Developments in turbine technology
- Simon Watson, Delft University of Technology, The Netherlands:
Operations & maintenance

The topics of the papers in these proceedings cover the whole spectrum of scientific interests in wind energy. The following selection demonstrates the variety of contributions and discusses some of the highlights.

The session on Assessing the wind resource and turbine performance contains works that discuss how extreme winds will be estimated in the New European Wind Atlas (Bastine et al.) and a novel idea for assessing atmospheric stability from measurements using a simple diagnostic plot (Svennigsen et al.). A number of other papers consider Lidar technology. For example, the paper by Würth et al. discusses how Lidar can be used to forecast the short-term power output of a wind turbine. The paper by Stock-Williams et al. demonstrates how a machine learning approach can be used to reconstruct wind fields more accurately from Lidar measurements, including an evaluation of the reconstruction uncertainty. Other prominent topics considered in the contributions are, for example, complex terrain and meso-scale models.

The session on Turbine technology has two interesting papers on wind turbine control, one dealing with optimal yaw under wake conditions (Urbán et al.) and the other developing observability analysis for analysing data-driven wind turbine models (Ritter et al.). The flight phases of ground-generating airborne wind energy systems are optimized in the paper by Warnock et al. The dynamics of a semi-submersible floating wind turbine are investigated with simulations (Galván et al.) and the fatigue in umbilical power cables is studied by Young et al.

In the Operations & maintenance session the paper by Rochat et al. demonstrates temperature sensing in a HVDC offshore cable. A general approach to anomaly detection, based on deep neural networks that predict probability distributions, is described by Vogt et al. An important tool in analyzing the reliability of wind turbine components is Failure Modes, Effects and Criticality Analysis (FMECA). The paper by Cevasco et al. demonstrates how this can help identify the most cost-critical components for maintenance actions.

The session on Integrating wind into the energy system features a study on a hybrid auxiliary power system that complements diesel generators with wind turbines and an energy storage solution, in order to provide emergency power to a large wind farm during islanding operation (Huang & Chen). The paper by Loukidis et al. is a careful study on the effect changes of financial support scheme in Greece can have on the uncertainty in wind farm revenues. Rebello et al. demonstrate how dynamic curtailment with a simple algorithm can, in principle, allow for participation in the secondary regulation market.

In the Environmental impacts, social acceptance & spatial planning session, only a few contributions were received. The paper by Ioannou et al. studies the effect uncertainty in electric market prices can have on the profitability of a wind farm, comparing different mathematical models for future electricity prices. Gonzalez et al. study the different raw materials needed for future renewable energy projects in a scenario for 2050. Although wind energy was the least affected, they identify certain risks for a successful transition to a low-carbon economy.

Only one paper was submitted to the End of life issues session. Pettas & Cheng discuss down-regulation and individual blade control for a 10 MW wind turbine as strategies for fatigue load reduction. It is shown that their combination is advantageous.
The session on Digitalization features one paper. Do & Berthaut-Gerentes provide a short study on how wind speed and power output depend on the time scale, reasoning that the current sampling rate for SCADA systems (aggregating 10 minutes of information by averaging) is close to optimal.

The Health and safety session also only features a single paper. Leimeister et al. discuss ideas on how to reduce health and safety hazards in lifting operations by employing automated, human-free hoisting systems and suitable fastening solutions for transport at sea.

As with previous events, the European Academy of Wind Energy is responsible for organizing the review process for scientific contributions, has contributed to the development of the sessions, and has provided chairs for sessions with scientific content. All papers were peer-reviewed by a Scientific Committee, consisting of scientists from EAWE member institutes and their associates.

Handling the many papers was challenging this year, as the paper review took place mostly within the academic summer holidays. We thank all authors for their understanding and willingness to take part in this procedure, including the short deadlines imposed by the tight publication schedule. We thank all reviewers for their engagement and entirely voluntary work, without which we could not guarantee the scientific quality and current interest of the accepted contributions. WindEurope is responsible for the organization and logistics of the conference, and we thank their highly professional staff and their associates for the excellent collaboration.

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