



Total Control

*Advanced integrated supervisory and wind turbine control
for optimal operation of large Wind Power Plants*

Dissemination and communication plan and
annual report on the dissemination and
communication activities

Deliverable D5.8

Delivery date: 13.07.2022
Lead beneficiary: DTU
Dissemination level: Public



This project has received funding
from the European Union's Horizon
2020 Research and Innovation
Programme under grant agreement
No. 727680

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Version	Date	Description		
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EXECUTIVE SUMMARY

This report details the communication and dissemination activities of the past year, and shows the plans for the coming year. In 2020, conference participation was changed significantly by the Covid restrictions. In 2020 we have produced in total 11 journal articles, 1 article in conference proceedings, 2 conference activities and the external and internal websites. In the final years of TotalControl, 2021 and 2022, we have planned a number of activities, including videos, more journal publications and the final meeting.

DISSEMINATION AND COMMUNICATION 2020

1.1 DISSEMINATION ACTIVITIES

2020 was an extraordinary year due to the emergence of the Covid pandemic.

Generally, all publications are mentioned on our website's publications archive.

- **Lio, W. H., Larsen, G. C. & Thorsen, G. R.**
Dynamic wake tracking using a cost-effective LiDAR and Kalman filtering: Design, simulation and full-scale validation. Renewable Energy, Vol. 172, 2021
- **Lu, L., Saborío-Romano, O. & Cutululis, N. A.**
Reduced order VSM based frequency controller for wind farm. Energies, Vol. 14, 2021
- **Sørensen, J. N. & Larsen, G. C.**
A minimalistic prediction model to determine energy production and cost of offshore wind farms. Energies, Vol. 14, 2021
- **Göçmen T., Urbán, A.M., Liew, J. & Lio, A. W. H.**
Model-free estimation of available power using deep learning. Wind Energy Science, Vol. 6, 2021
- **Lio, W. H. & Meng, F.**
Kalman-based interacting multiple-model wind speed estimator for wind turbines. IFAC Proceedings Volume 53, 2021
- **Sood, I., Munters, W. & Meyers, J.**
Effect of conventionally neutral boundary layer height on turbine performance and wake mixing in offshore windfarms. Journal of Physics: Conference Series, Volume 1618, 2020
- **Lio, W. H., Larsen, G. C. & Poulsen, N.K.**
Dynamic wake tracking and characteristics estimation using a cost-effective LiDAR. Journal of Physics: Conference Series, Volume 1618, 2020
- **Larsen, G.C., Ott, S., Liew, J., Laan, M.P. van der, Simon, E., Thorsen, G.R. & Jacobs, P.**
Yaw induced wake deflection a full-scale validation study. Journal of Physics: Conference Series, Volume 1618, 2020
- **Eguinoa, I., Kölle, K., Campagnolo, F., Iribas-Latour, M., Meyers, J., Göçmen, T., Duc, T., Astrain, D., Wingerden, J., Bottasso, C. L., Andersen, S. J. & Giebel, G.**

Launch of the FarmConnors Wind Farm Control benchmark for code comparasion. Journal of Physics: Conference Series, Volume 1618, 2020

- **Larsen, G.C. & Pedersen, M. M.**
Integrated wind farm layout and control optimization. Wind Energy Science, Vol. 5, 2020
- **Giebel, G., Galinos, C., Kazda, J. & Lio, W. H.**
T2FL: An efficient model for wind turbine fatigue damage prediction and cost of offshore wind farms. Energies, Vol. 13, 2020

PUBLICATIONS IN CONFERENCE PROCEEDINGS

- **Schoot, W., de Boer, W. & Bossanyi, E.**
Grid Frequency Stability with Wind Power: Irish Case Study Using a New Closed Loop simulation Environment. Proceedings of the 19th Wind Integration Workshop, 2020

ORAL PRESENTATIONS/POSTERS AT CONFERENCES/WORKSHOPS

- **Giebel, G., Larsen G.C., Natarajan, A., Meyers, J., Bossanyi, E. & Merz, K.**
TotalControl - Advanced integrated control of large-scale wind power plants and wind turbines. Global Wind Summit 2018, Hamburg, Germany 25-28 September 2018
- **Lu, L.**
Enhanced Frequency Control Capability from Wind Turbine Generators and wind Power Plants. UPC Barcelona, Spain, 5 September 2018

NEWSLETTERS

- **TotalControl Newsletter December 2020**

1.2 COMMUNICATION ACTIVITIES

The main communication activity aimed at the general public in 2020 was the [workshop](#) held online on December 10, as a back-to-back activity with the [wind farm control coordination action FarmConnors](#). Originally, both were planned to be on the WindEurope Summit in Hamburg, but that got cancelled and transformed into an online event. Since the aim of going there was to benefit from having half of the wind sector attending, we avoided the new online dates of the conference and hosted it ourselves. The entire workshop can be revisited on [YouTube](#).

DISSEMINATION AND COMMUNICATION PLAN 2021

2.1 UPCOMING DISSEMINATION ACTIVITIES

In the light of the current Covid situation it is uncertain how many conferences will be open to physical participation. We will try to participate to as many of the relevant conferences as possible in order to present the results of the project.

Gregor Giebel, Johan Meyers and others are the conveners of the mini-symposium on wind farm control. Some 15 abstracts were submitted this time. From TotalControl:

Ervin Bossanyi: Simple induction control scheme for wind farms

Ju Feng: Assessing the AEP increase potential of wind farm control by wake steering



Wind Energy Science Conference 2021
 Theme 1: Wind Resource, Wind Farms and Wakes



Wind Farm Control
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Wind Farm Control offers the possibility to increase power production and reduce loads by clever collaborative behaviour of the wind turbines in a farm. While a central wind farm controller was used since 2003 to allow for downregulation, the modern scientific topic distinguishes between wind farm flow control and control of the electrical part of the plant. The former has seen a lot of work over the last 15 years, first by downregulating the front row turbines to leave more wind to the turbines behind, and later by intentional yawing of the turbines and thereby, the wake in order not to hit a downstream turbine. Both techniques have potentially positive effects on the combined farm production and/or the aggregated loading of the turbines. Several other schemes for increased wake dissolution have also been proposed since. In the electrical arena, the provision of ancillary services and the reduction of losses were the main drivers, though some ancillary services (e.g. reserve power provision) also use flow control. We therefore invite talks regarding real-time wake modelling and state estimation, wind farm flow models, control algorithms, load assessment for wind farm control, wind-farm control experiments and any other topic fitting to wind farm control.

WESC 2021
 25 - 28 MAY
 HANNOVER, GERMANY

MINI-SYMPOSIUM

Abstracts are welcome!

2.2 UPCOMING COMMUNICATION ACTIVITIES

The third video is delayed, and was originally to be delivered at the end of 2020 (D5.4). It will pick up the thread of the first two videos and explain how we get from the experiments to the wind farm control models. The fourth and final video will be produced before the end of the project, and give an overview over the TotalControl toolbox.

The closing of the project will be followed by a final meeting among the partners. The uncertainty on the status of Covid makes planning difficult, but there were good experiences with online workshops.