



Total Control

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

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Definitions

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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 2019, we produced 5 conference activities and the external and internal websites. 2020 we have planned a number of activities, including videos, more journal publications and a side event on the Hamburg trade fair.

DISSEMINATION AND COMMUNICATION 2019

1.1 DISSEMINATION ACTIVITIES

On all major conferences where we go, we hand in an abstract for an overview poster for TotalControl. The last instalment of the overview poster (shown on the right) was presented on the [WindEurope Offshore Conference and Exhibition](#) in Copenhagen, 26-28 November 2019, where over 8000 participants had the opportunity to see it. Before, it was displayed on the [WindEurope ConfEx](#) 2019 in Bilbao, 2-4 April, which drew 8500 attendees.

Additionally, we had several other publications on two further, more specialised conferences. A major activity was the keynote of project head, Gunner Larsen, on the largest ever event for wind farm control, the 25 talks of the mini-symposium on wind farm control run by TotalControl WP lead for dissemination, Gregor Giebel and a co-lead. During the 5 sessions, typically over 70 people attended, showing the large interest for wind farm control.

The screenshot shows the TotalControl project website. At the top, it lists partners: KU Leuven, SINTEF, GEMPUIT, GEWISS, COWI, and SINTEF. The main heading is 'PO.055 Advanced integrated control of large-scale wind power plants and wind turbines' by Gregor Giebel, Gunner Larsen, Anand Natarajan, Julian Meyer, Ervin Rossanyi, Karl Mørz, DTU Wind Energy, KU Leuven, DNV GL, and SINTEF. The page includes an abstract, a 'First video released' section with a grid of video thumbnails, a 'Wind farm control time scales' section with a diagram, and a 'Project set-up' section with a flowchart. It also mentions 'Lilgrund tests began September 2019' and 'Levenmouth tests started November 2019'. At the bottom, there are references to various conferences and the website www.TotalControlProject.eu.

The screenshot shows a conference poster for 'Theme 2: Turbine Technology and Aeroelasticity' at the Wind Energy Science Conference 2019. The poster features a wind turbine icon and the eawe logo. It highlights a 'Mini-symposium: Wind Farm Control' co-chaired by Prof. Jan-Willem van Wingerden (TU Delft). The text describes wind farms as single generating assets and mentions that the principle of wind farm control can be achieved using both flow and active power control. It also notes that this mini-symposium will set the agenda for related discussions. The event is scheduled for 17-20 June, Cork, and the website www.wesc2019.org is provided.



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

- **Das, K., D.H. Minguijon, & N.A. Cutululis**
Optimization of reactive power dispatch in offshore wind power plants. Journal of Physics: Conference Series (not yet published, to be in 2020)
- **Mikkelsen, T., M. Sjöholm, P. Astrup, A. Pena, G. Larsen, M.F. van Dooren, A.P. Kidambi Sekar**
Lidar Scanning of Induction Zone Wind Fields over Sloping Terrain. Journal of Physics: Conference Series (not yet published)
- **Meng, F., A. W. H. Lio & J. Liew**
The effect of minimum thrust coefficient control strategy on power output and loads of a wind farm. (not yet published)
- **Lio, A. W. H. & F. Meng**
Effective wind speed estimation for wind turbines in down-regulation. Journal of Physics: Conference Series (not yet published)
- **Lu, L., Ö. Göksu & N. A. Cutululis**
[Power Angle Small-Signal Stability Analysis of Grid-Forming Wind Turbine Inverter Based on VSM Control.](#) Proceedings of the 18th Wind Integration Workshop, 2019
- **Lu, L. & N. A. Cutululis**
[Virtual synchronous machine control for wind turbines: a review.](#) Journal of Physics: Conference Series, Volume 1356, Number 1, 2019
- **Vitulli, J.A., G.C. Larsen, M.M. Pedersen, S. Ott & M. Friis-Møller**
[Optimal open loop wind farm control,](#) Journal of Physics: Conference Series, Volume 1259, 2019

- Mikkelsen, T., M. Sjöholm, P. Astrup, A. Pena, G. Larsen, M.F. van Dooren & A.P. Kidambi Sekar
[Lidar Scanning of Induction Zone Wind Fields over Sloping Terrain](#). NAWEA WindTech 2019 Conference, UMass Amherst, MA, USA, 14-17 October 2019
- Giebel, G., G. Larsen, A. Natarajan, J. Meyers, E. Bossanyi & K. Merz
[TotalControl - Advanced integrated control of large-scale wind power plants and wind turbines](#). Wind Energy Science Conference 2019, Cork, Ireland, 17-20 June 2019
- Lu, L.
[A Virtual Synchronous Machine Control Scheme for Wind Turbines](#). Wind Energy Science Conference 2019, Cork, Ireland, 17-20 June 2019
- Giebel, G., G. Larsen, A. Natarajan, J. Meyers, E. Bossanyi & K. Merz
[TotalControl - Advanced integrated control of large-scale wind power plants and wind turbines](#). WindEurope Offshore Conference, Copenhagen, Denmark, 26-28 November 2019
- Larsen, G.C.
[Recent developments in wind farm flow modeling and wind farm control](#), DTU-KAIST International Cooperative Wind Energy Workshop, Ulsan Korea, 21-22 October 2019
- Lu, L.
[Power Angle Small-Signal Stability Analysis of Grid-Forming Wind Turbine Inverter Based VSM Control](#), 18th Wind Integration Workshop, Ireland Dublin, 16-18 October 2019
- Lu, L. & N. A. Cutululis
[A Virtual synchronous machine control scheme for wind turbines](#). Wind Energy Science Conference 2019, Cork, Ireland, 17-20 June 2019
- Giebel, G., G. Larsen, A. Natarajan, J. Meyers, E. Bossanyi & K. Merz
[TotalControl - Advanced integrated control of large-scale wind power plants and wind turbines](#). WindEurope Summit 2019, Bilbao, Spain, 2-4 April 2019
- Lu, L. & N. A. Cutululis
[Virtual Synchronous Machine Control for Wind Turbines: A Review](#). EERA Deep Wind Conference, Trondheim, Norway, 16-18 January 2019

1.2 COMMUNICATION ACTIVITIES

The main communication activity in 2019 was the (slightly delayed) launch of the first video, both on the website, on YouTube and on LinkedIn. See the separate [Deliverable D5.2](#) for it. The [LinkedIn version](#) was seen more than 4000 times, and got 135 likes.

Right at the end of 2019, the second video was launched. After the [first video](#) explained wind farm control in general, the [second video](#) concentrates on the currently running experiments in Levenmouth and Lillgrund.

DISSEMINATION AND COMMUNICATION PLAN 2020

2.1 UPCOMING DISSEMINATION ACTIVITIES

Two abstracts are accepted at the upcoming Deepwind conference in Trondheim in January. Several other conferences are targeted towards the more scientific audience of either the wind sector or the power system sector, but as the abstract deadlines have not yet passed, the exact number and content of the papers is too early to say.

As the project reaches a more mature stage, more journal articles are also expected.

2.2 UPCOMING COMMUNICATION ACTIVITIES

The third video, to be delivered at the end of 2020 (D5.4), will then pick up the thread and explain how we get from the experiments to the wind farm control models.

The launch of the second video will also be used as an occasion to launch the project newsletter. By now, enough results have been collected to make a decent series of newsletters, such as to not just have one and then lay dormant for too long. The first topics of the newsletter, besides the videos, are the reference wind farm ([D1.3](#)), the [openly available datasets](#) of the LES precursor runs and the ongoing measurement campaigns. The text is deliberately short, but with clickable links, and therefore aimed at a quick overview of what is going on, while giving the possibility to dig deeper.

As a further activity, we will have a side project at the [WindEurope event in Hamburg](#), back-to-back with the sister project FarmConnors. Since both target the wind farm control community, and since FarmConnors is also run by DTU, the synergy is exploited as much as possible. The Hamburg side event targets some of the prospective 35.000 attendees from all aspects of wind power, as well as the more specialised audience within the wind farm control community.