IRPWind

Integrated Research Programme on Wind Energy

Project acronym: **IRPWIND**
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Collaborative project
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Annual event for all EERA JP Wind P2
Work Package 4 - Deliverable number 4.02

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Definitions

Acronym	Description
EERA	European Energy Research Alliance
JP	Joint Programme
IRPWind	Integrated Research Programme
SP	Sub-programme
R&D	Research and Development
R&I	Research and Innovation
IP	Intellectual Property
EC	European Commission
CPO	Chief Policy Officer

Contents

Executive Summary

The IRPWind conference is an annual event aimed at transferring knowledge on wind energy research among EERA JP Wind members. Over the years, the goal of the conference has been broadened, making an effort to inform and discuss with industrial participants as well. In the edition of 2015, a total of 155 participants took part in the 2-day event, with both industry and national programmes representatives joining in. A mix of plenary presentations and parallel sessions for the EERA JP Wind sub-programmes, covered the complete range of technical research topics and sought for ways to integrate with industrial requirements on R&D and IP/technology in general.
We can conclude that knowledge transfer among EERA JP Wind members is a success at the conference, even though fewer parallel sessions will even improve this further. Integrating with the industry, presenting in the "right" way and keeping the momentum of the enthusiasm after the conference remains a point of attention. This was also reflected in the online survey that was filled out by 87 participants. Communicating, expressing the expectations prior, during and after the conference will help the organisation continuously improving the IRPWind conference.

1. Introduction

The IRPWind conference (deliverable 4.2) is defined as an annual dissemination event between EERA JP Wind partners. Both EERA JP Wind projects are presented as well as outcome of national projects. The event aims to share knowledge, also across sub-programmes and provide an opportunity for all EERA JP Wind members to network and discuss offshore wind related research topics.
The ultimate goal of work package 4, “transfer of knowledge” is to disseminate and exploit developed knowledge, further equalizing the level of knowledge on wind energy across the European wind sector. This includes both the research community, the industry, national program agencies as well as the European Commission.

The event is not open to the public. EERA JP Wind has targeted specific persons that are not part of the EERA JP Wind community to attend the 2016 edition. Appendix A shows a complete list of attendees.

2. IRPWind conference 2015

The second edition of the IRPWind Conference was held in Amsterdam on September 28th and 29th, entitled “United research, serving a united industry”. The set-up of the conference was similar to the first edition, comprising of presentations held in several sessions, reporting on research progress and results of national and European research projects on offshore wind energy.
Having taken the lessons learned from the first edition, this year’s conference showed a larger participation of industry. Furthermore, the organisation searched actively for feedback on the IRPWind initiative and the conference itself through an online survey Registrations included 6 representatives from national programmes, 22 representatives from industry and 127 representatives from the research community. The opening and closing of the conference was cared for by the IRPWind project officer Matthijs Soede.

2.1 Registrations

The EERA JP Wind sub-programme coordinators were asked to provide a list of industrial representatives that are important stakeholders in their field of expertise. 61 people from 30 different companies were invited, 17 accepted, 7 declined, 37 did not react. The organisation committee of the 2016 IRPWind conference also strived for participation of representatives from national programmes. 24 representatives were invited, unfortunately only 6 managed to attend the conference, 1 kindly declined the invitation. Lastly, 25 technology transfer experts received an invite for the 2016 edition of the IRPWind conference. 9 of them joined, 2 declined.
With a 127 EERA JP Wind members joining the conference, a 35% increase in participation was achieved on the total registration. The full list of registrations can be found in Appendix A.

2.2 Day 1, September 28th

After registering, a series of plenary sessions was started. The introduction of IRPWind was done by Peter Hauge Madsen (DTU). Unfortunately, Paul Verhoef (EC, head of unit renewables) cancelled his attendance days prior to the conference. The task of officially opening the conference was then taken up by Matthijs Soede (EC, IRPWind project officer).
After these two presentations, the parallel sessions were started. As the EERA JP Wind consists of 7 separate sub-programmes, it proved a challenge to be able to fit the long list of presentations in a two day programme. Finally, 4 parallel sessions in separate meeting rooms were held. Feedback after the conference suggested to reduce the number of parallel session as people felt they were missing interesting presentations they would have liked to attend.

The afternoon started off with 2 plenary sessions and a panel discussion. Kristian Ruby (EWEA, CPO) presented on the how Europe can maintain its wind energy's global leadership through research and innovation. Especially Asia is catching up, believed to surpass the EU budget on renewable R&I in 2019. Close collaboration between industry and research institutions as well as the EU's R&I budget, Horizon 2020, are therefore key in asserting Europe's current leading position.

Figure 1. Kristian Ruby, EWEA's CPO delivering his speech

The Windscanner.eu was presented as the next step in wind condition measurements. The scanning LiDAR technology developed under this European collaboration has opened up a whole range of new applications. The presentation was followed by a signing session were representatives of all involved research institutes signed an memorandum of understanding to continue the efforts leading to this joint research facility called Windscanner.

The rest of the afternoon was formed by sub-programme specific workshops, often used as IRPWind progress meetings for each work package in the project: a clever way of using the IRPWind conference.
The poster session, combined with some drinks resulted in plenty of active discussions in the foyer of the conference venue. The registration process yielded 16 poster participants, of which 8 provided an abstract in time to be printed in the programme booklet. These abstracts are presented in Appendix D. To boost the amount of scientific posters at the conference, a poster award will be initiated for future editions. For that the IRPWind organisation will need to form a review committee.

The first day of the conference was concluded by a dinner, which had 75 participants.

2.3 Day 2, September 29th

The second day was opened by Peter Eecen (ECN), representing the host organisation of the conference. He took the opportunity to once more put the goals and objectives of the IRPWind project in the lime light. He was followed by Peter de Weijs (Westermeerwind), presenting the everyday challenges of designing and constructing a 144MW near shore wind farm in the Netherlands. Also in such a commercial project there is room for research an innovation.

The morning sub-programme session were followed by a plenary presentation by Ernst van Zuijlen (TKI WoZ), who represented the Dutch national programme that aims to promote innovation and collaboration between research institutes and SMEs in the Netherlands. A key take-away: we are on track to achieve the 40% cost reduction for offshore wind energy, compared to 2010. Mauro Villanueva (Gamesa), finished the plenary presentations with the message that industry should join the research community in this effort, while we still can. The wind energy community must take action, before we realize it is too late to move into gear.

Suggestions to further improve the collaboration between industry, national programmes and research community were provided in a dedicated workshop called “EERA JP Wind and the industry”. The foundations were laid for an online technology transfer platform where technology transfer experts can exchange lessons learned, IP and technology can be placed in the window shop and industry can meet the research community and see what’s in store. This session was directly followed up after the conference by Mauro Villanueva and translated in the repository of ENEA.

The afternoon sessions included a workshop on Mobility, which is an essential element in integrating Europe’s research activities. Furthermore, a potential new sub-programme was presented by VTT called “Cold climate”.

The conference was closed by Matthijs Soede, who encouraged all those present to keep the momentum of the conference. He presented several possibilities for funding of proposals effectively showing that EU is investing heavily in research on renewable energy.

2.4 Available material

The complete list of presentations can be found in Appendix C. The PDF versions of the presentations of the conference have been uploaded to the Sharepoint site of IRPWindconf.eu. All attendees of the IRPWind conference have received log-in details. Posters and presentations of last year's IRPWind conference are accessible through the same link.

https://www.irpwindconf.eu/do/login/

2.5 The theme

As mentioned, this year's IRPWind conference theme was "united research serving a united industry". During the opening of the conference, Matthijs Soede justly indicated that a better title would have been "united research and industry serving society". Nonetheless, the atmosphere during the conference and the received feedback shows that the research community has done a great job, offering their hand to the industry to jointly pick up the challenge of maintaining the global lead in wind energy research.

Figure 2. Peter Hauge Madsen introducing the theme in his opening session

3. Feedback and lessons learned

During the preparation of the conference it was decided to give the conference a more professional feel. Partly this was achieved through the programme booklet that was designed by a graphic design agency. Another improvement of the 2015 conference was the method of gathering feedback.

3.1 Feedback

A company specialized in online surveys was contracted to co-develop a survey that was send out to all IRPWind registered attendees. This resulted in 87 partially completed surveys, of which 66 were completed. Compared to 2015, the amount of returned questionnaires is 4.5 times as large. Moreover, the questions posed in this survey are much more valuable, as some of them are of an open character, triggering written answers rather than multiple choice.

The aim of the survey was to receive feedback on the set-up of the conference, while touching upon the perceived level of cooperation/integration of activities of the research community and wind energy industry.
The questions were the following:

1. What type of organisation do you represent?
    a. Research community 87.4%
    b. Industry 9.2%
    c. National program 2.3%
    d. Other 1.1%
2. Which job title fits you best?
    a. (Senior) researcher 50.6%
    b. Head of research department 24.7%
    c. (Senior) engineer 7.1%
    d. Head of engineering/CTO 0.0%
    e. Consultant (12.9%)
    f. Other (4.7%)
3. Please state how valuable the sessions were that you attended
    a. Plenary sessions on the first day were deemed less valuable by 8%, average by 25.3% and very valuable by 17.3%
    b. Plenary sessions on the second day scored average (44%) to very valuable (26,7%)
    c. All parallel sub-programme session scored average to very valuable, except SP2 Aerodynamics and SP7 Wind integration. However these sessions also have the highest scores “very valuable”. Note that the score can be affected by people from sub-programmes that were covered on the second day, that simply choose a session on the first day randomly.

4. Goals and objectives:
    a. Almost half (44%) of the attendees was aware of the goals and objectives prior to the conference
    b. 51% of the attendees indicated that they became aware of the G&O of IRPWind during the conference
5. How could this conference become even more interesting for you?

“more time at the workshops for discussing the presentations”

“It should be possible to attend the sessions in SP1, SP2 and SP5. Maybe the sessions could be shorter, in order to have fewer parallel sessions”

“Industry and research need more interaction. It seems from IRPWIND seminar that research institutes think they know better the medium-long term research needs for wind energy. I think this is not the correct way. After the conference I have the feeling that is more like "United research defining future R&D needs"”

“It would be helpful for knowledge publishing and spreading to have a technical co-sponsor and select special presentations to be published as technical papers in indexed and well-known databases (e.g. IEEEXplore and Energy Procedia). This competition will also encourage the participants to present new and interesting materials.”

“Improve the plenary lectures, reduce the number of parallel sections (I couldn't attend some of these due to an overlapping).”

“include more detailed description of content of presentations / sessions on the Website”

“Should increase involvement of the selective industry participants.”

“changes to the way the poster session is organised. In the time slot reserved for the poster session, I did not even know where it was, and everybody was chatting in the lunch room. So stayed there and did the same. Basically no one went for the posters. It must be at least frustrating if not even insulting, to stand with a poster, and almost no one is coming... I would recommend to either: - place the posters directly where the lunch is - make a separate poster session which is not the same as lunch - remove the poster session completely”

“I appreciate the cross-cutting activities so keep or increase this part”

“Though in this second edition more presentations from the industry were give, I would like to see even more in the next one.”

“Diffusion of partner institution initiatives beforehand, possibly in a booklet; diffusion of participants beforehand; matchmaking sessions concerning interests of participants (CfP, articles, discussions); improved location of posters”

“More policy-related More on economics and research Perhaps information on other JP's research”

“Workshop type of session between industry and researchers to discuss state of-art expertise versus topical needs and challenges.

6. Do you want to be invited to next year's edition of the IRPWind conference?
    a. 100% yes (66 persons)
    b. 0% no

3.2 Lessons learned

The IRPWind conference of 2016 should keep:

- Increased participation of industry and national programmes
- Plenary presentations by industry
- The 2 day programming
- Around 150 participants
- Opportunity to plan EERA JP Wind related activities around the conference
- Standing, more social lunch

The IRPWind conference of 2016 should improve on:

- The amount of parallel sessions: maximum 2
- The size of presentations rooms: >75 people/room
- The length of the SP sessions: reduce
- Present research topics with the correct commercial attitude: what's the added value?
- The location of the poster session: more posters, in the back of the second plenary hall
- The amount of posters and possibility to have them peer-reviewed
- The preparation of panel discussion, or leave it out
- Availability of sound engineer and photographer
- The finalization of the programme: key-note speakers confirmed in May
- Preparation of the plenary speakers by organisation: mics, presentations, travel arrangements etc.
- Make data from previous editions available through irpwindconf.eu

4. Conclusions

Once again we can look back at a successful IRPWind conference. The increased presence of industry led to a more practical approach towards presenting wind energy research. This was reflected in the plenary sessions, the panel discussion and the "EERA JP Wind and the industry" workshop.
The efforts to bring the industry, national programmes and research community in one room are appreciated by the participants. We still see opportunities for further integrating the research vision of industry with that of national programmes and researchers. Furthermore, has proven to be difficult to keep the momentum of the conference in the months after.
It is suggested that more frequent contact between industry and the research community, on an EERA JP Wind/IRPWind level will promote this integration of R&D activities. The conference can function as a yearly event where knowledge transfer is the main priority.
The recently initiated European Technology and Innovation Platform (ETIP) can form the missing link for this continuous consultation. We need to ensure it has the IRPWind conference of 2016 on its agenda.

Taking into account the remaining lessons learned from the survey, we can look forward to an even more successful IRPWind conference in the coming years.

Appendix A. List of registrations 2015

No.	Title	LastName	Organisation
1	Mr.	Amico Roxas	ENEA
2	Mr.	Anaya-Lara	University of Strathclyde
3	Mr.	Andersson	DTU
4	Mr.	Antoniou	Fraunhofer IWES
5	Mr.	Arsuaga	CIRCE
6	Mr.	Attya	University of Strathclyde
7	Mr.	Avolio	CNR-ISAC
8	Mr.	Ayuso	IDAE (Institute for Energy Diversification and Saving
9	Mr.	Bacharoudis	CRES
10	Mr.	Bajor	Institute of Power Engineering
11	Mr.	Barth	ForWind - Center for Wind Energy Research
12	Mrs.	Bay Hasager	DTU
13	Mr.	Bechmann	DTU Wind
14	Ms.	Benveniste	IREC
15	Mr.	Berthelsen	MARINTEK
16	Mr.	BESTİL	TÜBİTAK
17	Mr.	Beurskens	SET Analysis* Adv ECN
18	Mr.	Biera	CENER
19	Mr.	Bluemink	VTT
20	Mr.	Bottasso	Technische Universität München
21	Mr.	Breitner	ForWind Hannover
22	Mr.	Byrkjedal	Kjeller vindteknikk
23	Mrs.	Calidonna	CNR
24	Mr.	Clausen	DTU Wind Energy
25	Mr.	Coker	METU Center for Wind Energy
26	Mr.	Croce	Politecnico di Milano
27	Mr.	CRUZ	CIEMAT
28	Mr.	Cutululis	DTU Wind Energy
29	Mrs.	De Pino	CNR
30	Mr.	de Weijs	Westermeerwind
31	Mr.	Derks	Adwen
32	Mr.	Devriendt	OWI-lab / VUB
33	Mr.	Domínguez-García	IREC
34	Mr.	Donnelly	3E
35	Mr.	Dyck	Phoenix Contact Electronics
36	Mrs.	Dyer	ORE Catapult
37	Mr.	Dzierzanowski	PGE Energia Odnawialna S.A.
38	Mr.	Eecen	ECN
39	Mrs.	Frøysa	CMR/NORCOWE
40	Mr.	Gancarski	CENER
41	Mr.	Gerz	Institute of Atmospheric Physics of DLR (German Aerospace Center)

42	Mr.	Gorenstein Dedecca	TU Delft
43	Mr.	grasso	Vestas
44	Mr.	Gullì	CNR
45	Mr.	Guzman	RWTH Aachen University
46	Mr.	Hackhofer	PtJ
47	Mr.	Hangan	University of Western Ontario
48	Mr.	Hanssen	1-Tech s.p.r.l.
49	Mr.	Hauge Madsen	DTU Wind Energy
50	Mr.	Hermans	ECN
51	Mr.	Huebler	Leibniz Uni of Hannover - Institute of Structural Analysis
52	Mr.	Hummelshøj	DTU Wind Energy
53	Mr.	Iribas	CENER
54	Mr.	Piel	ForWind Hannover
55	Mr.	Jensen	DTU Wind Energy
56	Ms.	Jiang	TU Delft
57	Mr.	Jorgensen	DTU
58	Mr.	Karimirad	MARINTEK
59	Mr.	Kat	Tubitak
60	Mr.	Kayran	Middle East Technical University
61	Mr.	Kim	University of Stuttgart
62	Mrs.	Kitzing	DTU
63	Mr.	Knauf	Siemens AG
64	Mr.	Knudsen	DTU
65	Ms.	Kooijman	ECN
66	Mr.	Kooijman	GE
67	Mr.	Koutoulakos	Nuon/Vattenfall
68	Mr.	Kuehn	ForWind/ Uni Oldenburg
69	Mr.	Kunneke	Delft University of Technology
70	Mr.	Lange	Fraunhofer IWES
71	Mr.	Lavandera	Idesa
72	Mr.	Lehtomäki	VTT Technical Research Centre of Finland Ltd
73	Mr.	Leithead	University of Strathclyde
74	Ms.	Lekou	Centre for Renewable Energy Sources and Saving (CRES)
75	Mr.	Leuenberger	ECN
76	Ms.	Lourens	Delft University of Technology
77	Mr.	Luczak	IMP PAN
78	Mr.	Lutz	University of Stuttgart
79	Mr.	Lymperopoulos	FCH JU
80	Mr.	Madsen	Technical University of Denmark
81	Mr.	Martinez	Vattenfall R&D
82	Mr.	McKeever	ORE Catapult
83	Mr.	mcmillan	uostrath
84	Mr.	Molins	Universitat Politecnica de Catalunya

85	Ms.	Moreno	Fundación CIRCE
86	Mr.	Morthorst	DTU
87	Mr.	Moya	CENER
88	Mr.	Müller	PGE Energia Odnawialna S.A.
89	Mr.	Ng	ORE Catapult
90	Mr.	Nieuwenhout	ECN
91	Mr.	nijssen	WMC
92	Mr.	Nonås	MARINTEK
93	Mr.	Otterson	Fraunhofer IWES
94	Mr.	Ozdemir	ECN
95	Mr.	Paluch	PKN Orlen SA
96	Mr.	Papathanasiou	ECN
97	Mrs.	Paz Comech Moreno	CIRCE
98	Mr.	Perez	TECNALIA
99	Mr.	Prieto	ORE Catapult
100	Mr.	Pujana	IK4-IKERLAN
101	Mr.	Raijmaekers	WMC
102	Ms.	Ram	DTU
103	Mr.	Rinne	VTT
104	Mr.	Rodriguez Arias	CTC
105	Mr.	Rohrig	Fraunhofer IWES
106	Mr.	Rolfes	Fraunhofer Hannover
107	Mr.	Ruby	European Wind Energy Association
108	Ms.	ryan	UCD
109	Mr.	Salgado	IK4 Ikerlan
110	Mr.	Savenije	ECN
111	Mr.	Schepers	Energy Research Center of the Netherlands
112	Mr.	Schito	Politecnico di Milano
113	Mr.	Schröder	Leibniz Universität Hannover
114	Mr.	Schyska	University of Oldenburg - ForWind
115	Ms.	Seidel	EAWE e.V.
116	Mrs.	sempreviva	DTU Wind Energy
117	Mrs.	Serri	RSE S.p.A.
118	Ms.	Sharick	UK Energy Research Centre
119	Mr.	Simao Ferreira	TU Delft - DUWIND
120	Mrs.	Simões Esteves	LNEG
121	Ms.	Sobótka	Orlen
122	Mr.	Soede	European Commission
123	Mr.	Sorensen	DTU
124	Ms.	Stam	ECN Wind Energy
125	Mr.	Stengaard	DTU Wind Energy
126	Mr.	Steudel	Senvion GmbH
127	Mr.	Stoevesandt	Fraunhofer IWES

128	Mr.	Strack	WindGuard
129	Mr.	Stridbaek	DONG Energy
130	Mr.	Subias	CIRCE
131	Mr.	Svardal	Christian Michelsen Research AS
132	Mr.	Svendsen	SINTEF Energy Research
133	Mr.	Tande	SINTEF
134	Mr.	TESSMER	DLR - German Aerospace Center
135	Mr.	Ugarte Olarreaga	CENER
136	Mr.	Uzol	METU Center for Wind Energy (METUWIND)
137	Mr.	van Kuik	TU-Delft
138	Mr.	Van Nieuwenhoven	Laborelec
139	Mr.	van Noort	Aeolis Forecasting Services BV
140	Mr.	van Roermund	ECN
141	Mr.	van Wingerde	Fraunhofer/IWES
142	Mrs.	van Zuijlen	ECN
143	Mr.	van Zuijlen	TKI WoZ
144	Mr.	Vasiljevic	DTU Wind Energy
145	Mr.	Verelst	DTU Wind Energy
146	Mrs.	Veum	ECN
147	Mr.	VILLANUEVA	GAMESA
148	Mr.	von Terzi	GE Global Research
149	Mr.	Vrana	Sintef Energi
150	Mr.	Wagenaar	ECN
151	Mr.	Wiggelinkhuizen	ECN
152	Mr.	Zarouchas	Delft University of Technology
153	Mr.	Zasso	Politecnico di Milano
154	Ms.	Zeni	European Wind Energy Association

Appendix B. Conference programme 2015

28-Sep	Teleport - Plenary hall	Room A	Room B	Room C	Room D
		SP1 Wind conditions - Hans Ejsing Jørgensen (DTU)	SP2 Aerodynamics - Peter Eecen (ECN)	SP3 Offshore wind - John Olav Tande (SINTEF)	SP7 Wind integration - Poul Erik Morthorst (DTU)
8.00	Registration				
8.30					
9.00	Opening + welcome Peter Hauge Madsen, DTU				
9.30	Presentation by Paul Verhoef, EC				
10.00		SP1 - Workshop morning	SP2 - Workshop morning	SP3 - Workshop morning	SP7 - Workshop morning
10.30					
11.00					
11.30					
12.00					
12.30	Lunch + poster				
13.00					
13.30					
14.00	Presentation by Kristian Ruby, EWEA				
14.30	Presentation of Wind-scanner.eu				
15.00	Panel discussion				
15.30					
16.00		SP1 - Workshop afternoon	SP2 - Workshop afternoon	SP3 - Workshop afternoon	SP7 - Workshop afternoon
16.30					
17.00					
17.30	Networking drinks + posters				
18.00					
18.30					
19.00	Dinner				

29-Sep	Teleport - Plenary hall	Room A	Room B	Room C	Room D
		SP5 Research facilities - Felix Avia (CENER)	SP6 Structural design and materials - Denja Lekou (CRES)	SP4 Grid integration - Kurt Rohrig (Fr.hofer/IWES)	Parrallel sessions
09.00	Welcome by Peter Eecen, ECN				
09.30	Presentation by Peter de Weijs, Westermeerwind				
10.00		SP5 - Workshop part 1	SP6 - Workshop part 1	SP4 - Workshop part 1	EERA JP Wind and the industry - Innovation market place - Network of TTE's - Industrial advisory board
10.30					
11.00					
11.30					
12.00					
12.30	Lunch				
13.00					
13.30					
14.00	Presentation by Ernst van Zuijlen, TKI WoZ				
14.30	Presentation by Mauro Villanueva, Gamesa				
15.00		SP5 - Workshop part 2	SP6 - Workshop part 2	SP4 - Workshop part 2	IRPWind WP5 - Mobility
15.30					
16.00					Cold Climate workshop
16.30	Closing by Matthijs Soede, EC				

Appendix C. List of presentations

- 01. P.H. Madsen_DTU_IRPWIND yearly conference_2015 introduction
- 02. P.H. Madsen_DTU_The European WindScanner Facility_MoU-sign
- 05. H. E. Jorgensen_DTU_Strategy on Wind Conditions
- 06. B. Schyska_Forwind_Analog Ensemble Method
- 08 J N Sorensen_DTU_Highlights from wake conference in Visby
- 08. J.N. Sorensen_DTU_Highlights from wake conference in Visby
- 10. A. Sempreviva_DTU_Mesoscale Modelling Benchmarking Exercise
- 12 J S Rodrigo_CENER_IEA-Wakebench
- 12. J.S. Rodrigo_CENER_IEA-Wakebench
- 13. A. Bechmann_DTU_WAsP Online
- 14. B. Lange et al._Fraunhofer IWES_The New European Wind Atlas (NEWA)
- 17. H.J. Kooijman_GE_AVATAR, 10MW blade project GE perspective
- 17. H.J. Kooijman_GE_AVATAR, 10MW blade project GE perspective_DO NOT RELEASE
- 18. H.A. Madsen_DTU_Highlights of the Innwind WP2 project
- 19b. C.L. Bottasso_TUM_wind sensing by rotor loads
- 19c. G. Schepers_ECN_Inflow activities at ECN
- 19d. Y. Kim_IAG_Turbulence inflow modelling in FLOWer code 3 test cases
- 19f. H.A. Madsen_DTU_Blade mounted sensor for inflow meas and charac
- 20. J.O.G. Tande_SINTEF_EERA SP Offshore Wind Energy
- 21. R. Donnelly_3E_FP7 ClusterDesign
- 22. L.M. Nonas_MARINTEK_ LEANWIND FP7
- 23. P.A. Berthelsen_MARINTEK_ LIFES 50plus introduction
- 24. J.O.G. Tande_SINTEF_IRPWind WP6 offshore
- 25. K. Schroeder_Forwind_Overview on IRPWind WP 6.1
- 26. P. Gancarski_CENER_IRPWind status WP6.2
- 27. O. Anaya-lara_UoS_IRPWind status of WP63
- 28. P.E. Morthorst_DTU_Economic and social aspects of wind integration
- 29. B. Ram_DTU_Social sciences
- 30. G. Benveniste_IREC_Cost of Wind
- 31. L. Kitzing_DTU_How policy design can foster tech developments
- 32. C. van Zuijlen_ECN_How policy design can foster tech developments
- 33. K. Skytte_DTU_Subprogramme 7 meeting
- 36. A. Ugarte_CENER_Meeting of EERA RI Networks
- 38. S. Barth_Forwind_Wind Energy Tunnels Network
- 41. D. Lekou_CRES_EERA SP Structures & Materials workshop
- 42. D. Lekou_CRES_Highlights of INNWIND.EU WP2 Task 2.2
- 46. D. Lekou_CRES_IRPWind WP7.1 –WP7.5
- 49. S. Raijmaekers_WMC_The impact of accelerated ageing on GFRP
- 50. K. Rohrig_IWES Fraunhofer_EERA JP Wind SP_Grid_Integration
- 51. H. Holttinen et al._VTT_AnSer2RES proposal
- 52. A. Attya_UoS_Provision of frequency support
- 53. J.L. Domínguez-García_IREC_Ancillary services from wind power
- 53. J.L. Domínguez-García_IREC_Grid Integration RI Network
- 55. P. McKeever_ORE Catapult_HD MMC Offshore HVDC
- 56. N. Lymperopoulos_FCH_The Fuel Cells and Hydrogen Joint Undertaking
- 57. P.H. Madsen_DTU_Introduction EERA and the Industry
- 59. M. Leuenberger_ECN_EERA JP Wind and the industry
- 61. O. Anaya Lara_UoS_Mobility experience
- 62. V. Lehtomaki_VTT_Cold Climate Sub Program Proposal
- 63. P. Eecen_ECN_Opening Day 2
- 64. P. de Weijs_Westermeerwind_Presentation
- 65. E. van Zuijlen_TKI WoZ_Cutting off-shore wind costs by 40%
- 66. M. Villanueva_Gamesa_Keynote speech_DO NOT RELEASE
- 67. M. Soede_EC_IRPWind closing remarks

Appendix D. Poster abstracts (8/16)

1 Monitoring of offshore foundations for design optimisation, O&M decission support and life time assesement: an overview of the activities of OWI-Lab

Christof Devriendt, Wout Weijtjens, Nymfa Noppe, Tim Vebelen, Gert De Sitter

An overview of the foundation monitoring activities of OWI-lab, the Offshore Wind Infrastructure Lab, will be given. OWI-Lab develops mid- and long-term monitoring solutions for offshore wind turbines. OWI-lab is currently continuously monitoring 3 monopile foundations and 2 jacket foundation within the Belgian north sea The motivation is gaining the insights that are crucial to minimize construction and installations costs of future offshore wind farms and to extend the life time of existing structures and reduce their operation and maintenance costs.

2 SHM approaches of offshore wind turbine substructures: application on simulation data

O. Salgado[1], F. Martinez[1], R. Rodríguez[2], A. Rodríguez[2], C. Amézqueta[3], I. Nuin[3]

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Operation and Maintenance (O&M) costs constitute 20-25% of the total levelised cost per kWh produced over the lifetime of an offshore wind turbine. A very substantial reduction in O&M costs through new technological concepts is hence a challenge, and the remote evaluation of actual status of the whole system is the starting point for the potential improvement.

This poster presents a collaborative proposal between IK4, CTC and CENER in order to improve existing structural health monitoring approaches to detect possible failures on floating substructures including mooring and anchoring systems based on simulation data obtained from dynamic simulation codes.

3 Robust Controller for Load Mitigation in a Commercial 3 MW Wind Turbine

Aron Pujana-Arrese[1], Iciar Font[2], Carlo-Enrico Carcangiu[2] and Joseba Landaluze[1]

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The design and analysis of different robust control strategies applied to a commercial 3 MW wind turbine is presented. An exhaustive simulation analysis is developed with the proposed robust control strategies and it is compared to the baseline control strategy installed in the commercial wind turbine in terms of Key Performance Indicators (KPI). The family of linear models extracted from a high-fidelity aeroelastic code is used to design the robust control strategies and this software package is also used to perform a full set of calculations including both extreme and fatigue load cases. The control objectives for the novel proposed robust control algorithms are improving the regulation of the generator speed, mitigating the wind effect in the tower fore-aft and side-to-side first modes and damping the drive train mode with the main objectives of mitigating the loads in the wind turbine and improving the generation of electric power.
Overall, the results obtained from this study are very promising in terms of loads and performance. Load levels are generally aligned with the baseline controller, and even allowing some extra load reduction, which is a good result considering that the baseline is a mature turbine product.
The work presented in this paper is the first fundamental step for the implementation of advanced robust controllers in real commercial wind turbines. Moreover, the robust control strategy has been integrated into the whole control software package and validated through HIL, confirming the capability of the current control hardware to work with such high ordered state-space represented robust controllers. The following step consists in performing a comprehensive field test campaign, in order to complete the validation cycle and make this solution available for industrial applications.

An overview of the foundation monitoring activities of OWI-lab, the Offshore Wind Infrastructure Lab, will be given. OWI-Lab develops mid- and long-term monitoring solutions for offshore wind turbines. OWI-lab is currently continuously monitoring 3 monopile foundations and 2 jacket foundation within the Belgian north sea The motivation is gaining the insights that are crucial to minimize construction and installations costs of future offshore wind farms and to extend the life time of existing structures and reduce their operation and maintenance costs.

4 Experimental and operational structural dynamics identification of the laboratory scale offshore support structure with uncertainty assessment.

Marcin Łuczak

Institute of Fluid Flow Machinery, Polish Academy of Sciences

The poster presents an experimental campaign on the laboratory scale model of the tripod type offshore support structure. The model structure was tested in the different support and environment configurations: free-free, supported and in the large towing tank conditions. Tripod model allows to model the propagation of the circumferential crack of the cylinder. The towing tank test configuration included the wind tower with the 3 bladed rotor. Rotary support allowed to expose the tested structure to the waves coming from different angles. Test campaign accounted for the different types of sea waves. For the reference modal model of intact and damaged structure impulse modal test was performed with the stopped rotor and calm water conditions. The response of the structure to the wave were measured with 4 bi-axial underwater accelerometers located on the submerged part of the model and 4 tri-axial accelerometers located on the above-water components. Experimental and operational modal analysis were applied to identify the structural dynamics of the investigated laboratory scale model for intact and damaged state, different support and wave patterns. Numerous modal models consisting of the natural frequencies, mode shapes and corresponding damping coefficients were estimated from the measured signals. Comprehensive test matrix allowed to assess the differences in modal model parameters due to the damage, support and environmental loads.

5 Windcrete: Proof of concept

Climent Molins

Universitat Politècnica de Catalunya UPC - BarcelonaTech

A proof of concept of a monolithic concrete SPAR platform for FOWT was developed in the framework of the AFOSP KIC-InnoEnergy project (Alternative Floating Platform Designs for Offshore Wind Towers using Low Cost Materials). The AFOSP project consisted in a series of experimental and numerical studies aimed at proving the feasibility of the concept and demonstrated promising CAPEX and OPEX reductions. The members of the AFOSP consortium are: GNF, University of Stuttgart and UPC.

The experiments comprised a set of hydrodynamic tests performed in the CIEM wave flume facility at the UPC, with a 1:100 scale model assuming Froude similitude. The complete experimental campaign included free decay tests, a set of 22 regular wave trains of different periods to determine the RAO's and another set of 21 regular and irregular wave trains in conjunction with a mechanical wind device, simulating the mean thrust force exerted by the wind turbine.

Numerical studies were intended to verify that the design is stable when subjected to design load case (DLC) according to the IEC. These studies consisted in coupled dynamic simulations including the mooring system, the controller and the structural dimensions for a particular location, using the certified coupled aero-servo-hydro-elastic code FAST. IEC load situations include different environmental conditions and technical conditions of the floating system including failure cases.

6 Modelling Complex Systems: The North Seas Offshore Grid and Future Research.

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The North Seas offshore grid has two main functions, to connect offshore wind farms and to interconnect power systems in Norther Europe. Many projects address this grid, given its importance and it being a priority for the European climate and energy policies. Nonetheless, studies vary in a number of features, and thus to guide future research a review is conducted of published works since 2010. This review develops a simple and effective methodology that can be applied to other energy systems models. It jointly considers the studies of interest, the system characteristics, a categorization framework and relevant indicators. Most studies focus on investment and operation of the grid using optimization models, but differences in assumptions, methodology and detail of results publication limit their comparability. Nonetheless, integrated typologies frequently present economic, operational and environmental benefits, although the reviewed studies do not unambiguously warrant immediate and full cooperation on grid governance. Lastly, future research should be attentive to the presentation and resolution of data, assumptions and results, as well as consider the grid characteristics that define system performance and dynamics.

Disclaimer: A previous version of this poster has been presented in the 38th International Conference of the International Association of Energy Economics, 2015.

7 Multi-scale procedure for modelling shear-web and spar-cap joint of wind turbine blat

G. Fernandez[1], H. Usabiaga[1], D. Vandepitte[2]

[1]IK4-IKERLAN, [2]KU Leuven

The work focuses on the development of an automated approach that combines a detailed two scale structural finite element model of the blade, the Blade Element Momentum approach and 2D CFD code for modelling a blade under stationary wind conditions considering aerodynamic, inertial and gravitational loads. The approach should provide more accurate stress-strain values than the current beam based approach especially when composite and adhesive progressive damage are considered in the model. It also requires significantly less computational time than the strong-coupled CFD-FEM approach.

Besides macro-scale response of the blade, a more localized analysis of a particular subcomponent can be carried out using sub-modelling approach. In this case the approach has been used for predicting stress-strain and failure of the adhesive between spar-cap and shear-web joint.

8 Reduction of fatigue damage equivalent loads In the wind turbine system through the use bending-twisting coupling induced in composite wind turbine blades.

Altan Kayran

METU Center for Wind Energy

The effect of bending twisting coupling induced in wind turbine blades is investigated for its effectiveness in reducing fatigue damage equivalent loads (DEL) in the whole wind turbine system. Baseline full GFRP blade and bend-twist coupled blades are also compared in terms of stress in the critical blade section, tower clearance, dynamic characteristics and cost of the blade. The use of CFRP material in the main spar caps of bend-twist coupled blades is specifically investigated for its effectiveness in reducing damage equivalent loads in the whole wind turbine system.