5th Wind Energy Systems Engineering Workshop
Final Conference CL-Windcon Project*

October 2nd – 4th, 2019
Pamplona (Spain)

Hosted by National Renewable Energy Centre of Spain (CENER), NREL and DTU Wind

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<th>Wednesday 2nd October, 2019</th>
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*This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 727477
SESSION 2- What is Wind Energy Systems Engineering?
Chairpersons: Carlo Bottasso (TUM) and Alessandro Croce (POLIMI)

Origins of Systems Engineering and MDAO for wind energy applications (wind turbine design)  
Carlo Bottasso (TUM)

Expansion of Systems Engineering in wind energy to plant design applications  
Ewan Machefaux (Vestas Wind Systems A/S)

Re-thinking plant operation and control - maximizing profitability over the plant lifetime  
Christopher Bay (NREL)

SESSION 3- Application of Wind Energy Systems Engineering in Practice
Chairperson: Irene Eguinoa (CENER)

Vortex induced vibrations in high soft steel tubular towers  
Javier Alonso (SGRE)

XXL Wind Turbine Challenges  
Arantxa Esparza (NabraWind)

Breaking the ice for the MDAO ship  
Sebastian Sanchez Perez-Moreno (Innogy)

Hybrid Storage Systems in Renewable Energy Integration: Barasoain case study  
Eugenio Guelbenzu (Acciona Energy)

SESSION 4- Advanced Methods in Wind Energy Systems Engineering - Plant Controls (CL-Windcon)
Chairperson: Jan-Willem van Wingerden (TU-Delft)

Wind farm controller design and testing using LongSim  
Ervin Bossanyi (DNV-GL)

Dealing with time-varying inflow conditions in wind farm control  
Bart Doekemeijer (TUDelft)

Overview of recent experiments in wind farm control using scaled models in a boundary layer wind tunnel  
Carlo Bottasso (TUM)

Full scale testing of open-loop wind farm control approaches for reducing wake losses  
Stefan Kern (GE)

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08:30-09:15  **Keynote**: W2Power: Twin-rotor floating wind platform development  
Pedro Mayorga (EnerOcean)

Chairpersons: Frederick Zahle and Michael McWilliam (DTU)

- Advanced MDAO for wind power plant design  
  Katherine Dykes (DTU)

- High-fidelity wind turbine blade design enabled by adjoint techniques  
  Frederick Zahle (DTU)

- Large-Scale Gradient-Based Optimization for Wind Energy Systems  
  Andrew Ning (BYU)

10:25-10:45  

10:45-12:15  **SESSION 6**: Advanced Applications in Offshore Wind Energy Systems Engineering  
Chairperson: Mario Garcia-Sanz (US DOE ARPA-E)

- Control Co-Design of Floating Offshore Wind Turbines: the ARPA-E ATLANTIS Program  
  Mario Garcia-Sanz (US DOE ARPA-E)

- SiL scaled hybrid testing in the design of floating wind turbines  
  Jose Azcona (CENER)

- ELISA Technology: from numerical modelling to offshore installation  
  Joaquín Urbano (ESTEYCO)

- Engineering Judgment and Systems Engineering Perspective from Sandia’s Floating Offshore VAWT Project  
  Brandon Ennis (Sandia Labs)

12:15-13:15  Lunch

13:15-14:45  **SESSION 7**: Standards and Data for Wind Energy Systems Engineering  
Chairperson: Katherine Dykes (DTU)

- Task 37 guidelines for integrated wind energy system modeling  
  Pietro Bortolotti (NREL)

- Design for TCs and EQs: Experience from Taiwan  
  Niels Jacob Tarp-Johansen (Ørsted)

- Publishing FAIR data  
  Pawel Gancarski (CENER)

- Cybersecurity and wind energy  
  Elyoenai Egozcue (S21sec)

- New wind power plant control in the framework of existing certification schemes  
  Nikolai Hille (DNV-GL)

15:30  Visits: Barasoain experimental area (hybrid wind storage plant) & CECOER (Renewables Energy Control Center) - ACCIONA

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<th>Time</th>
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<td>09:00-10:00</td>
<td>BLADE OASIS/BASFF</td>
<td>Ainara Irisarri (CENER)</td>
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<td>Iñaki Nuin (CENER)</td>
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<td>10:00-11:00</td>
<td>WISDEM &amp; FLORIS</td>
<td>Pietro Bortolotti (NREL)</td>
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<td>Christopher Bay (NREL)</td>
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<td>11:00-11:45</td>
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<td>HAWTOpt2/Topfarm</td>
<td>Katherine Dykes (DTU)</td>
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<td>Cp-Max</td>
<td>Luca Sartori (POLIMI)</td>
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