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EWEA **2011**
BRUSSELS
EUROPE'S PREMIER WIND ENERGY EVENT

Event Guide

EWEA Annual Event
14 - 17 March 2011, Brussels - Belgium



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Welcome message

A forward looking industry



It is the beginning of a new decade. While 2020 may once have seemed a good way off, we already have less than ten years to go. It is just round the corner, and today's decisions will impact not just 2020, but the decades to follow.

The first ten years of this century have in some ways been a mixed bag. They have seen gold turn to dust as the world economy collapsed. They have seen natural disasters, terrorist attacks, destruction and wars. They have witnessed an energy and climate crisis.

Yet they have also been marked by increasing global wealth and standards of living. By the massive expansion of the internet and telecommunications. By amazing artistic endeavours and overwhelming humanitarian generosity to others in times of need.

They have also seen the world's leaders slowly begin to acknowledge the crunch issues of energy and climate change. This awakening has been accompanied by the take off of the renewables industry and above all, of on- and offshore wind energy, which is now at 194 GW worldwide – 84 GW - or 43% of the total - of which is installed in Europe.

Growth in Europe has been assisted by the recognition that wind energy is a clean, infinite source of power and pushed forward by the global reach of European wind power manufacturers and developers. It has been guided by the goals set up at EU level, most recently the 2020 targets of the 2009 Renewable Energy Directive. The analysis by the European

Wind Energy Association of the national action plans linked to these targets shows that the EU should meet and even slightly exceed the 20% renewable energy goal.

But what will happen afterwards? Once the 2020 goal is met, where do we go from there? What will EU climate and energy policy be on 1 January 2021? Will the EU have 2030 targets, and if so what sort of targets? What about the EU's commitment to reduce carbon emissions by 80-95% by 2050? And the renewable energy industry's goal of a 100% renewable electricity sector with 50% from wind energy by the same year?

These are pressing questions because what happens in 2020 impacts on investment decisions today. Luckily, for the next few days at EWEA 2011 we have the ideal forum, with a wide and impressive range of industry and political experts, to try and answer them.

For most of us here, it is clear that wind energy is key to Europe's energy and climate future both up to and way past 2020. Now is the time to discover how this can be ensured and what role we all have to play.

Let me wish you a very stimulating and rewarding EWEA 2011.

Arthouros Zervos, EWEA 2011 Conference Chair and President of the European Wind Energy Association (EWEA)



CONFERENCE

Conference sessions, poster presentations, workshops and side events

CONFERENCE PROGRAMME

Monday, 14 March

08:00 - 09:00 Welcome coffee (Poster area)

Aud. 2000

10:00 - 12:00

PLENARY AND PANEL SESSIONS

OPENING SESSION

Leading political figures from the European institutions and national governments will open the conference with visionary speeches. Setting the scene for the days ahead, the speakers will share their views on the future of the renewables and wind energy industries at the Member State and European levels. They will also provide the delegates with an insight into their organisation's recent and planned activities in the fields of energy and environment.



Keynote speakers



Lykke Friis,
Minister for Climate and Energy, Denmark



José Carlos das Dores Zorrinho, Secretary of State for Energy and Innovation, Portugal



Stefano Saglia, Under Secretary of Economic Development, Italy



Peter Olajos, Green Economy and Climate Change Deputy State Secretary, Hungary



Christos Doukérdis, Ministre-Président du Gouvernement francophone bruxellois, responsible for Tourism, Education and Budget



Herman van Rompuy, President of the European Council (video message)



Arthouros Zervos, President, European Wind Energy Association (EWEA)



Christian Kjaer, CEO, European Wind Energy Association (EWEA)

12:00 - 14:00 Lunch (catering areas)

Monday, 14 March

CONFERENCE PROGRAMME

Aud. 2000

14:00 - 15:30

PLENARY AND PANEL SESSIONS

EU ENERGY POLICY: WHAT HAPPENS AFTER 2020? (PANEL)

The European Union is committed to source 20% of its energy from renewables and cut CO₂ emissions by 20% by 2020. This pioneering legislation has helped to make Europe a world-leader in wind energy. But what will happen in January 2021? What will fill the energy policy vacuum, and where will that leave investors and electricity producers? Something needs to fill the gap - not least because the EU has also committed to cutting greenhouse gases by at 80-95% by 2050. Should the EU adopt new targets for 2030? What are the alternatives? The debate must start now.

Moderator



Nisha Pillai, BBC World

Speakers



Victor Abate
GE Energy,
Vice President -
Renewables (Europe),
United States of
America



Jorge Calvet
CEO, Gamesa, Spain



Christian Kjaer
CEO, European Wind
Energy Association
(EWEA), Belgium



Anni Podimata
MEP and Vice Chair
of the Committee
on Industry, Research
and Energy, European
Parliament



Jens Peter Saul
CEO, Siemens Wind
Power, Germany

15:30 - 16:00 Coffee break (catering areas)

CONFERENCE PROGRAMME

Monday, 14 March

Aud. 2000

16:00 - 17:30

OFFSHORE WIND ENERGY: CHALLENGES AND OPPORTUNITIES

- ▶ Lead chair: **Mark Ennis**, SSE Renewables, United Kingdom

This session looks at the wind power ambitions of those countries surrounding the North sea. It will examine the opportunities and benefits that would result from a co-ordinated approach to the key challenges of grid infrastructure, consenting, spatial planning, support mechanisms and safety.

- ▶ 2030 ROADMAP FOR OFFSHORE WIND DEPLOYMENT IN THE NORTH SEA – **Karina Veum**, Energy Research Centre of the Netherlands (ECN), The Netherlands
- ▶ UK OFFSHORE WIND PROGRAMMES: ADDRESSING THE BARRIERS – **Dermot Grimson**, Crown Estate, United Kingdom
- ▶ THE STATE OF THE OFFSHORE WIND INDUSTRY – **Frank Wiersma**, Ecofys, The Netherlands
- ▶ MONITORING OFFSHORE WIND ENERGY USE STATUS QUO - HOW ARE THE OFFSHORE WIND FARMS FARING? – **Philipp Lyding**, Fraunhofer IWES, Germany
- ▶ THE INTELLIGENT PARTNERSHIPS FOR THE OFFSHORE PROJECT INSTALLATIONS AND WIND FARM OPERATION – **Thomas Karst**, MAKE Consulting A/S, Denmark

POLICY, INDUSTRY,
MARKETS & REGULATION

Monday, 14 March

CONFERENCE PROGRAMME

Aud. 500

16:00 - 17:30

DRIVE TRAIN COMPONENTS AND POWER ELECTRONICS

- ▶ Chairs:
Emilio Gomez-Lazaro, Universidad Castilla-La Mancha, Spain
Peggy Friis, Risoe DTU, Denmark

This session will deal with various aspects of dimensioning and monitoring the drive train/generator subsystem as one of the main parts of a wind turbine. A new signal analysis method for online condition monitoring systems with a special focus on the detection of gearbox failures and diagnosis will be presented. The actual possibilities to determine reliable load assumptions for the drive train and its components by using the Multibody-System-Simulation with special respect to the gearbox internals, e.g. the tooth contact, will be described. Furthermore, the performance characteristics of permanent magnet wind power generators in directly driven wind turbines will be compared based on different rotor configurations. Finally a new approach of control and simulation of double feed

- ▶ CONTROL AND SIMULATION OF DOUBLY FED INDUCTION GENERATOR FOR VARIABLE SPEED WIND TURBINE SYSTEMS BASED ON AN INTEGRATED FINITE ELEMENT APPROACH – **Qiong-zhong Chen**, University of Liège, Belgium
- ▶ USE OF SCADA AND CMS SIGNALS FOR FAILURE DETECTION AND DIAGNOSIS OF A WIND TURBINE GEARBOX – **Yanhui Feng**, Durham University, United Kingdom
- ▶ HYDROSTATIC DRIVE TRAIN IN WIND ENERGY PLANTS – **Johannes Schmitz**, RWTH Aachen University, IFAS, Germany
- ▶ A PARAMETRIC STUDY OF THE EFFECT OF GENERATOR MISALIGNMENT ON BEARING FATIGUE LIFE IN WIND TURBINES – **Matthew Whittle**, Durham University, United Kingdom

induction generators for variable speed wind turbine systems based on an integrated finite element approach will be presented.

SCIENTIFIC

Aud. 600

16:00 - 17:30

AERODYNAMICS

- ▶ Lead chair: **Gerard Schepers**, ECN Wind Energy, The Netherlands
- ▶ Co-chair: **Spyros Voutsinas**, National Technical University of Athens, Greece

The session presents several investigations on non-conventional blade shapes (e.g. swept wings) and the use of special devices to influence the aerodynamic performance of a wind turbine (e.g. boundary layer suction and winglets). One paper will be devoted to the CFD simulation of wake the flow with a fully resolved rotor geometry.

- ▶ UNSTEADY NAVIER-STOKES SIMULATIONS OF A ROTOR OPERATING IN WAKE – **Frederik Zahle**, Risø DTU, Denmark
- ▶ ADVANCED AEROELASTIC MODELING OF SWEEPED ROTOR BLADES – **Spyros Voutsinas**, National Technical University of Athens, Greece
- ▶ NUMERICAL STUDY ON PERFORMANCE OF INNOVATIVE WIND TURBINE BLADE FOR LOADS REDUCTION – **Teresa Maggio**, Università degli Studi di Napoli Federico II, Italy
- ▶ BOUNDARY LAYER SUCTION FOR WIND TURBINE BLADES: AN INTEGRAL DESIGN APPROACH – **Gael de Oliveira**, Actiflow BV, The Netherlands
- ▶ A COMPUTATIONAL EFFICIENT ALGORITHM FOR THE AERODYNAMIC RESPONSE OF NON-STRAIGHT BLADES – **Pierre-Elouan Réthoré**, Risø DTU, Denmark

TECHNOLOGY

Aud. 700

16:00 - 17:30

REMOTE SENSING

- ▶ Lead chair: **Jan Coelingh**, Ecofys, The Netherlands

The use of LIDAR for wind speed measurements is still increasing and therefore competing with cup anemometry. Through experiments, experience is being built up in various conditions and will be presented in this session. LIDAR is important especially for project developers and wind turbine manufacturers but in fact for all who use wind measurements. The session will provide the state of the art of LIDAR in different circumstances. Experimental results based on a comparison of onshore and offshore measurements will be presented for floating LIDAR. The uncertainty of LIDAR measurements in complex terrain will be investigated by comparing measurement results in different terrain types against mast data. Finally, in an interactive discussion, three presenters will go into the use of a nacelle-based LIDAR for power curve measurements and share their experiences.

- ▶ INVESTIGATING THE EFFICACY OF FLOATING LIDAR MOTION COMPENSATION ALGORITHMS FOR OFFSHORE WIND RESOURCE ASSESSMENT APPLICATIONS – **Daniel Jaynes**, GL Garrad Hassan, United States of America
- ▶ INVESTIGATION OF SOURCES FOR LIDAR UNCERTAINTY IN FLAT AND COMPLEX TERRAIN – **Fernando Borbon Guillen**, CENER, Spain
- ▶ DETERMINATION OF POWER CURVES BASED ON WIND FIELD MEASUREMENTS USING A NACELLE-BASED LIDAR SCANNER – **Andreas Rettenmeier**, University of Stuttgart, Germany
- ▶ FIRST TEST OF A NACELLE-MOUNTED TWO-BEAMS LIDAR SYSTEM UNDER OFFSHORE CONDITIONS – **Thomas Neumann**, DEWI GmbH, Germany
- ▶ POWER PERFORMANCE MEASURED USING A NACELLE-BASED LIDAR – **Rozenn Wagner**, Risø DTU, Denmark

WIND RESOURCE

▶ 17:00 - 18:00 Beer reception (at Hansen Transmissions International stand 11538 & CG Power Systems stand 11530, Hall 11) ▶ see page 50 for details

▶ 19:00 - 21:30 Conference Reception (Brussels Event Brewery) ▶ see page 50 for details

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CONFERENCE PROGRAMME

Tuesday, 15 March

08:00 - 09:00 Welcome coffee (Poster area)

09:30 - 17:30 Belgian day: Exhibition tour and conference

▶ see page 38 for details

Aud. 2000

09:00 - 10:30

FINANCE FORUM

FINANCE: RECOVERING, MATURING AND ADVANCING (PANEL)

Despite nagging uncertainty in European financial sector, 2010 saw creative solutions for financing clean energy projects. The industry has tapped new sources of debt and equity and added to the array of financial structures to keep capital flowing. This panel of leading finance professionals will examine the current state of play for financing wind projects and peer over the horizon at what financial development will drive growth for the next several years.

Moderator



Angus McCrone,
Chief Editor, Bloomberg
New Energy Finance
News, United Kingdom

Speakers



Chris Hunt,
Managing Director,
Riverstone LLP, United
States of America



David Jones, CEO
Allianz Specialised
Investments,
United Kingdom



Peter Roszbach,
Managing Director,
Impax New Energy
Investors, United
Kingdom



Dominik Thumfart,
Managing Director,
Head of Renewable
Energy, Deutsche
Bank Asset Finance &
Leasing, Germany



Romain Talagrand,
Head of Power Project
Finance, BNP Paribas,
France

Tuesday, 15 March

CONFERENCE PROGRAMME

Aud. 700

09:00 - 10:30

WAKES

- ▶ Lead chair: **Mike Anderson**, Renewable Energy Systems (RES), United Kingdom
- ▶ Co-chair: **Andrew Tindal**, GL Garrad Hassan, United Kingdom

Reducing the uncertainty in the prediction of wake effects is of vital importance for large wind farm developments. Wakes not only impact the energy production but also increase the loading a wind turbine will experience. In the offshore environment evidence suggests that wakes persist far more than they do on land and as a consequence are a major design driver.

This session brings together a number of papers which present numerical wake models of varying complexity ranging from CFD to “engineering” models. Experimental data will be presented to assess the accuracy of the models. The session will also explore a novel technique for measuring wakes using separated non-aligned LIDARs.

Aud. 500

09:00 - 10:30

ACTIVE AND PASSIVE LOAD ALLEVIATION

- ▶ Chairs:
Helge Aagaard Madsen, Risø DTU National Laboratory for Sustainable Energy, Denmark
Gijs van Kuik, Technical University Delft, The Netherlands

The session will focus on technologies for controlling wind turbine loads induced by turbulence and gusts. The potential of this technology has been reported in previous conferences: up to 30% reduction of the fatigue loads. Knowledge on sensors, control algorithms and aerodynamic action is needed to accomplish this. The session contains contributions on these three fields of knowledge, addressing full-span control as well as control by (micro-) flaps at the trailing edge.

10:30 - 11:00 Coffee break (catering areas)

WIND RESOURCE

- ▶ WIND FARM WAKE EFFECTS ESTIMATIONS BY A MOSAIC TILE WAKE MODEL – **Ole Steen Rathmann**, Risø DTU, Denmark
- ▶ OFFSHORE WIND ACCELERATOR: WAKE MODELLING USING CFD – **Christiane Montavon**, ANSYS UK Ltd, United Kingdom
- ▶ NUMERICAL ASSESSMENT OF PERFORMANCE OF LIDAR WINDSCANNERS FOR WAKE MEASUREMENTS – **Davide Trabucchi**, Oldenburg University, Germany
- ▶ TOPFARM - PHILOSOPHY, RESULTS AND OUTLOOK – **Gunner C. Larsen Larsen**, Risø DTU, Denmark

SCIENTIFIC

- ▶ FEASIBILITY OF AERODYNAMIC FLAP HINGE MOMENT MEASUREMENTS AS INPUT FOR LOAD ALLEVIATION CONTROL – **Tim Behrens**, Vestas Wind Systems A/S, Denmark
- ▶ WIND GUSTS DETECTION AND LOAD ALLEVIATION USING ARTIFICIAL NEURAL NETWORKS ASSISTED CONTROL – **Carlo Enrico Carcangiu**, Alstom Wind, Spain
- ▶ HIGHER HARMONIC CONTROL OF WIND TURBINES – **Carlo Luigi Bottasso**, Politecnico di Milano, Italy
- ▶ EXPERIMENTAL INVESTIGATION OF DYNAMIC LOAD CONTROL STRATEGIES USING ACTIVE MICROFLAPS ON WIND TURBINE BLADES – **Oliver Eisele**, TU-Berlin HFI/ISTA, Germany

Aud. 700

11:00 - 12:30

FINANCE FORUM

FINANCING GREEN GROWTH IN TIMES OF A FINANCIAL CRISIS

- ▶ Chairs: **Klaus Rave**, Global Wind Energy Council (GWEC) & WKN AG, Germany
- ▶ **Vilma Radvilaite**, European Wind Energy Association (EWEA),

Public banks have played an ever increasing part on the global wind energy market since 2008, filling the gaps left by the private sector as is their role laid down in various statues. This session will present the strategies and business models/cases of some of the key players in the field of public funding. The EU has identified wind energy as a strategic energy technology, and has highlighted that wind energy contributes to all of the EU's energy policy objectives: increased competitiveness, energy security and fighting climate change. As part of the SET-Plan the European Commission has initiated and launched,

- ▶ **Christopher Knowles**, European Investment Bank (EIB)
- ▶ **Thomas Mirow**, European Bank for Reconstruction and Development (EBRD) (tbc)
- ▶ **Marie Donnelly**, DG Energy, European Commission
- ▶ **Pierre Fauconnier**, SPF Economie, PME, Classe moyennes et Energie, Belgium

together with the industry and the Member States, a 10 year Research and Development plan for wind energy – the European Wind Initiative. The implementation of this ambitious strategy requires a yearly investment of public and private resources in wind energy R&D of approximately € 600 million (totalling € 6 billion by 2020).

Aud. 2000

11:00 - 12:30

WIND RESOURCE

MESOSCALE MODELLING

- ▶ Lead chair: **Ignacio Marti**, Centro Nacional de Energias Renovables (CENER), Spain
- ▶ Co-chair: **Lueder Von Bremen**, ForWind, Germany

Mesoscale models are beginning to be used in the wind energy sector for wind resource assessment purposes. The advantages of using these atmospheric models to study the wind potential are clear: simulation of the wind field (plus many other atmospheric parameters) with a spatial resolution in kilometre-scale covering big domains of more than 1000 km x 1000 km, the possibility to simulate any region of the world without local measurements, etc. However, there is a need to understand the uncertainties of such models, especially when dealing with wind energy. During this session, mesoscale model users, wind resource assessment and prospective staff will provide an overview of the state of the art and innovative applications of mesoscale models in wind energy, together with information about challenges, uncertainty and integration examples of the data generated by these atmospheric models.

- ▶ COMPREHENSIVE UTILIZATION OF MESOSCALE MODELLING FOR WIND ENERGY APPLICATIONS – **Jake Badger**, Risø DTU, Denmark
- ▶ MESOSCALE MODELS IN WIND ENERGY: A QUICK GUIDE – **Adrea Hahmann**, Risø DTU, Denmark
- ▶ MODELLING OF WIND SPEED FIELDS OVER EUROPE AND POWER CORRELATIONS IN A 400 GW SCENARIO – **Jens Tambke**, ForWind - University of Oldenburg, Germany
- ▶ ANALYSIS OF THE CLIMATIC CONDITIONS FOR OFFSHORE WIND POWER IN NORWEGIAN WATERS – **Erik Berge**, Kjeller Vindteknikk AS, Norway
- ▶ VALUE MAPPING - IDENTIFYING OFFSHORE WIND FARM AREAS WITH COST OF ENERGY MAPS BASED ON WIND RESOURCE AND PROJECT COSTS – **Anthony Crockford**, Ecofys, The Netherlands

Aud. 600

11:00 - 12:30

TECHNOLOGY

FLOATING CONCEPTS FOR OFFSHORE WIND PARKS

- ▶ Lead chair: **Dolf Elsevier van Griethuysen**, Ballast Nedam Offshore, The Netherlands
- ▶ Co-chair: **Jesper Winther Stærdahl**, Siemens Wind Power A/S, Denmark

Offshore wind energy is growing rapidly, mainly thanks to the development of support structures fixed to the bottom of shallow to medium-deep seas. The next step to harvest the full potential of offshore wind is the use of floating structures. Presently, multiple companies and research institutes worldwide are working on concepts and innovations to solve the practical challenges to make this new technique feasible. This session will highlight the latest developments of these concepts and innovations, and will bring you up to date to the state of the art of floating structures for offshore wind.

- ▶ WINDFLOAT - COST & RISK REDUCTION OF OFFSHORE WIND TURBINE INSTALLATION USING FLOATING SUPPORT STRUCTURES – **Craig Andrus**, Principle Power, United States of America
- ▶ EOLIA PROJECT AND ITS OUTCOMES IN DEEP OFFSHORE FLOATING WIND TECHNOLOGY – **Javier Pascual**, ACCIONA Energia, Spain
- ▶ WINFLO, AN INNOVATIVE MULTI MEGAWATTS FLOATING WIND TURBINE SYSTEM EFFICIENT FROM 50M DEPTH; A PROJECT LED BY BE NASS&WIND INDUSTRIE – **Bertrand Fazio**, Nass&Wind Industrie, France
- ▶ OPTIMIZATION OF FLOATING SUPPORT STRUCTURES FOR DEEP WATER WIND TURBINES – **Petter Andreas Berthelsen**, MARINTEK, Norway

Aud. 500

11:00 - 12:30

SCIENTIFIC

LOADS CONTROL AND SAFETY

- ▶ Chairs: **Morten Hartvig Hansen**, Risoe-DTU, Denmark
- ▶ **Peinke Joachim**, Carl von Ossietzky University of Oldenburg, Germany

There is an increased interest from industry in the possibilities of using advanced control algorithms for active reduction of fatigue loads on different wind turbine components. One presentation will address advanced control loops that are usually not included in industrial wind turbine control algorithms. However, they offer viable possibilities for cost of energy reduction by means of weight reduction, increased availability due to reduced probability of failures, increased lifetime, upscaling, etc.

A project which aims to develop a new tool for design and implementation of advanced wind turbine controllers will be introduced. The new tool will be compared to the conventional controllers used by wind turbine manufacturers. The last presentation will present methods of reducing the number of load simulations required to demonstrate the extreme extrapolated load value of an offshore wind turbine.

- ▶ COMPUTATIONALLY EFFICIENT DETERMINATION OF LONG TERM EXTREME OUT-OF-PLANE LOADS FOR OFFSHORE TURBINES – **Anand Natarajan**, Risø DTU, Denmark
- ▶ DYNAMIC RESPONSE AND CONTROL OF THE HYWIND DEMO FLOATING WIND TURBINE – **Bjørn Skaare**, Statoil ASA, Norway
- ▶ TOWARDS NEW INDUSTRIAL SOFTWARE FOR ADVANCED WIND TURBINE CONTROL – **Stoyan Kanev**, ECN, The Netherlands
- ▶ FAULT TOLERANT WIND TURBINE PRODUCTION OPERATION AND SHUTDOWN(SUSTAINABLE CONTROL) – **Tim van Engelen**, ECN, The Netherlands

12:30 - 14:00 Lunch (catering areas)

Aud. 2000

14:00 - 15:30

PLENARY AND PANEL SESSIONS

WIND POWER TECHNOLOGY 2020? (PANEL)

This panel session will examine how wind power technology will develop in the coming decade to make it the most cost-effective of all power technologies. On the basis of the UpWind project, panellists will discuss how the industry needs to innovate to benefit from greater economies of scale, and identify the specific technological needs for developing large-scale offshore wind production. They will also consider how far the increase in turbine capacity can go - to 10 MW, or even 20 MW - and provide insight into how best to provide the necessary R&D to support the development of wind technology.

Moderator



Darius Snieckus,
Recharge, United Kingdom

Speakers



Henning Kruse,
Chairman, Wind Energy Technology Platform (TP Wind), Denmark



Andrew Garrad,
CEO, GL Garrad Hassan, United Kingdom



Peter Hjulær Jensen,
R&D Manager in Wind Energy, Risø DTU, Denmark



Stefan Tostmann,
Head of Unit, Directorate-General for Energy, European Commission



Nicolas Fichaux,
Project Officer Wind Technologies, International Renewable Energy Agency (IRENA), United Arab Emirates

Aud. 700

14:00 - 15:30

POLICY, INDUSTRY, MARKETS & REGULATION

WWW (WORLD WIDE WIND)

- ▶ Lead chair: **Klaus Schreiber**, Gothaer Allgemeine Versicherung AG, Germany
- ▶ Co-chair: **Steve Sawyer**, Secretary General Global Wind Energy Council (GWEC), Belgium

The aim of this session is to examine the emerging and booming wind countries outside of Europe. The horizon of the wind world has changed a lot during these years, and this is reflected in the diverse selection of presentations available in this session. By featuring emerging markets, the largely European audience will gain a valuable insight into how the wind industry is enabling sustainable economic development via the production of clean energy, and increasing employment related to the construction and maintenance of wind farms.

- ▶ HOW TO ATTRACT WIND-INVESTMENTS IN EMERGING MARKETS – A PROJECT DEVELOPERS POINT OF VIEW – **Christian Friebe**, Sustainable Business Institut (SBI), Germany
- ▶ **Sebastian Meyer**, Azure International, China (tbc)
- ▶ AMERICAN WIND POWER: CLEAN, AFFORDABLE AND HOMEGROWN – **Denise Bode**, American Wind Energy Association (AWEA)
- ▶ EMERGING WIND MARKETS - KEY DRIVERS AND BARRIERS FOR WIND POWER DEVELOPMENT IN AFRICA – **Elena Farnè**, MAKE Consulting, Denmark

Aud. 600

14:00 - 15:30

FINANCE FORUM

FINANCING OFFSHORE WIND IN 2011

- ▶ Chairs:
Jérôme Guillet, Green Giraffe Energy Bankers, France
Clémentine Tassin, Dexia, France

This panel will focus on the availability of non-recourse debt for the wind sector, and in particular for the offshore sector, in 2011. After two difficult years, the onshore wind sector's ability to procure debt has improved and is almost back to normal for sound projects. Structures are well understood by developers and funds are made available at reasonable terms in most European countries, except where regulatory changes or uncertainty are limiting investment prospects. On the other hand, access to debt for offshore wind projects is still very limited, as the market still lacks precedents and depth. The requirement to involve multilaterals and/or to build club deals involving large number of banks and to conduct extensive technical due diligence make financings for offshore projects, at best, complex and time-consuming affairs.

- ▶ **Christos Koliastias**, Mott MacDonald, United Kingdom
- ▶ **Filip Martens**, C-Power, Belgium
- ▶ **Fintan Whelan**, Mainstream Renewable Power, Ireland
- ▶ **Marc Schmitz**, Rabobank, The Netherlands

The panel, involving bankers and developers active in the offshore wind market, will discuss the current status of the market - recent deals, expected pipeline, the evolution of key terms and conditions, overall lending capacity. Special attention will be paid to construction risk, and what makes it possible (or not) for banks to accept to bear it. The session will be organised as a panel discussion (without PowerPoint presentations), and will give the audience the opportunity to bring their questions to the speakers.

15:30 - 16:00 Coffee break (catering areas)

Aud. 700

16:00 - 17:30

FINANCE FORUM

EQUITY FINANCE IN TODAY'S WIND INDUSTRY

- Chairs:
Mortimer Menzel, Augusta & Co, United Kingdom
Andrew Perkins, Ernst & Young, United Kingdom

- **Pedro Barriuso**, Element Power, United Kingdom
 ► **Representative**, Nass&Wind, France
 ► **Thomas Richterich**, Nordex, Germany (tbc)

Panelists will discuss all aspects of equity finance in the wind industry today, including both equity for on and offshore projects and equity for wind supply chain businesses. Topics will include: what sort of investors are there and what do they want to achieve? How do investors view wind projects in different stages of development and why? Are there any investors for offshore wind currently? Should I sell my projects individually or in large portfolios, or even my entire development business? What are the most important factors in any corporate equity raise. How to deal with the inevitable dilution to the old owner, can it be avoided? How to deal with the even more inevitable exit scenario?

CONFERENCE

Aud. 2000

16:00 - 17:30

WIND RESOURCE

FORECASTING/PREDICTION

- Lead chair: **Jens Tambke**, ForWind, Germany
 Co-chair: **Athanasios Kyriazis**, 3E, Belgium

Wind power forecasting has reached a mature stage in the last years. This session will showcase what can be called the 'third generation' prediction models, which go further than the deterministic forecast of power production over the coming days. Concerning meteorology, the benefits of ensemble forecasts in Europe will be demonstrated, showing the potential of this source of probabilistic predictions and the expected accuracy.

Because wind power will become the main source of electricity in an optimally interconnected Europe, the effects of spatial forecast error smoothing on a European scale will be quantified and visualised in this session. Moreover, specific extreme events and large errors, e.g. during ramps or icing, are of vital importance for the management of our electricity systems. The last two presentations will deal with the challenges related to forecasting those events.

- BENEFITS FROM THE INCREASED CONTRIBUTION OF THE EUROPEAN WEATHER FORECASTING COMMUNITY TO WIND POWER PREDICTION – **Pierre Pinson**, European Centre for Medium-range Weather Forecasts, United Kingdom
 ► INCREASING CERTAINTY: COMBINATION METHODS FOR RELIABLE PROBABILISTIC WIND PRODUCTION FORECASTS – **Jeremy Parkes**, GL Garrad Hassan, United Kingdom
 ► STUDYING WIND POWER FORECAST ERRORS ON THE EUROPEAN SCALE – **Lueder von Bremen**, ForWind - Center for Wind Energy Research, Germany
 ► WARNINGS FOR LARGE ERRORS IN WIND POWER FORECASTING – **Matthias Lange**, Energy & Meteo Systems, Germany
 ► ADVANCED RAMP FORECASTING FOR DIFFERENT TEMPORAL SCALES – **Robin Girard**, Mines Paristech, France

Aud. 600

16:00 - 17:30

SCIENTIFIC

GRID CONNECTION AND GRID INTEGRATION

- Chairs:
Ruddell Alan, STFC Rutherford Appleton Laboratory, UK
Julio J. Melero, Fundación CIRCE, Spain

The envisaged large-scale integration of wind energy into the European power system creates new challenges for wind turbine designers, the electricity industry, power suppliers and grid operators. This session will present and discuss some of these challenges, identifying possible technical problems and proposing appropriate solutions.

The session will begin with the presentation of a novel and robust voltage control strategy for wind farms. A combined simulation method to improve the performance of grid integration studies for VSC-HVDC connected wind power will be introduced and then induced torques on synchronous generators from operation of wind power plant based on full-load converter interfaced wind turbines will be analysed. The final presentation will be focused on the optimum mix between wind and PV capacity in the Greek power system.

- INDUCED TORQUES ON SYNCHRONOUS GENERATORS FROM OPERATION OF WIND POWER PLANT BASED ON FULL-LOAD CONVERTER INTERFACED WIND TURBINES – **Thyge Knüppel**, Siemens Wind Power A/S, Denmark
 ► DEMAND RESPONSE AND WIND POWER RAMP LIMITATION FOR REDUCING FREQUENCY EXCURSIONS IN POWER SYSTEMS WITH HIGH WIND PENETRATION – **Jorge Villena**, University of Castilla La Mancha, Spain
 ► TOWARDS THE OPTIMUM MIX BETWEEN WIND AND PV CAPACITY IN THE GREEK POWER SYSTEM – **George Caralis**, NTUA, Greece

Aud. 500

16:00 - 17:30

SCIENTIFIC

RELIABILITY AND OPERATION AND MAINTENANCE

- Chairs:
Poul Hummelshøj, Risø DTU, Denmark
John Dalsgaard Sørensen, Aalborg University, Denmark

This session will address wind turbine reliability from various angles; obtaining reliable material characteristics, describing material characteristics for design and quantification of component reliability and its effect on the availability of a wind turbine. Developments in design methods which allow the use of more detailed fatigue models will be presented. Furthermore, presentations will focus on projects which aim to improve the reliability and availability by quantifying the risk of component malfunction in the field. Individual components and their effect on turbine availability will be highlighted.

- MODEL-BASED FAULT DETECTION AND ISOLATION OF WIND TURBINES - A FIELD DATA APPROACH – **Pep Lluís Negre**, Alstom Wind SLU
 ► EFFECTS OF WIND SPEED ON WIND TURBINE AVAILABILITY – **Stefan Faulstich**, Fraunhofer IWES, Germany
 ► A LIMITED-SCOPE RELIABILITY-CENTRED MAINTENANCE ANALYSIS OF WIND TURBINES – **Katharina Fischer**, Chalmers University of Technology, Sweden
 ► THE CORRELATION BETWEEN WIND TURBINE TURBULENCE AND PITCH FAILURE – **Peter TAVNER**, Durham University, United Kingdom

17:30 - 19:00 Exhibition Reception (catering areas and at Gamesa stand 11232)
 ► see page 51 for details



CONFERENCE

CONFERENCE PROGRAMME

Wednesday, 16 March

08:00 - 09:00 Welcome coffee (Poster area)

Aud. 2000

09:00 - 10:30

WIND RESOURCE

ADVANCED FLOW MODELLING

- ▶ Lead chair: **Hans Esjing Joergensen**, Risø DTU, Denmark
- ▶ Co-chair: **José Laginha Palma**, FEUP/CEsA, Portugal

In this session we will hear about the latest development of CFD models over complex terrain, including modelling of atmospheric stability and unsteady CFD solutions for capturing some of the terrain induced vortices. The session will also include a 20 min discussion of what is gained by the implementation of atmospheric stability and the problems of including this in the CFD codes. The session will finish with an overview of the challenges of using CFD on real world wind farms.

- ▶ INVESTIGATING WIND QUALITY FOR SITING OF WIND TURBINES IN COMPLEX TERRAIN USING AN UNSTEADY CFD METHOD – **Cheng-Hu Hu**, Vestas Technology R&D, Denmark
- ▶ CONSIDERATIONS ABOUT THE ROLE OF ATMOSPHERIC STABILITY IN CFD MODELS – **Christiane Montavon**, ANSYS UK Ltd, United Kingdom
- ▶ VALIDATION AND CHALLENGES OF CFD IN COMPLEX TERRAIN FOR REAL WORLD WIND FARMS – **Joel Manning**, GL Garrad Hassan, United Kingdom
- ▶ **Arne R. Gravdahl**, Windwsim, Norway
- ▶ APPROACHES TO MODELING ATMOSPHERIC STABILITY IN STAR-CCM+ – **Steve Evans**, CD Adapco, United Kingdom
- ▶ NEW DEVELOPMENTS ABOUT THERMAL STABILITY IN METEODYN WT – **Karim Fahssis**, Meteodyn, France

Aud. 700

09:00 - 10:30

TECHNOLOGY

RELIABILITY

- ▶ Lead chair: **Giles Hundleby**, Ricardo, United Kingdom
- ▶ Co-chair: **Peter Tavner**, Durham University, United Kingdom

Wind turbine reliability can be improved via a better understanding of the detailed causes of faults and failures, improved testing facilities and approaches, improved validation of simulation and analysis tools and innovative drive train concepts. This session will explore the advances being made in these areas & discuss the contribution that can be achieved in overall wind turbine reliability.

- ▶ MEASURING WIND TURBINE RELIABILITY RESULTS OF THE RELIAWIND PROJECT – **Michael Wilkinson**, GL Garrad Hassan, United Kingdom
- ▶ RELIABILITY TESTING TOOLS AND METHODS FOR WIND TURBINE DRIVE TRAINS – **Robert Orange**, MTS Systems Corporation, United States of America
- ▶ NREL GEARBOX RELIABILITY COLLABORATIVE - EXPERIMENTAL DATA ANALYSIS – **Brian Mcniff**, MCNIFF LIGHT INDUSTRY, United States of America
- ▶ NOVEL ATTEMPTS FOR PLAIN BEARING SOLUTIONS IN WIND TURBINE DRIVETRAINS – **Alexander Kari**, Miba Gleitlager GmbH, Austria
- ▶ ACTIVE STATOR, A MORE EFFICIENT DRIVE TRAIN CONCEPT FOR A WIND TURBINE – **Makhlouf Benatmane**, Convertteam UK Ltd, United Kingdom

Wednesday, 16 March

CONFERENCE PROGRAMME

Aud. 600

09:00 - 10:30

GRIDS

THE HVDC SUPERGRID

- ▶ Lead chair: **Richard Cooke**, Petrofac, United Kingdom
- ▶ Co-chair: **Mihai Paun**, ENTSO-E

The political momentum is evident for the creation of a new grid infrastructure with the recent Infrastructure package of the European Commission and the ongoing intergovernmental North Seas Countries Offshore Grid Initiative. This session reviews the economic justification and the basis of decisions on future grid topology.

- ▶ MODULAR DYNAMIC MODELS OF LARGE OFFSHORE MULTI-TERMINAL DC (MTDC) NETWORKS – **Rodrigo Teixeira Pinto**, Technical University Delft, The Netherlands
- ▶ HVDC GRIDS; A VIEW TO STANDARDISATION – **Carl Barker**, Alstom Grid, United Kingdom
- ▶ AN OFFSHORE GRID IN NORTHERN EUROPE: TECHNO-ECONOMIC DESIGN CONSIDERATIONS – **Achim Woyte**, 3E, Belgium

Aud. 500

09:00 - 10:30

SCIENTIFIC

INNOVATIVE CONCEPTS AND SUPPORT STRUCTURES FOR OFFSHORE

- ▶ Chairs:
Tande John Olav, Stiftelsen for Industriell og Teknisk Forskning (SINTEF), Norway
Peter Schaumann, Leibniz University Hannover, Germany

This session will focus on innovative concepts for wind turbine design as well as in the design of support structures for offshore wind turbines. Investigations into wind turbine tower load reduction using passive and semi-active dampers will be introduced, as well as a new hydraulic yaw system with new compact hydraulic motor principle for wind turbines.

The concept of the tension leg spar-type support structure with a downwind turbine will be introduced, including influence of hydrodynamic damping and ameliorating the negative damping by blade pitch control. A comparison of measured and simulated responses at the first full scale floating wind turbine will then be presented.

- ▶ AMELIORATING THE NEGATIVE DAMPING IN THE DYNAMIC RESPONSES OF A TENSION LEG SPAR-TYPE SUPPORT STRUCTURE WITH A DOWNWIND TURBINE – **Madjid Karimirad**, CeSOS/NTNU, Norway
- ▶ WIND TURBINE TOWER LOAD REDUCTION USING PASSIVE AND SEMI-ACTIVE DAMPERS – **Arturo Rodriguez Tsouroukdissian**, Alstom Wind, Spain
- ▶ COMPARISON OF MEASURED AND SIMULATED RESPONSES AT THE FIRST FULL SCALE FLOATING WIND TURBINE HYWIND – **Tor David Hanson**, Statoil ASA, Norway
- ▶ NEW HYDRAULIC YAW SYSTEM WITH NEW COMPACT HYDRAULIC MOTOR PRINCIPLE FOR WIND TURBINES – **Rasmus M. Sørensen**, Liftra, Denmark

10:30 - 11:00 Coffee break (catering areas)

Aud. 700

11:00 - 12:30

WIND RESOURCE

SITING CHALLENGES

- ▶ Lead chair: **Lars Landberg**, GL Garrad Hassan, United Kingdom
- ▶ Co-chair: **Oisín Brady**, Natural Power, France

This session will cover a wide range of challenging aspects of wind resource estimation. Firstly, two presentations – one from the theoretical perspective, the other from the practical - will address issues related to flow in and around forestry. The next part of the session will address the latest developments in understanding the vertical profile especially at higher heights. Finally, some hot and cold news: an icing atlas from Finland, and a paper on resource estimation in deserts. The session will be of interest to analysts as well as managers within wind resource estimation.

- ▶ FINNISH ICING ATLAS – **Karoliina Ljungberg**, Finnish Meteorological Institute, Finland
- ▶ BETTER WIND RESOURCE ESTIMATION THROUGH DETAILED FOREST CHARACTERIZATION – **Jens Madsen**, Vattenfall, Sweden
- ▶ WIND RESOURCE ASSESSMENT IN DESERT AREAS – **Erik Holtslag**, Ecofys, The Netherlands
- ▶ TALL WIND PROFILES AND RELATED ISSUES – **Mark Kelly**, Risø DTU, Denmark
- ▶ THE LATEST NEWS FROM FORESTRY R&D - **Ebba Dellwik**, Risø DTU, Denmark

Aud. 2000

11:00 - 12:30

POLICY, INDUSTRY, MARKETS & REGULATION

EUROPEAN MARKETS

- ▶ Lead chair: **Geert Palmers**, 3E, Belgium
- ▶ Co-chair: **Jacopo Moccia**, European Wind Energy Association (EWEA)

This session will analyse targets and objectives for wind energy across Europe in light of the new EU RES directive and each Members States' National Renewable Energy Action Plan. A detailed overview of Europe's two main wind energy markets will be presented as well as an analysis of one of Europe's main emerging markets. Taking government objectives as a starting point, the panellists will look at the adequacy of policies and the countries' political risks.

- ▶ PROPOSAL BY VESTAS WIND SYSTEMS: CLOSING THE GAP BETWEEN TARGETS AND MEASURES – **Henrik Breum**, Vestas Wind Systems, Denmark
- ▶ WIND POLICY IN GERMANY: REMOVING THE BOTTLENECKS FOR A CONTINUING SUCCESS STORY – **Dania Röpke**, German Wind Energy Association (BWE)
- ▶ BULGARIAN WIND ENERGY - FROM GOLD RUSH TO STANDSTILL OR FROM 0 TO 14000 MW AND BACK AGAIN – **Sebastian Noethlich**, Bulgarian Wind Energy Association (BGWEA), Bulgaria
- ▶ **José Donoso**, Spanish Wind Energy Association (AEE)

Aud. 600

11:00 - 12:30

GRIDS

TOWARDS WIND TURBINES SUPPORTING POWER SYSTEMS

- ▶ Lead chair: **Ana Estanqueiro**, National Institute of Engineering, Technology and Innovation (INETI), Portugal
- ▶ Co-chair: **Frans van Hulle**, European Wind Energy Association (EWEA)

When power systems reach high shares of wind power, the capability of wind plants to actively contribute to power system services becomes of crucial importance. In this session major stakeholders (network operators, a wind turbine manufacturer and a wind farm operator) present developments and experiences with state-of-the-art wind power technologies and solutions like active power and voltage control that not only provide a range of grid support services, but also reduce the gap between wind and conventional power plants. Specific grid support issues related to offshore wind plants are presented as well.

- ▶ FRT-TESTING AND DIRECT TSO-CONTROL OF REACTIVE POWER OUTPUT OF LARGE WIND FARMS – **Peter Van Roy**, Elia, Belgium
- ▶ INTEGRATED APPROACH TO COMPLY WITH GRID CODE REQUIREMENTS FOR LARGE OFFSHORE WIND FARMS – **Marc Sala**, Alstom Wind, Spain
- ▶ VOLTAGE CONTROL FOR WIND POWER PLANTS. REAL RESULTS – **Clara Combarros**, Iberdrola Renovables, Spain
- ▶ GRID CODE REQUIREMENTS IN DENMARK: TOWARDS WIND TURBINES SUPPORTING POWER GRIDS – **Vladislav Akhmatov**, Energinet.dk, Denmark

Aud. 500

11:00 - 12:30

SCIENTIFIC

STRUCTURAL DESIGN, PROBABILISTIC DESIGN

- ▶ Chairs: **Kim Branner**, Risø DTU, Denmark
Denja Lekou, Centre for Renewable Energy Sources and Saving (CRES), Greece

The session will focus on new design approaches for improving structural reliability of wind turbines and more specifically, for rotor blades. The failure rate for wind turbine blades corresponds to approximately 7% of the total failures. Two presentations will concentrate on the necessity of taking into account the different sources of variability in design parameters. Structural reliability for rotor blades involves the probabilistic modelling of all the uncertainties concerning the design of a blade, as well as the use of fast and accurate reliability methods. By adopting a reliability-based design approach, the case and site-dependent uncertainties can be used for verifying the design, estimating the probability of failure and calibrating partial safety factors for use in deterministic design. The other presentations will be focussed on the experimental and numerical studies of a bend-twist coupled wind turbine blade section, which was performed by means of experimental modal analysis.

- ▶ A NON-LINEAR UPSCALING APPROACH FOR WIND TURBINE BLADES BASED ON STRESSES – **Pablo Castillo Capponi**, Delft University of Technology, The Netherlands
- ▶ EXPERIMENTAL VERIFICATION OF THE IMPLEMENTATION OF TWIST-BEND COUPLING IN A WIND TURBINE BLADE – **Marcin Luczak**, LMS International, Belgium
- ▶ RELIABILITY BASED CALIBRATION OF PARTIAL SAFETY FACTORS FOR WIND TURBINE BLADES – **Henrik Stensgaard Toft**, Aalborg University, Denmark
- ▶ STRUCTURAL RELIABILITY ANALYSIS OF ROTOR BLADES IN ULTIMATE LOADING – **Konstantinos Bacharoudis**, University of Patras, Greece

The linear similarity rules for upscaling of wind turbine blades show a linear increase of stresses due to the weight. The final presentation will deal with a non-linear upscaling approach under the assumption that the stresses in the upscaled blade are the same as the reference blade.

12:30 - 14:00 Lunch (catering areas)

Aud. 2000

14:00 - 15:30

PLENARY AND PANEL SESSIONS

100% RENEWABLE ELECTRICITY IN THE EU BY 2050? (PANEL)

The EU has committed to cut CO₂ emissions by 80-95% by 2050, requiring a zero-carbon power system. This panel will debate how wind power and the many other renewable energy technologies can meet the climate challenge in that timeframe, and also examine the consequences for energy policy and investments. Looking ahead to the 30 years between 2020 and 2050, what path does the EU need to take in order to move from 20/30% emissions cuts to reductions of 80-95%?

Moderator

Speakers



Fiona Harvey,
The Guardian,
United Kingdom



Connie Hedegaard,
European Commissioner
for Climate Action,
European Commission



Simon Blakey,
Special Envoy,
Eurogas



Josche Muth,
Deputy Secretary
General, European
Renewable Energy
Council (EREC),
Belgium



Steve Sawyer,
Secretary General
Global Wind Energy
Council (GWEC),
Belgium



Oluf Ulseth,
Vice-Chairman of
the Energy Policy
& Generation
Committee,
EURELECTRIC

Aud. 700

14:00 - 15:30

TECHNOLOGY

OFFSHORE STRUCTURES

- ▶ Lead chair: **Peter Schaumann,** Leibniz University Hannover, Germany
- ▶ Co-chair: **Andreas Reuter,** Fraunhofer Institute for Wind Energy and Energy System Technology (IWES), Germany

The installation, execution, and reassessment of large offshore wind farm structures are crucial tasks for the future. Within this session, an overview of offshore wind farm experiences and the latest developments will be provided, including economic and technical aspects. Additionally, new self-installing tower concepts will be presented and discussed.

- ▶ SOIL RESPONSE OF OFFSHORE WIND TURBINES; STIFFNESS AND DAMPING OF MONOPILE FOUNDATIONS IN SAND – **Christian LeBlanc Thilsted,** DONG Energy, Denmark
- ▶ SELF INSTALLING WIND TURBINE (SIWT): INSTALLATION OF A COMPLETE WIND TURBINE (INCLUDING FOUNDATION) IN A SINGLE OFFSHORE OPERATION USING LOW COST AND WIDELY AVAILABLE STANDARD MARINE EQUIPMENT – **Mark Riemers,** SPT Offshore, The Netherlands
- ▶ REASSESSMENT OF OFFSHORE WIND TURBINES SUPPORT STRUCTURES WITHIN A RELIABILITY BASED FRAMEWORK – **Athanasios Kolios,** Cranfield University, United Kingdom
- ▶ UNIVERSAL FOUNDATION, A NOVEL WIDE-RANGING SUBSTRUCTURE INSTALLATION CONCEPT – **Søren Andreas Nielsen,** MBD Offshore Power A/S, Denmark
- ▶ DESIGN STANDARDS FOR FLOATING WIND TURBINE STRUCTURES – **Knut O. Ronold,** Det Norske Veritas, Norway

Aud. 500

14:00 - 15:30

SCIENTIFIC

ASSESSMENT OF MICROSCALE WIND

▶ Chairs:

Charlotte Hasager, Risoe DTU, Denmark

Evangelos Politis, Centre for Renewable Energy Sources and Saving, Greece

The assessment of microscale wind characteristics is facing important changes and challenges with the appearance of new measurement and numerical techniques. Physical modelling of complex terrain sites can be an efficient solution for the validation of numerical models. The use of Unmanned Aerial Vehicles (UAV) in the measurement of wind turbine wakes constitutes a promising novel experimental approach. The technique can be a cost-effective solution for the assessment of wind conditions in wakes and zones with difficult accessibility. At the microscale level, numerical models based on Computational Fluid Dynamics (CFD) are being used in complex terrain and wakes simulation. RANS models are the standard choice for turbulence simulation. A surface layer model will be compared to a full atmospheric boundary layer model in the simulation of the Bolund test case. An important step in the configuration of CFD models constitutes the

- ▶ FEASIBILITY OF MICRO-SITING IN MOUNTAINOUS TERRAIN BY WIND TUNNEL PHYSICAL MODELLING – **Boris Conan,** von Karman Institute, Belgium
- ▶ RANS SIMULATIONS OF WIND FLOW AT THE BOLUND EXPERIMENT – **Daniel Cabezón,** CENER, Spain
- ▶ AN IMMERSED BOUNDARY METHOD FOR EFFICIENT SIMULATION OF WIND FLOW OVER COMPLEX TERRAIN – **Samira Jafari,** Laboratory for Energy Conversion, ETH Zurich, Switzerland
- ▶ FULL-SCALE WIND TURBINE WAKE MEASUREMENTS USING AN INSTRUMENTED UAV – **Gulru Kocer,** Laboratory for Energy Conversion, Department of Mechanical and Process Engineering, ETH Zurich, Switzerland

generation of the mesh of the computational domain. The immersed boundary method will be proposed here as an efficient alternative to structured or unstructured body-fitted meshing.

15:30 - 16:00 Coffee break (catering areas)

16:00 - 17:30 Poster session (Poster Area - Hall 10 and foyer of Auditorium 2000)

▶ see pages 26-37 for a full list of poster presentations



17:00 - 18:00 WinWinD 3 product launch reception (WinWinD stand 11730) Sponsored by:

▶ see page 51 for more details

17:00 - 18:00 EWEA networking event (EWEA stand 11434)

▶ see page 51 for more details



Supported by: WONDERFUL COPENHAGEN

19:30 - 23:00 Conference Dinner (Tour & Taxis)

▶ see page 51 for more details

CONFERENCE PROGRAMME

Thursday, 17 March

08:00 - 09:00 Welcome coffee (Poster area)

Aud. 600

09:00 - 10:30 POLICY, INDUSTRY, MARKETS & REGULATION SOCIAL AND ENVIRONMENTAL ACCEPTANCE

- ▶ Lead chair: **Christa Schaut**, ODE-Vlaanderen, Belgium
- ▶ Co-chair: **Albert Jansen**, Agentschap, The Netherlands

The comparisons among different types of electricity generation shows that wind energy has the lowest impact on wildlife. To guarantee this advantage of wind energy, the impact of wind turbines on wildlife is taken into account when planning a wind farm. Wind turbines are not only providing environmental and economic benefits, but can also be aesthetic objects, a symbol for a renewable energy future. Informing citizens, public consultation and a meaningful communication are important steps in the project development. This session will discuss some best practice methods and share results for projects relating to both onshore and offshore wind farms.

- ▶ **Micheal O'Brian**, European Commission
- ▶ WIND FARM ADVERTISING WARS IN THE UK – **David Jones**, Platts, United Kingdom
- ▶ GREENING BLUE ENERGY; IDENTIFYING AND MANAGING ENVIRONMENTAL RISKS AND OPPORTUNITIES OF OFFSHORE WIND POWER – **Dan Wilhelmsson**, Swedish Secretariat for Environmental Earth System Sciences and IUCN Global Marine Programme, Sweden
- ▶ RESHARE: MECHANISMS TO INCREASE LOCAL PUBLIC ACCEPTANCE OF RENEWABLE ENERGY PROJECTS – **Ron van Erck**, European Commission

Aud. 2000

09:00 - 10:30 TECHNOLOGY NEW CONTROL CONCEPTS

- ▶ Lead chair: **Ben Hendriks**, GL Garrad Hassan, The Netherlands
- ▶ Co-chair: **Martin Kuehn**, University Of Oldenburg, Germany

What are the prospects of new control strategies? Can new control concepts aiming at load mitigation and turbine reliability bring down cost of energy? This session will explore different strategies. A forward looking LIDAR mounted on a nacelle giving valuable input to the controller to maximise power performance and mitigate loads. A farm control strategy aiming at the same power performance improvement and at load mitigation via a different route. A presentation on fault tolerant control describes a method to increase the reliability for advanced control strategies with blade root load measurement as input.

- ▶ FACING EXTREME WIND CONDITIONS WITH LIDAR ASSISTED CONTROL – **Isaac Pineda**, Alstom Wind, Spain
- ▶ PROSPECTS OF OPTIMIZATION OF ENERGY PRODUCTION BY LIDAR ASSISTED CONTROL OF WIND TURBINES – **David Schlipf**, Universität Stuttgart, Germany
- ▶ FAULT TOLERANT BLADE LOAD MONITORING FOR AN INDIVIDUAL PITCH CONTROLLED WIND TURBINE – **Ursula Smolka**, Universität Stuttgart, Germany
- ▶ A QUASI-STEADY WIND FARM CONTROL MODEL – **Arno Brand**, Energy Research Center of the Netherlands (ECN), The Netherlands

Thursday, 17 March

CONFERENCE PROGRAMME

Aud. 700

09:00 - 10:30 GRIDS OPERATION OF ELECTRICITY SYSTEMS WITH LARGE AMOUNTS OF WIND POWER

- ▶ Lead chair: **Hannele Holttinen**, VTT Technical Research Centre of Finland
- ▶ Co-chair: **Jose Luis Mata**, Red Eléctrica de España (REE), Spain

The session will look at some challenges the operation of power systems will face as high levels of wind energy penetration is reached, and some innovative solutions will be proposed. Ways to manage up to 75 % instantaneous penetration level from non synchronous production is presented for the Irish system. Case studies from different Central European system countries include probabilistic forecasting and congestion management, redirecting power flows, and a set of demonstrations planned for Twenties project. Finally, a renewable future in 2050 will be outlined.

- ▶ THE CHALLENGE OF INTEGRATING RENEWABLES INTO THE IRISH POWER GRID – **Michael Kelly**, Eirgrid, Ireland
- ▶ RESERVE AND CONGESTION MANAGEMENT USING WIND POWER PROBABILISTIC FORECASTING: A REAL CASE-STUDY – **Ricardo Bessa**, Institute for Systems and Computer Engineering of Porto (INESC Porto), Portugal
- ▶ TWENTIES PROJECT: MEASURING THE IMPACT OF INNOVATION – **Vincente González López**, TWENTIES project
- ▶ OPERATING THE FUTURE EUROPEAN POWER SYSTEM WITH 100% RENEWABLES – A SYSTEM STUDY BASED ON THE ENERGY [R]EVOLUTION SCENARIO – **Eckehard Troester**, Energynautics, Germany
- ▶ INCREASING WIND PENETRATION IN EUROPE WITH THE AID OF CONTROLLABLE DEVICES IN THE BENELUX – **Priyanko Guha Thakurta**, Katholieke Universiteit Leuven, Belgium

Aud. 500

09:00 - 10:30 SCIENTIFIC ROTOR AERODYNAMICS

- ▶ Chairs:
Alvaro Cuerva, Universidad Politécnica de Madrid, Spain
Gerard Schepers, ECN Wind Energy, The Netherlands

This session will feature complementary presentations on major aerodynamic experiments for wind turbine blade sections and full rotors that have been conducted in Europe in recent years. The first and second presentation will consider new processed data derived from the MEXICO experiment as part of the work done within IEA Wind Task 29 MEXNET(T), focusing on bound and tip-vortex understanding and near rotor plane flow field description.

Thirdly, combined wind tunnel and field aerodynamic data will be presented from the DANAERO MW research project comparing, among others, airfoil characteristics measured under 2D steady conditions in a wind tunnel against unsteady 3D flow conditions on a MW scale rotor.

- ▶ RESULTS FROM MEXNEXT: ANALYSIS OF DETAILED AERODYNAMIC MEASUREMENTS ON A 4.5 M DIAMETER ROTOR PLACED IN THE LARGE GERMAN DUTCH WIND TUNNEL DNW – **Gerard Schepers**, ECN Wind Energy, The Netherlands
- ▶ NEAR WAKE STUDIES OF THE MEXICO ROTOR – **Thorsten Lutz**, Institute of Aerodynamics and Gas Dynamics (IAG), University of Stuttgart (USTUTT), Germany
- ▶ EXPERIMENTAL AND NUMERICAL STUDY OF RADIAL FLOW AND ITS CONTRIBUTION TO WAKE DEVELOPMENT OF A HAWT – **Daniel Micallef**, TUDelft, The Netherlands
- ▶ DAN-AERO MW: MEASURED AIRFOIL CHARACTERISTICS FOR A MW ROTOR IN ATMOSPHERIC CONDITIONS – **Christian Bak**, Risø DTU, Denmark

10:30 - 11:00 Coffee break (catering areas)

CONFERENCE PROGRAMME

Thursday, 17 March

Aud. 700

11:00 - 12:30

POLICY, INDUSTRY, MARKETS & REGULATION

SUPPLY CHAIN: CHALLENGES AND OPPORTUNITIES FOR A GROWING INDUSTRY

- ▶ Lead chair: **Colin Morgan**, GL Garrad Hassan, United Kingdom

Europe has technical leadership in the supply chain for wind energy driven by 20 years of solid growth in the onshore wind market here and in export markets. As onshore wind has hit a plateau in traditional European markets, the spotlight is now on the offshore wind sector and the substantial business opportunities that that will bring in the next two decades.

Many of the opportunities in offshore wind are quite different to those in onshore wind – it is indeed a new sector. Turbines are on a much larger scale and the services of marine installation, foundation fabrication, subsea cabling, offshore substations and project support services must also be considered; all of which demands entirely new or radically expanded industries. The session has been put together to start by looking at the big picture – the scale of the opportunity, the changes in the industrial landscape needed and the national employment benefits we can expect. It will then look at how one of the main developers is master-planning their supply chain, before drilling into an initiative which aims to bring small and medium size companies together in a

- ▶ FORECASTING OFFSHORE WIND GROWTH IN EUROPE IN THE CONTEXT OF SUPPLY CHAIN BUILD-OUT ACROSS THE REGION – **Magnus Dale**, Emerging Energy Research, Spain
- ▶ **Gordon Edge**, Renewable UK, United Kingdom
- ▶ DEVELOPING THE UK'S FIRST INTEGRATED WIND ENERGY SUPPLY CHAIN SUPERCLUSTER – **Steve Clarke**, Mainstream Renewable Power, United Kingdom
- ▶ MIDTVIND - A SUPPLIER NETWORK! MIDTVIND - STRENGTHENING THE SUPPLIERS! – **Jakob Lau Holst**, Danish Wind Industry Association (DWIA), Denmark

cohesive manner, enabling them to overcome barriers to entry into what is really a game dominated by large corporations.

While of general interest, this session targets businesses moving into the sector as well as those working on industrial policy - trying to draw together European experiences on where the offshore wind industrial opportunity lies and how to maximise chances of successful business capture.

Aud. 600

11:00 - 12:30

GRIDS

ELECTRICITY MARKET INTEGRATION

- ▶ Lead chair: **Paul Wilczek**, European Wind Energy Association (EWEA)

Next to urgent grid reinforcements, the question must be addressed of how to achieve an optimal power market design that supports the large uptake of variable RES such as wind power. This session will examine the implications from forecast practices and different power market timings, and will also address the institutional dimension given in the 3rd Liberalisation Package through binding EU regulations on electricity market design.

- ▶ OPTIMAL MANAGEMENT OF WIND GENERATION IN POWER SYSTEMS & MARKETS – THE ANEMOS.PLUS PROJECT – **Georges Kariniotakis**, MINES-ParisTech/ARMINES, France
- ▶ **Cecillia Hellner**, ENTSO-E
- ▶ WIND POWER BALANCING COSTS FOR DIFFERENT SIZE ACTORS IN THE NORDIC ELECTRICITY MARKET – **Hannele Holttinen**, VTT Technical Research Centre of Finland, Finland
- ▶ OPTIMAL POWER MARKET TIMING FOR WIND ENERGY – **Sascha T Schroeder**, Risø DTU, Denmark
- ▶ MARKET VALUE OF STATE-OF-THE-ART WIND POWER PREDICTIONS - A CASE-STUDY FOR THE ESTINNES WIND POWER PLANT – **Kristof De Vos**, Katholieke Universiteit Leuven, Belgium

Thursday, 17 March

CONFERENCE PROGRAMME

Aud. 2000

11:00 - 12:30

TECHNOLOGY

CONDITION MONITORING SYSTEMS

- ▶ Lead chair: **Gerard J.W. van Bussel**, Technical University Delft, DUWIND, The Netherlands

More and more wind turbines are being equipped with extensive condition monitoring systems (CMS) on top of standard SCADA systems. These systems allow to remotely diagnose the condition of critical components, and to infer and report malfunctions before failure and damage occur. So using CMS may reduce the risk and cost of downtime and lost power output. On the other hand CMS adds to the complexity of the system. So how good are CMS in predicting failures and is SCADA information not sufficient for diagnosing the condition of the wind turbine? This session will assess the cost-effectiveness of CMS, it will present operators experiences and it will introduce novel methods to extract wind turbine condition properties from existing (SCADA) information.

- ▶ THE OPERATOR'S ASSESSMENT OF CONDITION MONITORING: PRACTICAL EXPERIENCE AND RESULTS – **Frédéric Giordano**, O1dB-Metravib, France and **Rémi Stein**, Erelia, France
- ▶ INTELLIGENT MALFUNCTION PROGNOSTICS – **Frank Kirschnick**, Cassantec Ltd., Switzerland
- ▶ SELF ORGANISING MAP BASED CONDITION MONITORING OF WIND TURBINES – **Simon Catmull**, RES Offshore, United Kingdom
- ▶ COST-EFFECTIVENESS OF CONDITION MONITORING SYSTEMS (CMS) – **Manfred Gose**, Lahmeyer International GmbH, Germany
- ▶ DETECTION OF INTER-COIL SHORT CIRCUITS IN WIND GENERATOR WINDINGS – **Ante Elez**, Koncar - Electrical Engineering Institute, Croatia

Aud. 500

11:00 - 12:30

SCIENTIFIC

PREDICTABILITY OF WIND CONDITIONS

- ▶ Chairs:
Arno Brand, Energy research Centre of the Netherlands (ECN), The Netherlands
Javier Sanz Rodrigo, Centro Nacional de Eneñas Renovables (CENER), Spain

Numerical models and databases are being developed at different scales. Global reanalysis databases, produced by meteorological offices, constitute a very appealing source of historical data for the assessment of long-term energy yield with Measure Correlate Predict statistical methods. The performance of various reanalyses will be presented. The long-term consistency of reanalysis products is also an important asset for the prediction of extreme winds. When the scale of global models is not sufficient, mesoscale models are used to downscale wind characteristics. Off-shore wind conditions in the North Sea are characterised by high levels of temporal variability, an important issue in wind power forecasting.

- ▶ STOCHASTIC MODELING OF WIND POWER PRODUCTION – **Matthias Wächter**, ForWind, Germany
- ▶ INVESTIGATION ON THE USE OF NCEP/NCAR, MERRA AND NCEP/CFRS REANALYSIS DATA IN WIND RESOURCE ANALYSIS – **Sónia Lição**, O2 Vind, Sweden
- ▶ EXTREME WIND ATLASES USING THE SELECTIVE DYNAMICAL MESOSCALE MODELING METHOD – **Xiaoli Guo Larsén**, Risø National Laboratory for Sustainable Energy, Technical University of Denmark, Denmark
- ▶ PREDICTABILITY OF HOUR-SCALE WIND FLUCTUATIONS OVER THE NORTH SEA – **Claire Louise Vincent**, Risø National Laboratory for Sustainable Energy - Technical University of Denmark, Denmark

High resolution mesoscale simulations over the North Sea will show how predictable these fluctuations can be. A fourth presentation will propose that, at the microscale level, stochastic models can be used to simulate small scale wind.

12:30 - 14:00 Lunch (catering areas)

14:00 - 16:00 Exhibition visiting time

POSTER PRESENTATIONS

Poster Session: Wednesday 16 March, 16:00 - 17:30
(Poster Area, Hall 10 & foyer of Auditorium 2000)

Hundreds of poster presentations are available for viewing throughout the event in the poster area. This dedicated poster session is an opportunity for all delegates to meet with the poster presenters and discuss the presentations in more detail.

POLICY, INDUSTRY, MARKETS & REGULATION

Offshore wind

- **PO.002** Realising the potential of offshore wind power formation of capabilities to support a transformation of the energy sector, **Kersti Karltorp**, Chalmers University of Technology, Sweden
- **PO.005** The need to integrate geophysical with geotechnical data to aid pile design and installation: - a case study of the sherigham shoal windfarm, **Roger Birchall**, Gardline Geosurvey, United Kingdom
- **PO.009** Remote sensing standards: their current status and significance for offshore projects, **Peter Clive**, SgurrEnergy Ltd, United Kingdom
- **PO.012** Roxtec - cable sealing solutions for offshore wind power, **Robert Stubb**, Roxtec International, Sweden
- **PO.014** The Emerging Offshore Wind Industry in North America: Projects, Policies, and Recent Developments, **Mary Ann Christopher**, Foley & Lardner LLP, United States of America
- **PO.018** Benefits of a dedicated offshore wind energy industry - construction and operation, **Dolf Elsevier van Griethuysen**, Ballast Nedam Offshore, The Netherlands
- **PO.019** The Market for and Competitiveness of Wind Generated Electricity in Maine: A Social Cost Assessment, **Gary Hunt**, University of Maine, United States
- **PO.022** The Offshore Wind Infrastructure project, **Patrick Hoebeke**, 3E SA, Belgium
- **PO.023** HVDC technology for large scale offshore wind connections, **Claes Westerlind**, ABB, Sweden
- **PO.024** Developing European Offshore Resources- lessons from Siemens 20 years of experience, **Michael Hannibal**, Siemens Wind Power, Denmark
- **PO.025** Rave - joint research at germanys first offshore wind park alpha ventus, **Michael Durstewitz**, Fraunhofer IWES, Germany

Obstacles, barriers & local impacts

- **PO.027** Wind for Schools: Fostering the Human Talent Supply Chain for a 20% Wind Energy Future, **Eric Lantz**, National Renewable Energy Laboratory, United States
- **PO.028** Bureaucracy during the environmental licensing of wind farms in Greece, **John Lazarou**, Acciona Energiaki S.A, Greece

- **PO.029** Recycling wind turbines: Outlook and Technologies, **Alvaro Feito Boirac**, Vestas Wind Systems A/S, Denmark
- **PO.030** A 21st Century Approach to Aerial Bird and Mammal Surveys at Offshore Wind Farm Sites, **Alex Banks**, APEM Ltd, United Kingdom
- **PO.031** Offshore wind farms in the Belgian part of the North Sea: Monitoring the environmental impact, **Steven Degraer**, Royal Belgian Institute of Natural Sciences, Belgium
- **PO.032** Environmental constraints to onshore wind energy development: Integrating project experience into the traditional GIS based site prospecting procedure, **Aimee Nicholson**, Parsons Brinckerhoff, United Kingdom
- **PO.033** How to incorporate your opposition, **Albert Jansen**, Agentschap NL, Heard Island and McDonald Islands
- **PO.034** Social acceptance as an obstacle in the implementation of wind farms in Greece, **Konstantinos Gkarakis**, Hellenic Wind Energy Association, Greece
- **PO.035** Offshore wind farms in the Mediterranean Sea - A tourist attraction or a tourist repellent?, **Vanja Holmquist Westerberg**, Laboratoire Montpellierain d'Economie Theorique et Appliquée, France
- **PO.037** Main Results of the Action Plan for Removing Barriers to the Implementation of Wind Power in Mexico, **Marco Borja**, Instituto de Investigaciones Electricas, Mexico
- **PO.038** Life cycle assessment of the wind turbines installed in Spain until 2008, **Francisco Lahuerta**, CENER, Spain
- **PO.039** Local Perceptions of Wind Turbine Installations in Japan, **Memi Motosu**, The University of Tokyo, Japan
- **PO.040** Recent views on the public acceptance of wind energy and photovoltaic applications in Greece, **Vasiliki Katsirou**, Soft Energy Applications and Environmental Protection Lab, Greece
- **PO.044** Comparison of the energy pay-back period between wind and photovoltaic stand-alone power systems, **Vasiliki Katsirou**, Soft Energy Applications and Environmental Protection Lab, Greece
- **PO.045** Benefit-Sharing Mechanisms in Renewable Energy, **Jan Coen van Elburg**, RebelGroup, Belgium
- **PO.046** Opinions of adult Poles concerning RES with particular emphasis to wind power, **Bozena Mroczek**, The Pomeranian Medical University in Szczecin, Poland

Carbon prices, emissions trading, other climate policies and investment decisions

- **PO.047** Emissions Trading and Wind Energy 2013-2020: A North America - Europe Axis? **Verki Tunteng**, Centre for International Sustainable Development Law and Heenan Blaikie LLP, Canada

Global policies, industrial development & markets

- **PO.049** South Africa - a new manufacturer of wind turbines? **Stefan Szewczuk**, Council for Scientific & Industrial Research, South Africa
- **PO.053** Wind energy in morocco (resources, potential projects), **MustaphaENZili**, ADEREE, Morocco
- **PO.054** Requirements for WTGS (Wind Turbine Generator System) components for North American access, **Andreas Neuhäuser**, UL International Inc, Finland
- **PO.058** Development of the wind power market in South Africa, **Luc Dewilde**, 3E, Belgium
- **PO.060** Wind energy technology: A path to cost reductions, **Eric Lantz**, National Renewable Energy Laboratory, United States
- **PO.061** Data Management: Creating a Legacy for Offshore Wind Projects and Marine Spatial Planning, **Alison Lucas Collier**, Gardline Marine Sciences Limited, United Kingdom
- **PO.062** Accelerating the Deployment of Offshore Renewable Energy Technologies (ADORET), **Gregory Dudziak**, Mott MacDonald, United Kingdom
- **PO.063** How has Spain become a leader in the wind energy industry during the last decade? (An analysis of influential factors on the successful development of wind energy in Spain) **Fatemeh Aminzadeh**, Instituto Universitario De Microgravedad "IGNACIO DA RIVA" (IDR/UPM), Spain
- **PO.064** Medium power wind turbine for distributed generation and proximity wind, **Marc Rivard**, ERGNET, France
- **PO.065** The commercial Anemos activities – lessons learned from a successful spin-off from EU funded research, **Hans-Peter (Igor) Waldi**, Overspeed GmbH & Co. KG, Germany
- **PO.066** Meeting the educational need for professional project managers in the wind industry, **Liselotte Aldén**, Gotland University, Sweden
- **PO.068** Facilitating strategies for small wind energy systems development in urban areas of lanzarote island, **Rafael Zubiaur** Barlovento recursos naturales s.l., Spain

FINANCE FORUM

Project finance/project equity

- **PO.072** Project Finance - Technical Advisor Lessons from Past Deals, **Christos Koliatsas**, Mott MacDonald, United Kingdom

Risk assessment and management

- **PO.078** Getting it right pre-construction, **Peter Clive**, SgurrEnergy Ltd, United Kingdom
- **PO.079** Use of operational results in the revision of the long-term annual expected production of a wind farm, **José Carlos Matos**, INEGI, Portugal
- **PO.080** Review of wind turbine technology 2011, **Ricardo Guedes**, Megajoule, Portugal
- **PO.083** Review of methods to recalculate P50/P90 after one year of operation: how accurate can we get? **Jean Grassin**, Ecofys, The Netherlands

WIND RESOURCE

Offshore wind resource assessment

- **PO.084** Innovative Methods for Offshore Wind Resource Assessment, **Karen Conover**, DNV, United States
- **PO.086** Remote Sensing on Moving Offshore Platforms, **Tony Rogers**, DNV, United States of America
- **PO.087** Comparison of LIDAR- and UAM -based offshore mast effect corrections, **Annette Westerhellweg**, DEWI GmbH, Germany
- **PO.088** Floating Lidar: Development and Applications, **Thomas Duffey**, 3E, Belgium
- **PO.089** Combining satellite wind maps and mesoscale modelling for a wind atlas of the South Baltic Sea, **Charlotte Hasager**, Risoe DTU, Denmark
- **PO.090** Extracting information from data: MCP in the real world, **Peter Clive**, SgurrEnergy Ltd, United Kingdom
- **PO.091** Offshore wind resource site characterization using WRF model, results from first validation test, **Gil Lizcano**, Vortex, Spain
- **PO.092** Comparison of LiDAR and Ultrasonic Anemometer Measurements of Offshore Wind Characteristics, **Gürsu Tasar**, NTNU, Norway
- **PO.094** Yawing and performance of an offshore wind farm, **Troels Pedersen**, Risø DTU, Denmark
- **PO.096** Analysis of 10 years of wind vector information from QuikSCAT for the North Sea: Preliminary Results from the OREC-CA project, **Ioanna Karagali**, Risoe National Laboratory for Sustainable Energy, Technical University of Denmark, Denmark
- **PO.098** Assessment of an off-shore site's wind power energy using meteorological models and measured data **Stefano Alessandrini**, RSE Spa, Italy
- **PO.099** Statistical assessment of the offshore wind and temperature profiles at the North of the Yucatan Peninsula - Mexico, **Simon Watson**, Loughborough University, United Kingdom
- **PO.100** Study of the UK offshore wind resources: Preliminary results from the first stage of the Supergen Wind II project Resource assessment, **Simon Watson**, Loughborough University, United Kingdom

Measurements at great heights

- **PO.101** Developments in wind profiling for wind turbine rotors, **Uwe Schmidt Paulsen**, Risø National Laboratory for Sustainable Energy, Denmark
- **PO.102** Comparing modeled wind profile with long-range wind lidar measurements at a flat coastal site, **Ekaterina Batchvarova**, Risø DTU, Denmark
- **PO.103** Wind Measurement Strategies to Optimize Lidar Return on Investment, **Matthieu Boquet**, LEOSPHERE SAS, France
- **PO.105** Utilisation of inland wind power - State of the project, **Doron Callies**, Fraunhofer IWES, Germany
- **PO.107** LIDAR measurements for power curve estimation following IEC 61400-12-1, **Saskia Bourgeois**, Meteotest, Switzerland
- **PO.108** Using SoDAR Wind Speed Measurements for Wind Turbine Power Curves, **Niels LaWhite**, Second Wind Inc., United States
- **PO.109** First insights on wind profile up to 100m in Croatia based on measurement data from three locations, **Diana Meimorec**, HEP-Obnovljivi izvori energije d.o.o., Croatia
- **PO.111** Vertical wind speed and Flow tilt angle measurements, in Complex Terrain, using various Lidars and Sonic anemometers, **Dimitri Foussekis**, C.R.E.S., Greece
- **PO.113** Autonomous Aerial Sensors for Wind Power Meteorology, **Gregor Giebel**, Risø DTU, Denmark
- **PO.114** Remote sensing of True 3D Wind and Turbulence, **Jone Saebboe**, WindMaster Technology, Norway
- **PO.115** Wind tunnel calibration of cup anemometers, **Svend Ole Hansen**, Svend Ole Hansen ApS, Denmark
- **PO.116** LIDAR Measurements - A Comparison of Two LiDAR systems with a Meteorological Mast, **Tomas Blodau**, REpower Systems, Germany
- **PO.116_A** High Level Wind Conditions at Prospective Wind Farm Sites in the Central Mediterranean Island of Malta, **Robert Farrugia**, University of Malta, Malta
- **PO.116_B** Comparison of wind speed measurements over complex terrain using a LIDAR system, **Andres Honrubia**, Renewable Energies Research Institute, Spain

Extreme wind speeds

- **PO.117** How good are ground-based remote sensors at measuring extreme wind events? **Michael Courtney**, Risø DTU, Denmark
- **PO.118** Analysis of extreme Wind Conditions based on real wind measurements and verification via existing models, **Peter Herbert Meier**, TÜV SÜD Industrie Service GmbH, Germany
- **PO.119** Comparison of Wind Turbine Design Standards' Extreme Speed and Shear Tolerance Criteria With High-Height Sodar Data, **Andrew Hastings-Black**, Second Wind, Inc., United States
- **PO.120** Sensitivity of wind turbine IEC class assessment depending on the different input data sets, **Sinisa Knezevic**, Energy institute Hrvoje Pozar, Croatia

Forecasting

- **PO.123** Energy Forecasting for Distributed Generation in Local Energy Neighbourhoods, **Tamas Bertenyi**, Quiet Revolution Ltd., United Kingdom
- **PO.124** Use of CFD model for short term power forecasting, **Jean-Claude Houbart**, METEODYN, France
- **PO.125** Analysis of the relationship between distance and wind speed correlation in complex terrain cases, **Jose Luis Pazos**, University of Vigo, Spain
- **PO.126** Methods to improve the accuracy of site-specific, hub-height wind speed forecasts, **Paul Abernethy**, Met Office Exeter, United Kingdom
- **PO.127** Probabilistic forecasting of extreme wind speeds using a WRF ensemble, **Andrew Fish**, Universidad Complutense de Madrid, Spain
- **PO.128** State-of-the-Art Wind Energy Ramp Event Forecasting Using Atmospheric Observations, **Nic Wilson**, Vaisala, Germany
- **PO.129** Scanning Doppler lidar for wind field assessment Lake Turkana Kenya, **John Sutton**, Winddriven Pty Ltd, Australia
- **PO.130** Wind speed prediction in Binalood Wind Farm using two artificial intelligent methods, **Haniyeh Razzaghi**, Material & Energy Research Center, Islamic Republic of Iran
- **PO.131** Towards Improved Wind Power Forecasting Technology with Focus on Extremes. The SafeWind Project. **George Kariniotakis**, MINES ParisTech, ARMINES, France
- **PO.132** Determination of local Wind Regimes in Spain and Inter-Annual Variability, **Jesús Navarro**, Garrad Hassan, Spain
- **PO.133** Wind power extreme event forecast, **Sven Creutz Thomsen**, Technical University of Denmark, Denmark
- **PO.134** Analysis of WRF Parameterization Schemes for Wind Potential Mapping in South of Brazil, **Miranda Marcos**, Inova Energy, Brazil

Horizontal and vertical wind field and wind resource modelling

- **PO.135** Application of Remote Sensing Data - Improved Methods to Estimating Scalar Averages from Vector Averages, **Anthony Rogers**, DNV, United States of America
- **PO.137** Interannual variability wind regime control on AEP estimations for different regions of Brazil, **Marcos dos Santos Miranda**, Inova Energy, Brazil
- **PO.139** Meso-scale and Micro-scale coupling in wind power assessment: comparison of two methodologies, **Olivier Texier**, Maia Eolis, France
- **PO.140** Optmization of mesoscale simulations using distinct nesting schemes, **Ricardo Guedes**, Megajoule, Portugal
- **PO.141** Navarre virtual wind series: physical mesoscale downscaling with WASP. Methodology and validation, **Javier Sanz**, CENER - Centro Nacional de Energias Reno, Spain

- **PO.142** Wind resource of microregions in south and northeast of brazil: an evaluation of meteorological data and computational tool, **Jorge Antonio Villar Alé**, Pontificia Universidade Católica do Rio Grande do Sul, Brazil
- **PO.143** Uncertainty of WASP wind profile modelling related to external conditions and model parameters, **Niels Gylling Mortensen** Risø DTU, Denmark
- **PO.145** Influence of thermal stratification on CFD simulations, **Carolin Schmitt** Theolia, Germany
- **PO.147** Predicting wind speeds using the WASP model, basing on distant data sources, **Kamil Beker** EPA Sp. z o.o., Poland
- **PO.148** Wind profile prediction at two sites of different complexity using correction in WASP, **Djordje Klisic** Faculty of Electrical Engineering, Serbia
- **PO.149** Long Term correction when varying correlation: a general rule using a joint probabilistic approach, **Livio Casella** Suzlon Wind Energy AS, Denmark
- **PO.150** A Windscanner Simulator, **Nikola Vasiljevic** Risø DTU, Denmark
- **PO.151** Large scale and high resolution wind potential analysis results for a combined WASP and WindSim approach, **Peter Herbert Meier** TÜV SÜD Industrie Service GmbH, Germany
- **PO.153** Simulating the Vertical Structure of the Wind with the Weather Research and Forecasting (WRF) Model, **Andrea Hahmann** Risøe-DTU, Denmark
- **PO.154** Integration of CFD and Meteorological Modeling Techniques for use in Wind Resource Assessment, **Catherine Meissner** Pacific Hydro, Australia
- **PO.155** Coupled patterns of variability of the wind and solar energy resources in Andalusia (southern Iberian Peninsula), **Francisco Javier Santos-Alamillos** University of Jaén, Spain
- **PO.156** Methods to assess uncertainty of wind resource estimates determined by mesoscale modelling, **Jake Badger** Risø DTU, Denmark
- **PO.157** Wind prediction in complex terrain in Italy by non-linear model MASCOT **Elisa Sorri** Tokyo University, Japan
- **PO.159** Vertical wind speed profiles estimation recognizing atmospheric stability, **Zeljko Djuricic** University of Belgrade, Faculty of Electrical Engineering, Serbia
- **PO.160** CFD Validation - A simple approach, **Catherine Meissner** Pacific Hydro, Australia
- **PO.162** Wind energy integration in urban areas, **Hafida Daou** Renewable Energies Development Center, Algeria
- **PO.163** Review of Data Sources for Long-Term Wind Resource Assessment, **Morten Lybech Thøgersen** EMD International A/S, Denmark

- **PO.164** Remote Sensing Verification Uncertainties, **Anthony Rogers** DNV, United States of America
- **PO.165** Sensitivity in mesoscale wind resource estimation to high-resolution land use and sea surface temperatures in Andalusia (Southern Spain), **Francisco Javier Santos-Alamillos** University of Jaén, Spain
- **PO.166** A comparison of wind flow over complex terrain using CFD simulation and LIDAR measurements, **Athanasios Gkaniias** Estia Consulting & Engineering S.A., Greece
- **PO.167** Sensitivity of the CFD-based Lidar correction, **Céline Bezault** METEODYN, France
- **PO.167_A** CENER Wind resources maps and virtual masts at mesoscale: Onshore (Tunisia) and Offshore (Great Lakes), **Daniel Cabezón** École de technologie supérieure, Canada
- **PO.167_B** Estimating wind resource using mesoscale modeling, **Ricardo Guedes** Megajoule, Portugal

Extreme climate conditions

- **PO.168** Icing probability estimation, learned experiences from WRF based simulations of icing in Europe, **Pau Casso** Vortex, Spain
- **PO.170** Measuring the wind resources in Haiti, **Luc Dewilde** 3E, Belgium

Extreme events

- **PO.171** Tornadoes and waterspouts in greece. a puzzle for wind farm development? **DEMETRIOS ZIGRAS**, Technological Educational Institute (TEI) of athens, Greece
- **PO.172** Prediction of Ramp Events and their Uncertainties - Experiences in North America, Australia and Europe, **Matthias Lange**, energy & meteo systems, Germany
- **PO.174** Assessing turbulence intensity and its impact on the structural integrity of wind turbines, **Thomas Hahm**, F2E Fluid & Energy Engineering GmbH & Co. KG, Germany
- **PO.175** Offshore wind power prediction through CFD simulation and the actuator disc model, **Giorgio Crasto**, University of Perugia, Italy
- **PO.176** Why doesn't my wind farm produce what I expected? A guide to wind farm performance assessment, **Jorge Garza**, Risø DTU, Denmark
- **PO.177** CFD simulations of dynamical wake effects at the Alpha Ventus offshore wind farm, **Annette Westerhellweg**, DEWI GmbH, Germany
- **PO.178** A quasi 3D computation of merging wakes using a boundary layer equation model approach, **Helge Aagaard Madsen**, Risø DTU National Laboratory for Sustainable Energy, Denmark

- **PO.179** Wake Investigations at Projects Subject to Forced Curtailments, **Holly Hughes**, DNV Renewables (USA) Inc., United States
- **PO.180** CFD simulations of the MEXICO wind turbine & wind tunnel, **Pierre-Elouan Réthoré**, Risø DTU, Denmark
- **PO.181** Direct measurement of wind turbine wakes using remote sensing, **Peter Clive**, SgurrEnergy Ltd, United Kingdom

Siting in complex terrains and forested areas

- **PO.182** Inflow angles in complex terrain: is it possible to accurately predict them in a wind farm site? **Catherine Meissner** Pacific Hydro, Australia
- **PO.183** Characterising Terrain Complexity, **Peter Clive** SgurrEnergy Ltd, United Kingdom
- **PO.184** Impact of Shear, Swirl and Yaw on Wind Turbine Performance, **Samira Jafari** Laboratory for Energy Conversion, ETH Zurich, Switzerland
- **PO.185** Wind energy in forested areas, **Peter Herbert Meier** TÜV SÜD Industrie Service GmbH, Germany
- **PO.186** Downscaling the wind energy resource in Complex terrain using coupled mesoscale and microscale models, **Venkatesh Duraisamy jothiprakasham** EDF, France
- **PO.187** Site calibration in complex terrain with lidar, **Paula Gómez** CENER, Spain
- **PO.188** Reduction in uncertainty of wind farm production estimates using the windie cfd code and mesoscale simulations over complex forested terrain, **Ricardo Guedes** Megajoule, Portugal
- **PO.189** GIS enabled decision support system for IEC 61400-12-1 reference meteorological mast siting, **José Carlos Matos** INEGI, Portugal
- **PO.190** Methods for Correcting Remote Sensing Measurements in Complex Flow Conditions, **Mark Young** DNV, United States
- **PO.191** Exploring several turbulent closure methods for simulating forest winds in complex terrain, **ilda albuquerque** crest-garrad hassan, United Kingdom
- **PO.192** An approach to power curve with lidar in complex terrain, **Paula Gómez** CENER, Spain
- **PO.193** Wind atlas of belgrade region, **Zeljko Djuric** University of Belgrade, Faculty of Electrical Engineering, Serbia
- **PO.194** Experimental assessment of the mast shadowing effect on wind speed measurements, **Amandio Ferreira** INEGI, Portugal
- **PO.196** Correction of Lidar remote sensing measurements by CFD simulations, **Catherine Meissner** Pacific Hydro, Australia
- **PO.197** On Proper Wind Tunnel Simulation of Turbulent Atmospheric Flow over Hills, **Graciana Petersen** University of Hamburg, Klima Campus, Germany
- **PO.198** Towards consistent high quality IEC 61400-1 site suitability assessments, **Lasse Svenningsen** EMD International A/S, Denmark

- **PO.199** Constraint based park optimization using dynamic wake model: A new optimization approach, **Catherine Meissner** Pacific Hydro, Australia
- **PO.200** WAsP and complex terrain corrections the whole story, **Wiebke Langreder** Suzlon Energy A/S, Denmark
- **PO.201** Mitigation of Bias and Uncertainty of Lidar Measurements in Complex Terrain, **Matthieu Boquet** LEOSPHERE SAS, France
- **PO.202** Simulating the flow conditions over complex terrain with rans models: sensitivity to a selection of parameters including atmospheric stability, **Christiane Montavon** ANSYS UK Ltd, United Kingdom
- **PO.203** 2nd generation Lidar techniques in complex forested terrain, **Peter Clive** SgurrEnergy Ltd, United Kingdom
- **PO.205** Wind Sector Management & #8211; also to be understood as Design Tool, **Dr. Patric Kleineidam** Lahmeyer International GmbH, Germany
- **PO.206** Measurement of Secondary Wind Characteristics by the WINDCUBE® LIDAR, **Matthieu Boquet** LEOSPHERE SAS, France
- **PO.207** Advances in CFD Forest Modeling in Wind Resource Assessment, **Catherine Meissner** Pacific Hydro, Australia
- **PO.209** LIDAR Validation in Complex Terrain, **Lars Landberg** GL Garrad Hassan, United Kingdom
- **PO.210** Effects of varying atmospheric stratification on vertical wind profile and energy yield prediction in complex terrain sites, **Carolin Schmitt** Theolia, Germany
- **PO.211** Vertical extrapolation of turbulence in forests **Wiebke Langreder** Suzlon Wind Energy A/S, Denmark
- **PO.212** Siting guidelines and wind resource assessment methodologies for small to medium sized wind turbines: case studies on farms in Belgium, **Nicolaz Guidon** 3E, Belgium

Offshore wind siting

- **PO.214** Offshore Wind Farm Design using Geographical Information System, **Ignacio Marti** CENER - Centro Nacional de Energias Reno, Spain
- **PO.215** Update Offshore Wind Atlas of the Dutch part of the North Sea, **A.J. Brand** ECN, The Netherlands
- **PO.216** The Design of Offshore Wind Farm Using WindPRO, **MoonSeon Jeong** Mokpo national University, Korea, Republic of
- **PO.218** Forecasting of offshore boundary layer conditions using high resolution WRF-PBL schemes for wind energy applications. Validation at FINO1 mast, **Domingo Muñoz-Esparza** von Karman Institute for Fluid Dynamics, Belgium

Prediction systems

- **PO.219** Meteorological Downscaling for Cost-Efficient Wind Resources Assessments, **Christophe Periard** Météo-France, France
- **PO.220** Evaluation of wind ramp forecasts from a rapid-update dynamical-statistical ramp prediction system, **John Zack** AWS Truepower, United States of America
- **PO.221** Proposal and validation of an analogous downscaling methodology for gust wind speed prediction over Iberia, **Álvaro Pascual** UCM, Spain
- **PO.223** New perspectives on synthetic winddata generation: validation of WRF derived long-term hourly time series, **Pep Moreno** Vortex, Spain
- **PO.224** Improving physical wind power forecasts with recurrent neural networks, **Anton Kaifel** ZSW, Germany
- **PO.225** Wind speed prediction using six metrological parameters with PNN, **Haniyeh Razzaghi** Material & Energy Research Center, Iran, Islamic Republic of
- **PO.226** Wind Power predictability an important factor in the planning and operation phases of Wind Generation Turbines, **Jesper Thiesen** ConWx ApS, Denmark
- **PO.227** Wind power forecasting in challenging climate conditions: The case of Guadeloupe Islands, **Stephanie Monjoly** Geosciences and Energy Laboratory - Université des Antilles et de la Guyane, France
- **PO.228** Functional data analysis applied to the problem of wind farm aggregation, **Javier Sanz** CENER - Centro Nacional de Energias Reno, Spain
- **PO.229** The Met Office - Virtual Met Mast An advanced wind-energy site-screening tool to assess the feasibility of potential wind farm sites. The tool provides virtual wind climatological data for periods of up to several decades for both onshore and offshore sites. Example results are presented for a range of proposed wind farm sites across the UK, **Stephen Norman** Met Office, United Kingdom
- **PO.231** The real-time wind power prediction system based on Smart-Grid in Jeju island, South Korea, **Youngmi Lee** ECO Brain CO, Ltd., Korea, Republic of
- **PO.232** Long term wind resource assessment by means of multivariate cross-correlation analysis, **Dario Patane** EREDA, Spain
- **PO.233** Visualizing and optimizing the reliability of ensemble prediction systems, **Jan Dobschinski** Fraunhofer IWES, Germany
- **PO.234** Probability Forecasts for Power Production, Wind Speed and Wind Direction, using Refined Ensemble Prediction Output, **Dirk Malda** MeteoGroup, United Kingdom
- **PO.235** A Study on Uncertainty Reduction of the Long Term Wind Resources by the Complementary MCP (Measure-Correlate-Predict) Technique, **Ki-Yong Oh** KEPKO Research Institute, Korea, Republic of

TECHNOLOGY

Aerodynamics and aeroelasticity

- **PO.237** Numerical study on the efficiency between the ducted and the free stream rotor of a horizontal axis wind turbine, **Costin Ioan Cosoiu** Technical University of Civil Engineering of Bucharest, Romania
- **PO.238** Pursuing the finest aerodynamic blade design, **Mario Jiménez de Lago** Gamesa Innovation & Technology, Spain
- **PO.239** Experimental studies on a rotor for complex terrain, **Yasunari Kamada** Mie University, Japan
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Active and passive load alleviation, distributed or embedded blade control

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Reliability, operation and maintenance, on- and/or offshore

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- **PO.495** Power smoothing of DFIG wind turbines with flywheel, **Francisco Díaz-González** IREC, Spain
- **PO.496** Modelling of a WTGS and validation with field test data, **Lluís Trilla** IREC, Spain
- **PO.497** Comparison of a Doubly-fed Induction Generator dynamic model using simulation tools for Wind Turbine transient studies, **Antonio-Jesús Pujante-López** Universidad de Castilla-La-Mancha, Spain

Small wind turbines, urban wind turbines, wind-diesel

- **PO.499** Voltage variation in electric lines with fixed speed small wind turbines, **Ramon Velo** University of Santiago de Compostela, Spain

Innovative concepts

- **PO.500** Power extraction efficiency analysis of a multi turbine offshore wind farm connected to a single power converter, **Mikel De Prada** IREC, Spain

The host market showcases its potential

Tuesday 15 March 09:30 - 17:30 followed by a networking reception

The Belgian Day is organised by ODE (Organisatie Duurzame Energie) Vlaanderen and the Walloon renewable energy association, EDORA. This one day event will offer participants new insights into the latest wind energy trends in the Belgian market and the future of the grid system.

The Belgian Day conference offers unrivalled networking opportunities with Belgium's leading industry players. In addition, both ODE Vlaanderen and EDORA will be present at the exhibition, at stand 12180, Hall 12.

EWEA 2011 conference delegates have free access to this event, however pre-registration is required. If you have not pre-registered but would like to attend, please visit the ODE/EDORA stand 12180 in Hall 12.

Please note this event will be conducted in English. Interpretation will not be provided.

Belgian Day programme

Time	Tuesday, 15 March 2011	
09:30	Welcome coffee (Restaurant, Level 1; Hall 11)	
10:00	Belgian wind energy market	Introduction (Restaurant, Level 1; Hall 11)
10:15		Meet the Belgian companies on the exhibition floor – guided tour
11:45	Lunch / Exhibition visit	
14:00	Conference welcome (Room 1121, Hall 11)	
14:10	Belgian wind energy status	Belgian onshore and offshore wind energy: status, constraints, targets & potentials EDORA / ODE
14:30		Government's vision on wind energy in Belgium Freya Van den Bossche - Flemish Minister of Energy Jean-Marc Nollet - Walloon Minister of Energy
15:00		Belgian value chain and employment potential Cédric Brüll - cluster Tweed Jan Declercq – Agoria Renewable Energy Club
15:30	Coffee Break	
16:00	Panel: Future Grid	The offshore and onshore grid reinforcements and adaptations required to allow ambitious middle- and long-term wind energy integration Marie-Pierre Fauconnier - Federal Administration Daniel Dobbeni - CEO of ELIA Achim Woyte - 3E Eckehard Tröster - Energynautics
17:20		Final conclusions
17:30	Reception & Networking Event	

Wind energy in Belgium

Belgium currently has more than 900 MW of installed wind energy capacity. The Walloon region leads with installed capacity of 442 MW onshore, while Flanders has 264 MW onshore. In terms of offshore wind energy, 195 MW are operational in the North Sea. Belgium needs to source 13% of its energy from renewables by 2020.

According to a recent study conducted by both EDORA and ODE, renewables could feasibly provide 16 to 18% of gross final energy consumption in Belgium. The 2020 targets for

wind energy have been set at 1,500 MW in Flanders, 2,000 MW in Wallonia and 2,825 MW in the Belgian North Sea Area, collectively producing 16.7 TWh/y by 2020.

If these targets are met, wind energy would provide more than 50% of Belgium's electricity from renewable sources, corresponding to about 15% of the projected electricity consumption in Belgium by 2020. Don't miss your chance to learn more about Belgium's leading wind industry players at EWEA 2011.



Organised by



In cooperation with



WORKSHOPS

Workshops are open to all registered conference delegates, exhibitors and exhibition visitors. All workshops take place in Hall 11. Please see individual workshop entries for the relevant room, and see the venue plan on page 81 for their location

TPWind & EWI

Funding wind energy R&D in Europe

Monday, 14 March

16:00 – 17:30

Room 1122



The European Wind Initiative (EWI) is a long-term, large-scale programme for funding wind energy R&D in Europe, and is rooted in the Commission's Strategic Energy Technology Plan (SET-Plan). With a total budget of €6bn for the 2010 – 2020 period, and with all relevant EU and national instruments contributing to its funding, the EWI is one of the most important instruments for the support of wind energy. The EWI was developed and is being implemented by the European Wind Energy Technology Platform (TPWind), in cooperation with EU Institutions and Member States. This event will provide participants with an update on TPWind, as well as a detailed overview of the objectives, contents and implementing mechanisms of the EWI.

TWENTIES

Large-scale integration of wind power

Tuesday, 15 March

11:00 – 13:00

Room 1101A



TWENTIES, an EU-funded project, uses six demonstrations to examine barriers to accommodating the amount of wind energy required to reach the EU's 2020 targets. Demonstrations address:

- system services (voltage and frequency) provided by wind farms
- the feasibility of Virtual Power Plants combining wind farm operations and flexible generation and loads
- increased grid flexibility (including power flow control devices and dynamic line rating)
- configurations and critical components for secure offshore meshed networks
- strategies for balancing large offshore shut downs under stormy conditions
- streamlined permitting processes of offshore wind farms

This event will update participants on the interim results of each demonstration.

UPWIND

Towards the large wind turbines of tomorrow

Wednesday, 16 March

09:00 – 13:00

Room 1122



UpWind - funded under the EU's Sixth Framework Program (FP6) - looks towards the wind power of tomorrow. Consisting of 15 scientific and integrated work packages, it investigates the design of very large wind turbines (over 10MW), for both onshore and offshore.

The areas covered in this event will include:

- results from research looking into upscaling to 20 MW
- an overview of the aerodynamic and aeroelastic research fields
- the latest developments in lidars
- an overview of the material research relevant to the design of wind turbine blades
- the latest findings of the overall project
- an overview of EU Commission initiatives and reflections on the future development of EU wind energy research and development programs

WORKSHOPS

ORECCA

The future of offshore renewables

Wednesday, 16 March

11:00 – 12:30

Room 1101A



A common approach for the exploitation of wind, wave, tidal and other ocean energy resources has the potential to accelerate the development of offshore renewables and reduce their cost. The Offshore Renewable Energy Conversion Platforms – Coordination Action (www.ORECCA.eu) aims to overcome knowledge fragmentation in Europe, with a focus on platform designs and technologies including supply chain issues. This workshop seeks to establish a common offshore renewables roadmap for Europe. Key experts are invited to provide their input to industry, research organizations and policy makers on the necessary steps to foster the development of the offshore renewables sector in a sustainable and environmentally friendly way.

SEANERGY 2020

Planning for offshore RES in the North Sea

Wednesday, 16 March

14:00 – 18:00

Room 1101A



What is SEANERGY 2020?

SEANERGY 2020 is an IEE-funded project to create and promote policy recommendations on how to best deal with maritime spatial planning (MSP) and remove MSP obstacles to the deployment of offshore power generation.

Why attend the North Sea regional workshop?

MSP is a decisive factor in the better deployment of offshore RES in the North Sea. Through presentations and interactive discussions, this workshop addresses the specific concerns of MSP in this area.

Who should attend?

MSP authorities (including planners, regulators, TSOs, project developers and utilities) and interest groups involved in MSP (including shipping and maritime transport organisations, fishing associations, environmental NGOs, researchers and other stakeholders).

SIDE EVENTS

Unless otherwise stated, side events are open to all registered conference delegates, exhibitors and exhibition visitors. All on-site side events take place in Hall 11. Please see individual side event entries for the relevant room, and see the venue plan on page 81 for their location

Wind farm flow and control

Aeolus: modelling and control of large offshore wind farms

Monday, 14 March

13:30 – 15:30

Room 1101A



Wind farms are expected to operate like other plants and to deliver quality power at the lowest cost. To this end, a new generation of wind farm control solutions has been developed in the FP7/ICT project Aeolus. The Aeolus side event is aimed at those involved in designing, developing or operating large offshore wind farms, and control engineers active in wind farm control. The side event provides participants with an overview of a new generation of wind farm flow models and wind farm control models. In addition, the Aeolus wind farm control solutions will be demonstrated to participants.

WINDSPEED Project – final dissemination workshop

A 2030 roadmap to offshore wind deployment in the Central and Southern North Sea

Tuesday, 15 March

14:00 – 18:00

Room 1122



The WINDSPEED project, funded under Intelligent Energy Europe, has developed a roadmap for the deployment of offshore wind energy in the Central and Southern North Sea in the period 2020 - 2030. This workshop will present the final roadmap, including development pathways for offshore wind energy in the North Sea basin for a number of different development perspectives. The workshop will be of interest to European and national policy makers, as well as policy makers from other disciplines such as spatial planning, grid infrastructure, sea traffic, environment and fisheries. It is also of great relevance to transmission system operators, energy utilities, and wind farm developers.

Improving turbine reliability

Optimising design, operation and maintenance for new generations of wind energy systems - EU FP7 ReliaWind research results

Tuesday, 15 March

14:00 – 18:00

Room 1101A



ReliaWind is an EU FP7 project under Theme 5 Energy, with a total budget of €7.7 million and the participation of 10 partners. The main objective was to lead the development of a new generation of efficient and reliable wind turbines, and to provide practical results for the industry to improve wind turbine design, operation and maintenance.

This event presents the ReliaWind project's exciting outcomes:

- Empirical analysis of wind turbine reliability
- Design for reliability
- Logical architecture of advanced wind turbine health monitoring systems
- Condition based maintenance tools for wind turbines
- Standardisation of reliability-originated design and maintenance

SIDE EVENTS



Project finance & development

Networking cocktail & dinner

Tuesday, 15 March

20:00 – 00:00

3E Headquarters, Kalkkaai 6 Quai à la chaux, 1000 Brussels

An informal discussion on current challenges in project financing and recent developments in offshore wind, with keynote addresses by:
Frank Coenen (CEO, Belwind)
Filip Martens (CEO, C-Power)
Please note this is an invitation-only event. Visit the 3E stand (11520) for more information and to register.

IEAWIND

A summary of international collaboration on wind energy R&D tasks

Wednesday, 16 March

09:00 – 15:30

Room 1121



This event consists of three sessions that give an overview on the international research collaboration tasks ongoing at the International Energy Agency (IEA) Implementing Agreement on Wind Energy. Each task involves collaboration from 8-15 countries working on different topics on wind energy.
9:00 - 10:30: Increasing social acceptance and estimating the cost and value of wind power
11:00 – 12:30: Research on cold climate, aerodynamics and offshore
14:00 – 15:30: Grid integration Task 25 session – 'Methodologies to estimate wind power impacts to power systems'

Wind turbine drivetrain innovations and product development

Wednesday, 16 March

14:00 – 18:00

Room 1102A



This seminar aims to provide an insight into the full product development life-cycle processes, new technologies and advanced product innovation that will help in reducing the cost and increasing the reliability of energy derived from wind power.

Along with guest speakers, Ricardo will present on the following topics:

- Product development processes
- Advanced drivetrain solutions
- Component innovation
- Gearbox design and development approaches
- The increasing role of drivetrain test rigs

The seminar is directed towards all those involved in designing and developing next generation wind turbine drivetrains, and those who want to understand how such improvements will increase confidence in turbine reliability and therefore the robustness of their business case.

SIDE EVENTS

Fresh wind in the French regulatory framework

Challenges and opportunities for the wind energy sector

Wednesday, 16 March

14:00 – 16:00

Room 1122



Bureau de coordination énergies renouvelables
Koordinierungsstelle Erneuerbare Energien

France currently has 5,660 MW of installed wind power, while it has set targets to extend this capacity to 19,000 MW onshore and 6,000 MW offshore by 2020. France therefore offers great opportunities for the wind power sector.

This event will provide participants with an overview of the new regulatory framework under “Grenelle II” laws. Particular attention will be paid to two aspects of this framework:

- the flat-rate taxation applied to companies connected to the power grid (IFER)
- regional schemes (schémas régionaux)

Presentations will be given by lawyers specialised in energy law and renewable energies, as well as by regional decision-makers. The event is highly relevant for all those interested in the wind energy sector in France.

WINDUSTRY France

A bottom-up approach to structuring the French wind power industry

Wednesday, 16 March

16:00 – 18:00

Room 1122



WINDUSTRY France was created at the beginning of 2010 and includes more than 300 French wind energy industrial stakeholders. The Syndicate for Renewable Energies (SER) and the French Wind Energy Association (FEE) have organised this networking event to bring together those companies already working in the wind energy industry in France, with those looking to enter the industry from other areas such as aeronautics, automotive, or engineering. Discussions and presentations will highlight the achievements to date in diversifying French industry in regards to wind energy.

The event will be followed by a small reception.

Further information is available from the SER/FEE stand (11511).

EU offshore wind industry – a Carbon Trust/EWEA event

Technology developments and R&D landscape

Wednesday, 16 March

16:00 – 18:00

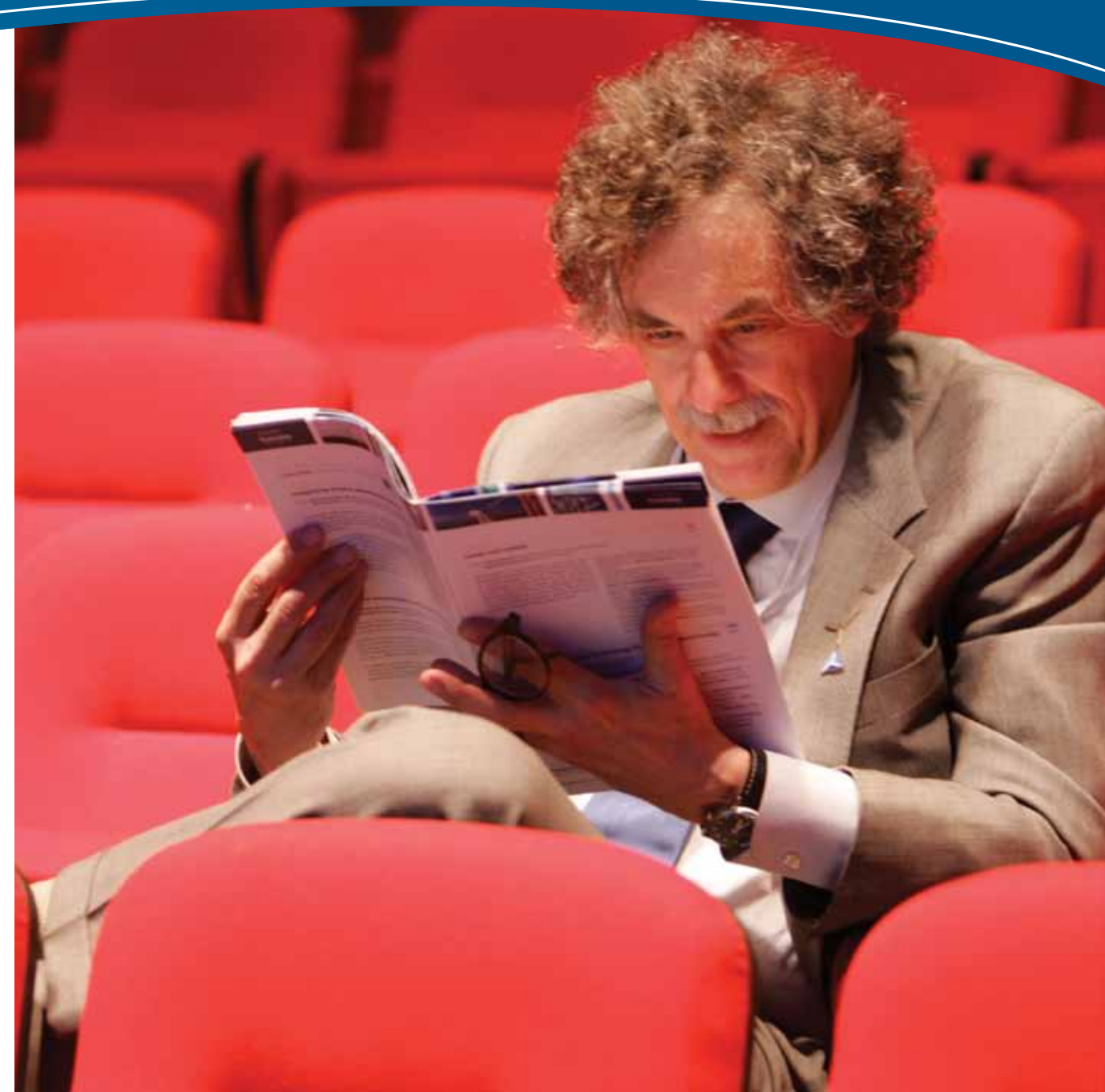
Room 1121



EWEA and the Carbon Trust present an overview of the R&D activity in offshore wind, and the main technology developments to date.

With over 30 R&D programmes underway across the EU, this event will offer an overview of the R&D landscape. Attendees will be introduced to three leading research initiatives and will have the opportunity to discuss potential synergies and research gaps. The event will close with a panel discussion and Q&A, including input from leading offshore wind developers.

This event will be of great interest to those involved in the offshore wind industry and wider research community, particularly those looking to become involved in R&D activities.



USEFUL INFORMATION

Practical information,
relaxation area, social events,
sustainability

Practical Information

Event venue

Brussels Exhibition Centre (Brussels Expo)

Place de Belgique 1
BE – 1020 Brussels
www.bruxpo.be

Metro station: Heysel

► Accommodation

For last-minute hotel bookings or changes to existing bookings made via the EWEA 2011 secretariat, please go to the hotel and information desk in the registration area.

► Badges

All participants are requested to wear their badges throughout the event. Badges are marked according to the type of pass purchased, and participants will not be admitted to the conference or exhibition without their badge. You may also be required to show your badge at some social events.

Should you lose your badge, please go to the registration area for assistance.

► Brussels

If you would like to extend your stay, or require more information about the city, the Brussels Tourist Information office offers information in several languages: www.brusselsinternational.be, + 32 2 513 89 40.

Offices can be found at:

- Hôtel de Ville de Bruxelles, GrandPlace, 1000 Brussels
- Bruxelles Info Place (BIP), Rue Royale 2, 1000 Brussels

Further information is also available from the Brussels Convention Bureau stand, located in the Registration Area, in Hall 10

► Catering

Welcome coffee

08:00 – 09:00 every morning in the Poster Area

Coffee breaks

In the catering areas:

10:30 – 11:00 Tuesday, Wednesday and Thursday
15:30 – 16:00 Monday, Tuesday and Wednesday

Buffet lunch

In the catering areas:
12:30 - 14:00 every day (only available to conference delegates and staff from exhibitor companies)

► *see the venue plan on page 81 and the exhibition floor plans on pages 70-75 for the location of the catering areas*

Please note that for those participants not entitled to the buffet lunch, it is possible to buy lunch and snacks onsite. Water is freely available throughout the venue.

► Cloakroom and luggage facility

There are two cloakrooms available free of charge in Hall 10 and Hall 11.

► *see the venue plan on page 81 for their locations*

► Commercial opening hours in

Brussels

Banks: banks in Belgium are generally open from Monday to Friday from 09:00 to 16:00.
Shops: open from 09:00 to 17:00 except on Sunday; some close between 12:00 and 14:00.

► Currency and credit cards

The unit of currency in Belgium is the EURO. Current exchange rates can be found at www.xe.com/ucc. Cashpoints are widely available throughout the city. There is a cashpoint located outside the venue near Hall 2. All major credit cards are widely accepted throughout Brussels in shops, restaurants, hotels, etc. Foreign exchange facilities can be found at the airport, railway station and major banks.

Theft/loss of credit card

Eurocard-Mastercard: + 32 2 205 85 85
Visa: +32 2 205 85 85 – 0800 1 8397
Diner's-Club: + 32 2 205 85 85 – +32 2 626 50 04
American Express: +32 2 541 92 22

► Emergencies

Fire brigade and emergency medical care: 100
Federal Police: 101
European Emergency: 112
Emergency doctor: +32 2 479 18 18
Anti-poison Centre: +32 70 245 245
Red Cross: 115
Information: - national: 1307 and 1234 (automatic) and - international: 1304

► Exhibition opening hours

The exhibition is open during the following times:

Monday: 10:00 - 18:00

with Hansen/CG Power beer reception from 17:00 to 18:00

Tuesday: 09:00 - 19:00

with exhibition reception sponsored by Gamesa from 17:30 to 19:00

Wednesday: 09:00 - 18:00

with WinWinD 3 product launch reception and EWEA networking event from 17:00 to 18:00

Thursday: 09:00 - 16:00

► Internet

A cyber café is available in Hall 12 which provides internet access and printing facilities. Free wireless is also available to all participants throughout the venue.

► *see the floor plan on pages 74-75 for the location of the cyber café*

► Language

The conference language, including all presentations, is English.

► Lost and found

At the venue

For any items lost or found whilst in the venue, please visit the registration area (located in Hall 10) or the organiser's office (located in Hall 11).

On public transport

Lost objects office: Avenue de la Toison d'Or 15, 1050 Brussels
+32 2 515 23 94

Practical Information

On the street

Central Division : Rue du Marché au Charbon 30, 1000 Brussels
+32 2 279 79 79

► Meeting rooms

If you reserved a meeting room and have any queries, please contact Aleksandra Nowak:
+32 2 213 18 00, anw@ewea.org.

► Mobile app

This year, a customised mobile app will be offered, free of charge, to all EWEA 2011 participants. It includes useful information such as the conference programme, exhibitor list and exhibition floor plans. The service is optimised for i-phone / Android use but is also available for all other smart phones (via a mobile website).
Download the EWEA Mobile App on the EWEA 2011 website: www.ewec2011.info

► Organiser's office

This is located at the entrance of Hall 11

► Poster session

A dedicated poster session will take place on Wednesday 16 November at 16:00 in the Poster Area (located in Hall 10 and foyer of Auditorium 2000).

► *see pages 26-37 for a full list of poster presentations*

► Proceedings

The proceedings of the conference, including all relevant information, papers, presentations and photos are available via the proceedings website, which is updated daily. The link to the website will be sent by email to all conference delegates during and shortly after the conference.

For more information about the proceedings, please contact Louise Lilja: lli@ewea.org, +32 2 213 18 26

Practical Information

► Press

A press conference is scheduled immediately after the opening session on Monday 14 March at 12:00 in the Press Room, in Hall 10, Level 1.

A fully-equipped press room is at the disposal of journalists throughout the event in Hall 10, Level 1. Computers, refreshments, background information and press packs will be available.

For press queries please contact Peter Sennekamp: pse@ewea.org, +32 2 213 18 3

► see the venue plan on page 81 for the location of the press room

► Speakers and session chairs

The Speakers' Room (located in Hall 11) is available to all speakers who wish to work on or upload their presentations. Staff are on hand to assist with any queries from speakers or session chairs.

Speaker briefings will take place in the Speakers' Room on the day of your session at the following times:

Morning sessions (starting at 9:00 & 11:00) - briefing takes place at **8:30**

Afternoon sessions (starting at 14:00 & 16:00) - briefing takes place at **13:30**

All session chairs and speakers must be present at the briefing.

The Speakers' Room is open during the following times:

Sunday, 13 March	14:00 – 18:00
Monday, 14 March, Tuesday, 15 March and Wednesday, 16 March	08:00 – 18:00
Thursday, 17 March	08:00 – 15:30

► Telephone

The international access code for Belgium is +32. Remove the '0' from the city/area code when dialling internationally. The city/area code for Brussels is 02. We request that all conference delegates put their mobile phones on silent mode during all conference sessions.

► Travel and transport

How to get to Brussels Expo:

By Metro

From Brussels Midi station, take Metro line 6, direction Roi Baudouin. Get off at Heysel. This journey takes about 15 minutes.

From Brussels Central Station, take Metro line 5, direction Erasme. Change at Beekkant and take line 6, direction Roi Baudouin. Get off at Heysel. This journey takes about 20 minutes.

By tram and bus

The terminus station for trams 23 and 51 is "Heysel". Buses 84 and 88 also stop here.

By taxi

Autolux: +32 2 411 12 21

Taxis Bleus: +32 2 268 00 00

Taxis Orange: +32 2 349 43 43

Taxis Verts: +32 2 349 49 49

Free public transport tickets

Brussels Convention Bureau has kindly sponsored 3,000 free 4-day public transport tickets, valid for the metro, tram and bus. Tickets are available on a first-come, first-served basis from the Convention Bureau stand in the Registration Area, Hall 10. This initiative is part of EWEA's commitment to improving the sustainability of its events and provides EWEA 2011 participants with quick, reliable connections to the city centre and major transport hubs.

Relaxation Area

Inner Sense will provide a massage corner in the relaxation area during the 4 days of the event.

- We recommend arranging an appointment to secure your massage.
- Appointments can be made by visiting the relaxation area, and will be taken for the same day only.

You can also start the day by joining a Yoga or Tai Chi Qi Gong session.

► see the venue plan on page 81 for the location of the relaxation area

- 09:00 – 09:30, Tuesday 15 March: Morning Energy Boost – Tai Chi Qi Gong
- 09:00 – 09:30, Wednesday 16 March: Morning Energy Boost – Yoga
- 09:00 – 09:30, Thursday 17 March: Morning Energy Boost – Tai Chi Qi Gong

Sponsored by



Morning Energy Boost - Yoga

Begin the conference relaxed and free of tension by joining Inner Sense in their early morning Yoga session. Balance your mind and body through a series of postures and breathing exercises that enhance strength and flexibility, release tension and calm your mind. Finish with a relaxation exercise that will prepare you for a successful and creative day, helping you to focus your mind and channel your energy.

Dress Code: Normal business attire.

Morning Energy Boost – Tai Chi Qi Gong

Start the day energised and relaxed with the ancient art of Tai Chi Qi Gong. It is sometimes considered a form of meditation in motion with its distinctive graceful and flowing movements, combined with deep tranquil breathing. It helps create a sense of centred well being by reducing stress levels, enhancing energy and stimulating concentration for an effective and focused day at the conference.

Dress Code: Normal business attire.



Social Events

Members only reception

Sunday 13 March, 18:00 – 21:00

Venue: Hôtel de Ville de Bruxelles (Brussels Town Hall), Grand Place, 1000 Brussels

Dress code: smart

Step back in time at this exclusive reception at Brussels Town Hall, one of Belgium's finest civic buildings. The foundation stone of the magnificent Gothic edifice was laid in the spring of 1402. In 1695, when the city was bombarded by Marshal de Villeroi, the Town Hall was destroyed by fire, but has since been rebuilt. Its reception rooms and alderman's offices contain magnificent Brussels tapestries from the 16th, 17th and 18th centuries, sumptuous Gothic wooden panelling, the insignia of ancient guilds and paintings from the collections at the Town Hall Museum.

Entrance is strictly reserved to EWEA members and subject to confirmation of invitation. Attendance is limited to two people per member.

Sponsored by :



Hansen/CG Power beer reception

Monday 14 March, 17:00 – 18:00

Location: Hansen Transmissions International NV (11538) & CG Power Systems NV (11530) stands, Hall 11

Belgium is home to the most diverse national collection of quality beer in the world. Participants are invited to join Hansen Transmissions International NV and CG Power Systems Belgium NV and sample some of the best Belgian beers available.

Open to all participants.

Sponsored by: 



Conference reception

Monday 14 March, 19:00 – 21:30

Venue: Brussels Event Brewery (BEB), Rue Delaunoyststraat, 58b/1, 1080 Brussels

Dress code: smart

Brussels Event Brewery is an old bottling plant of the former Bellevue Brewery. The history of the site is intertwined with the family history of Mr. Constant Vanden Stock, a legendary figure in Belgium known as the country's most important brewer of 'Belle-Vue' Gueuze and cherry beer. The Bellevue brewery opened in 1943, and remained operational until 1996.

Join us for a truly Belgian evening!

For more information, including transport arrangements, please see the conference reception invitation ticket. Entrance is reserved for conference delegates.

Sponsored by: 




Social Events

Exhibition reception

Tuesday 15 March, 17:30 – 19:00

Location: catering areas and at Gamesa stand (11232)

Gathering together all participants from both the exhibition floor and conference, the exhibition reception allows everyone to relax with an informal drink at the end of a busy day. With no other activities taking place at the same time, this is the one occasion during the event when everyone is in one place!

Sponsored by: 



WinWinD 3 product launch reception

Wednesday 16 March, 17:00 – 18:00

Location: WinWinD stand (11730), Hall 11

Conference delegates, exhibitors and exhibition visitors are invited to the WinWinD 3 product launch reception to learn more about their latest developments, and to meet others with similar interests over a drink.

Sponsored by: 



EWEA networking event

Wednesday 16 March, 17:00 – 18:00

Location: EWEA stand (11434), Hall 11



Every EWEA staff member plays a part in making this event happen. Come for a drink at our stand to meet us all, and to get more information about our many other activities. While you are there you can also learn more about Copenhagen, the next destination of EWEA Annual Event and also taste some Danish specialties!

Supported by: 



Conference dinner

Wednesday 16 March, 19:30 – 23:00

Location: Tour & Taxis, Avenue du Port 86c, 1000 Brussels

Dress code: formal

EWEA Annual Events' conference dinners have gained an impressive reputation over the years, and the 2011 edition will be no exception. This year's venue, Tour & Taxis, is a jewel of industrial architecture and was once a major transshipment centre. Around 600 guests will be present at this elegant gathering. Not only will you be able to spend time talking to those seated around you over an excellent meal, but you will also enjoy some inspiring entertainment.

This event is open to ticket holders only. For more information, including transport arrangements and dress code, please see the dinner ticket. If you have not already purchased a ticket, please enquire at the registration desks.



Sustainability

DID YOU KNOW...

...that EWEA has taken a number of actions to try to minimise the environmental impact of EWEA 2011?

- ▶ EWEA has put a **waste management process** in place for exhibitors to recycle as much as possible during build up and break down. EWEA's waste diversion target for EWEA2011 is 30% of total event waste.
- ▶ 100% of the **carpet** will be recycled after the event.
- ▶ Each official **hotel** was given a 'green score' based on a survey undertaken by EWEA, which assessed their level of commitment to responsible business practices. This enabled participants to consider sustainability when selecting their hotel.
- ▶ The **EWEA stand** has been designed using modular units to allow us to reuse it at future events.
- ▶ The shell scheme of all **full service stands** will be reused and recycled at other events by Melville (EWEA2011 stand constructor).
- ▶ EWEA required the **caterer** to: ensure a vegetarian option is available for all meals, serve condiments in bulk to reduce packaging waste, provide reusable equipment, select fair trade products, use local food where possible, and collaborate with local charities to donate any leftover food.
- ▶ EWEA, together with the CVB (Brussels Convention Bureau), secured free **public transport tickets** to encourage the use of public transport.
- ▶ All **banners** will be recycled after the event.
- ▶ EWEA chooses **environmentally friendly items**, wherever possible, such as lanyards made from bamboo, bags made from post-consumer plastic bottles, pens made from wood powder and corn starch, etc.
- ▶ All EWEA printed materials are printed on **FSC certified paper** (Forest Stewardship Council).
- ▶ EWEA has heavily reduced the number of **bag inserts** to reduce the amount of paper used and now offers electronic inserts instead.
- ▶ EWEA supports the work of **Renewable World** (formerly the Koru Foundation) with a donation of €1 per participant. This donation will be put towards a wind energy project in the developing world. To learn more about the project, visit Renewable World at the EWEA stand (11434). Match our efforts by making your own donation: www.renewable-world.org

...how we measure our performance?

Before, during and after the event, our actions are independently audited and the results are detailed in a **Sustainable Event Assessment report**, which evaluates our performance and suggests improvements. The report will be made available online following the event once all the necessary data has been collected, analysed and compiled.

For more information, please contact Luisa Coll, lco@ewea.org



THANK YOU

Supporting organisations,
committees, secretariat,
sponsors and partners

Supporting Organisations



“EWEA’s Annual Event is the major meeting for the European wind energy market, connecting the key players together: corporate leaders, investors, financiers, policy makers and scientists. It represents a unique combination of business opportunities, technical discussions, political debates and networking. For EWEA 2011, Brussels is a strategic place to promote the growth of the wind energy sector in Europe, and will make a crucial contribution to the implementation of EU objectives on renewable energy production.”

Michel Helbig de Balzac, President, Edora, Fédération de l’Energie d’Origine Renouvelable et Alternative (Renewable and Alternative Energy Federation), Belgium



EWEA 2011 gathers wind professionals together in the heart of Europe. They will confirm the ambition of the wind energy industry to deliver a vast amount of Europe’s power needs. Wind is the primary energy source we can count on. The extensive use of wind energy preserves our economical development, strengthens job creation and delivers affordable energy for all.

Chris Derde, President, ODE - Organisatie Duurzame Energie (Organisation for Renewable Energy), Flanders, Belgium

Thank you to the following organisations for their support of EWEA 2011

European Commission

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Mita-Teknik	7220	PP Techniq ApS	12142	SPX Hydraulic Technologies	12140	Weir Yes	12370
MLS Intelligent Control Dynamics (DUPE)	12370	PRENECON S.A. (Prime Energy Constructions)	7116	SSB Wind Systems GmbH & Co. KG	7519	WES	7730
Moog	7428	Province of Flevoland	7740	SSP Technology A/S	7220	Western Constructions - Western Shipyard Group	7118
Mott MacDonald	7052	Province of North-Holland	7630/7652/7730/7740	State of North Carolina	12239	Wilmers Messtechnik GmbH	11500
Moventas	11130	Prysmian Cables & Systems	12058	STEGO Norden AB	7120	Wind Energy Lorraine	11511
MSC Software	12342	RAD Torque Systems	11750	STEX	11511	Wind Prospect Ltd	11128
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MTS Sensor Technologie GmbH & Co KG	11629	Rautaruukki Oyj / Wind towers	12030	StormGeo AS	12059	Wind&Regen	11500
MTS Systems Corporation	11629	Raycap SA	7110	Stromag WEP	12240	WIND-consult GmbH	12379
National Instruments Belgium	12052	Recharge	11914	STX Windpower BV	7640	Windfair.net	7218
Natural Power	11138	ReDriven Power Inc.	12288	Sumitomo Corp. Europe Ltd	11651	windhunter - serwis sp. z o. o.	11238
Neorem Magnets Oy	11140	Relight SRL	11340	Sun & Wind Energy	12366	WINDnovation Engineering Solutions GmbH	11150
NETZSCH Mohnopumpen GmbH	11829	REM Surface Engineering	7101	SunMedia Verlags GmbH	11916	Windpower Monthly	
new energy / neue energie	12469	Remtech	12138	Svendborg Brakes A/S	7120	Windreich AG	12040
Nexans	12371	Renewable Energy World	12368	SWEG - Elsewedy for Wind Energy Generation S.A.E.	11240	Windro / Taechang NET	11837
NGenTec Limited	11911	Renovatio	7419	Symmetron	11930	WindSim A/S	11551
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NHN Development Company Holland North	7740	RES Group	7240	Team Humber Marine Alliance	11450	windtest grevenbroich GmbH	11701
Ningbo Ginlong Technologies Co Ltd	11236	ReStore Energy Systems / Division of Exide Tech	7352	Tecnoaranda	12370	Windurance	7301
Nordex SE	11420	Rexel Hungary LLC-Gexpro Services	7300	Teknoware Oy	12388	WINDUSTRY France	11511
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North Dakota Department of Commerce	12189	Risør DTU	7453	Telvent	12035	WinWinD	11730
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NRG Systems, Inc.	7241	ROLLIX	11511	TER LINDEN Transport and Craning BV	7652	WKN Windkraft Nord AG	7311
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NUMECA International	12241	RSA Insurance Group	7601	The Switch	11818	wpd think energy GmbH & Co KG	11429
OBSTA	12031	RWE Innogy GmbH	12070	TNO	7630	XEMC Darwind BV	7740
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Offshore Wind magazine	12492	Sander + Partner	7650	Tractebel Engineering SA	12020	Zhangjiangang Sanlin Flange Rorging Co Ltd	12065
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Oldbaum Services Ltd	11911	Sarens NV	12169				
Olympus Industrial	7200	SAS CTE	11206				

HALL 7

EWEA 2011
Job Board



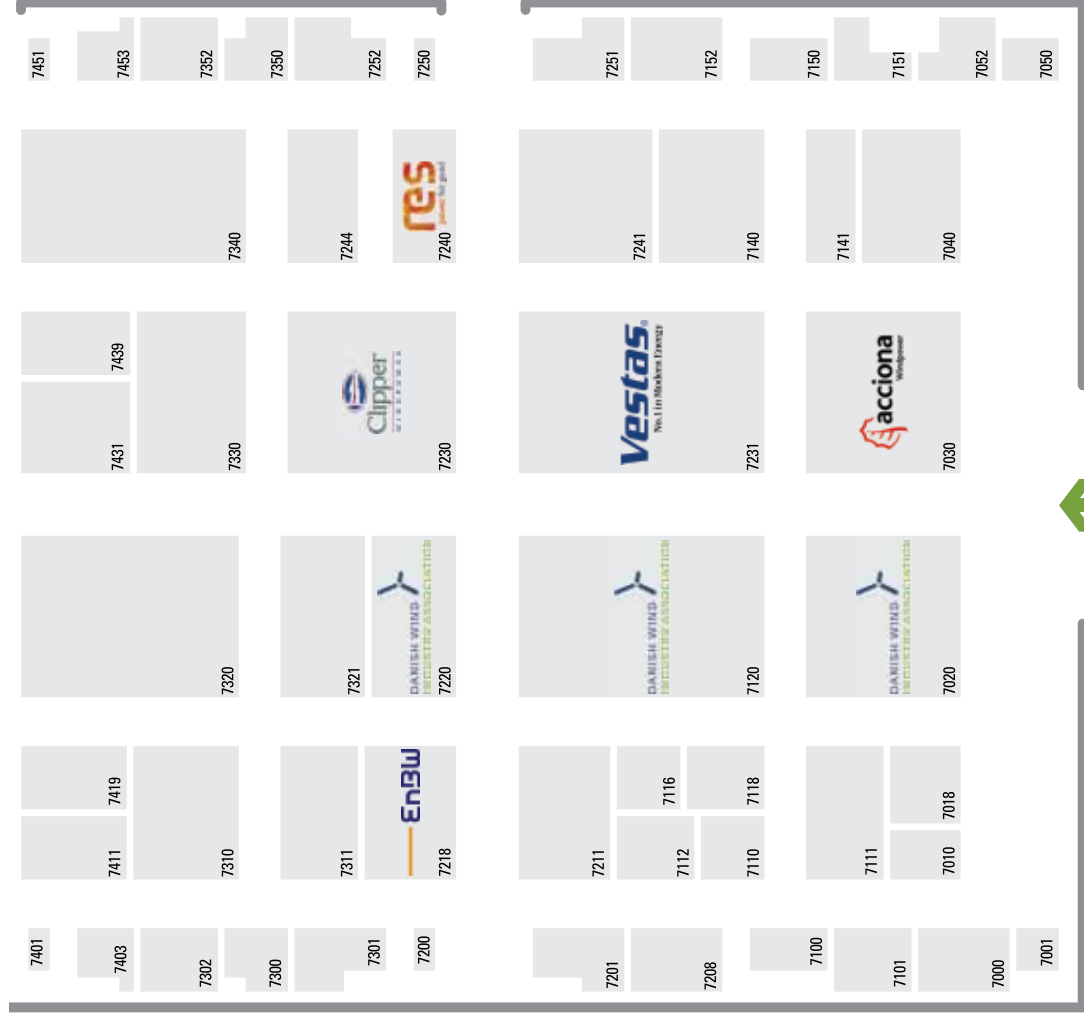
**Coffee Break
& Lunch Area**
(Conference delegates
& exhibitors only)

HALL 11

HALL 11



HALL 11



Auditorium 500
-1 Level

Visitor Entrance

Conference

OUTSIDE EXHIBITORS

OUTSIDE EXHIBITORS

EXHIBITION

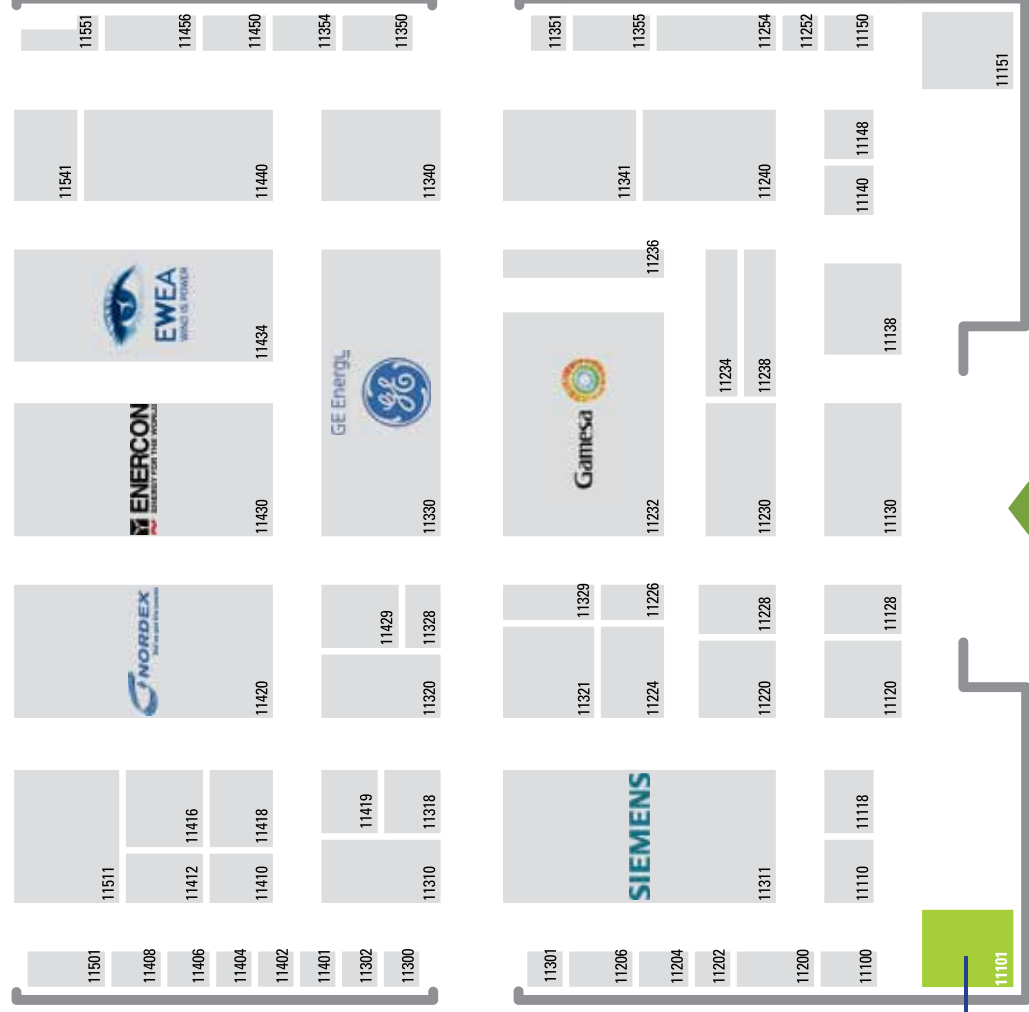
HALL 11



HALL 7

HALL 7

HALL 12
CONFERENCE



HALL 7

HALL 12
CONFERENCE

Publication Point

Visitor Entrance

OUTSIDE EXHIBITORS

OUTSIDE EXHIBITORS

HALL 12

Media Point
Cyber Café



HALL 11

HALL 11



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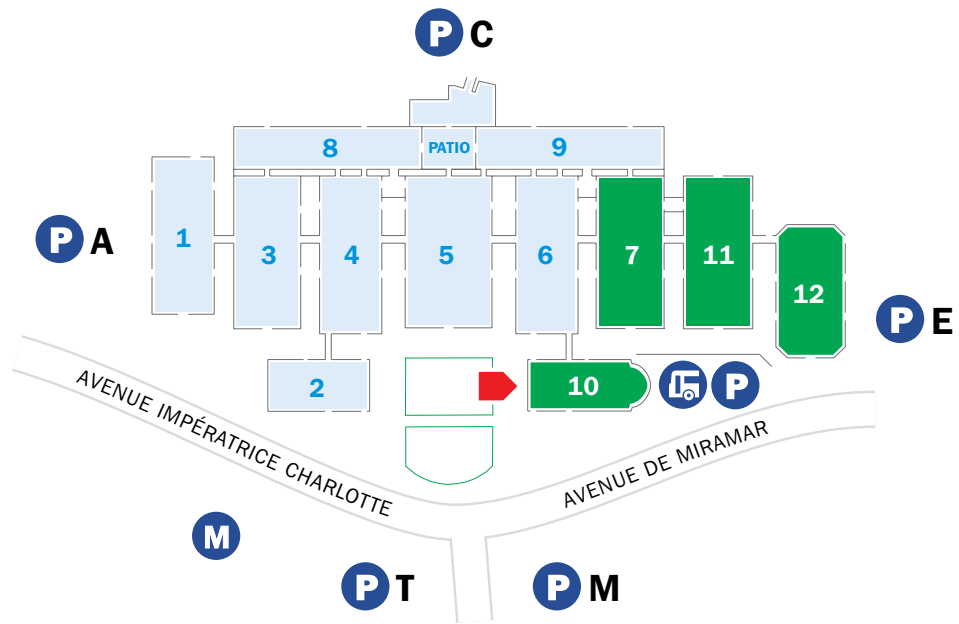
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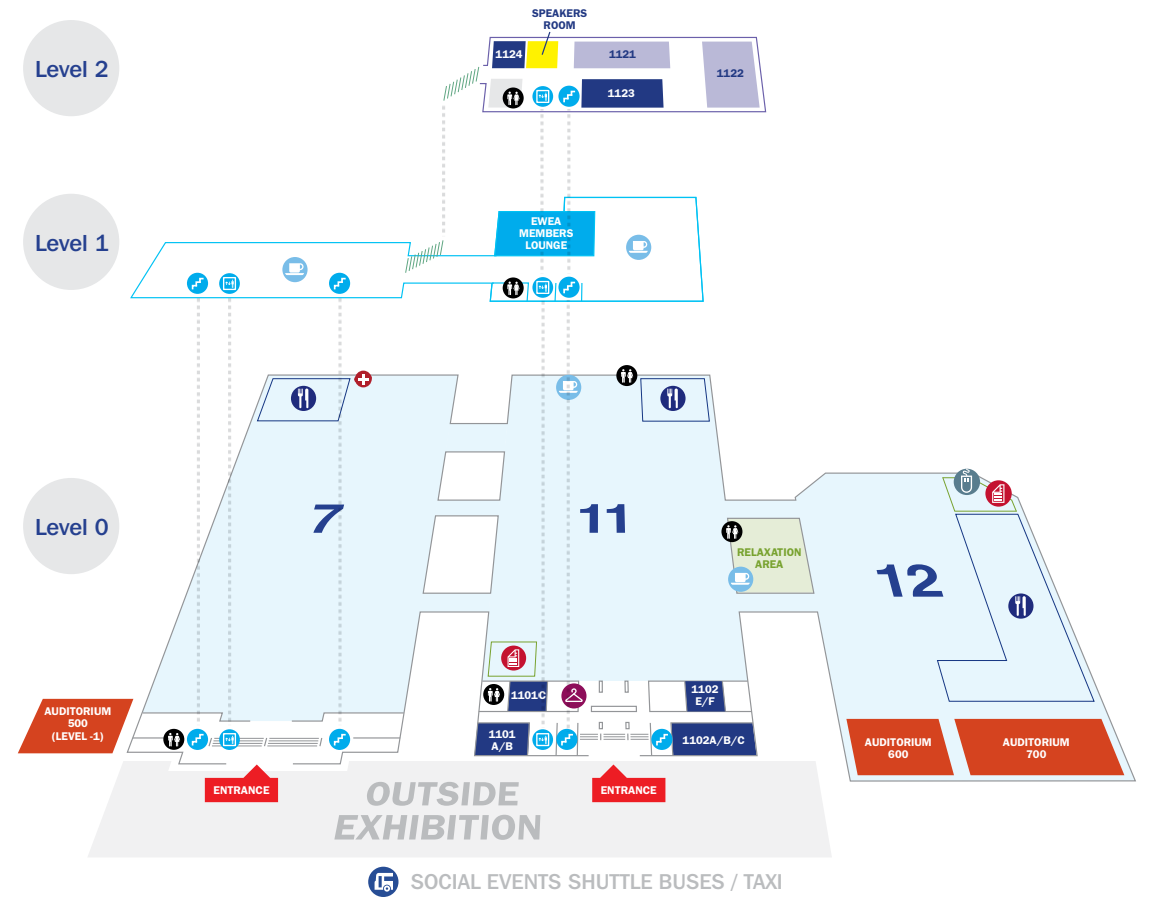
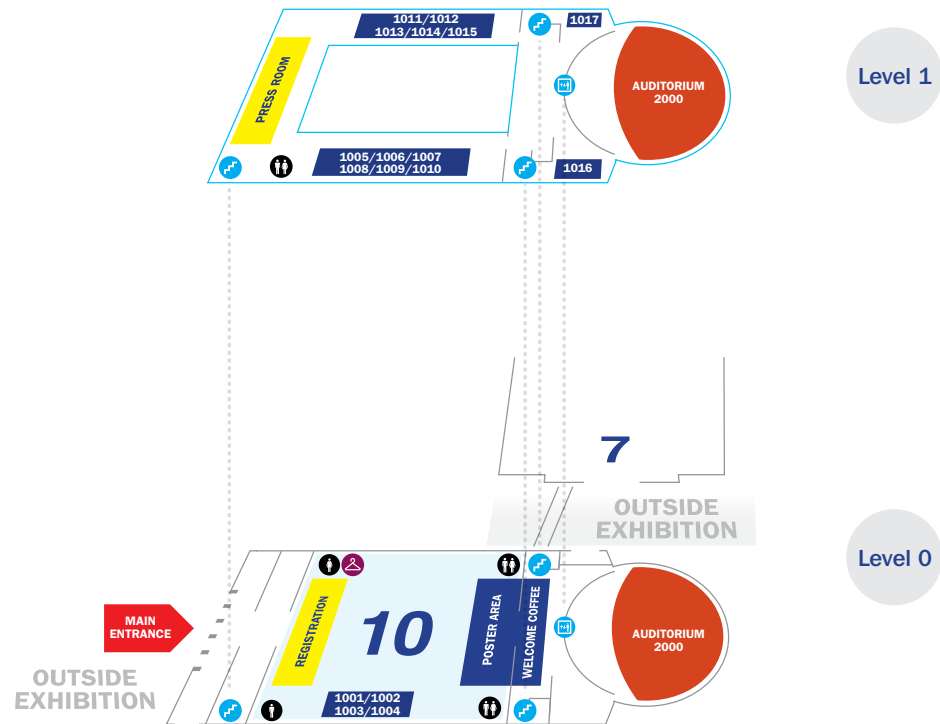


EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION



- Cloakroom
- Stairs
- Parking
- Coffee Break & Lunch Area
(Conference delegates & exhibitors only)
- Lift
- Metro
- Cyber Café
- First Aid
- Social Events Shuttle Buses
- Media / Publication Points
- Toilets
- Restaurant / Bar

Meeting Rooms	Registration/Speakers/Press Rooms
EWEA Workshops / Side Events	Conference Rooms





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Programme overview

Time	SUNDAY, 13 MARCH 2011				WORKSHOPS
09:30	Pre-event seminar: 'Wind Energy - The Facts' (Room 1122)				
	Members' only reception				
Time	MONDAY, 14 MARCH 2011				MONDAY 16:00 - 17:30
08:00	Registration				TPWind & EWI Funding wind energy R&D in Europe ROOM 1122
09:00	Welcome coffee				
10:00	Opening session				
12:00	Press conference (Level 1, Hall 10)				
12:30	Lunch				
14:00	EU Energy policy: what happens after 2020? (Panel)				
15:30	Coffee break				
16:00	Aud. 2000 Offshore wind energy: challenges and opportunities	Aud. 700 Remote sensing	Aud. 600 Aerodynamics	Aud. 500 Drive train components and power electronics	
17:00	Hansen/CG Power beer reception (Stands 11538 & 11530)				
19:00	Conference Reception - sponsored by ING				
Time	TUESDAY, 15 MARCH 2011				TUESDAY 11:30 - 13:00
08:00	Registration and Welcome coffee				TWENTIES Large-scale integration of wind power ROOM 1101A
09:00	Aud. 2000 Finance: Recovering, maturing and advancing (Panel)	Aud. 700 Wakes	Aud. 500 Active and passive load alleviation		
09:30	Belgian day				
10:30	Coffee break				
11:00	Aud. 2000 Mesoscale modelling	Aud. 700 Financing green growth in times of a financial crisis	Aud. 600 Floating concepts for offshore wind parks	Aud. 500 Loads control and safety	
12:30	Lunch				
14:00	Aud. 2000 Wind power technology 2020? (Panel)	Aud. 700 WWW (World Wide Wind)	Aud. 600 Financing offshore wind in 2011		
15:30	Coffee break				
16:00	Aud. 2000 Forecasting/prediction	Aud. 700 Equity finance in today's wind industry	Aud. 600 Grid connection and grid integration	Aud. 500 Reliability and operation and maintenance	
17:30 - 19:00	Exhibition Reception - sponsored by Gamesa				
Time	WEDNESDAY, 16 MARCH 2011				WEDNESDAY 09:00 - 13:00
08:00	Registration and Welcome coffee				UPWIND Towards the large wind turbines of tomorrow ROOM 1122
09:00	Aud. 2000 Advanced flow modelling	Aud. 700 Reliability	Aud. 600 The HVDC supergrid	Aud. 500 Innovative concepts and support structures for offshore	
10:30	Coffee break				WEDNESDAY 11:00 - 12:30 ORECCA The future of offshore renewables ROOM 1101A
11:00	Aud. 2000 European markets	Aud. 700 Siting challenges	Aud. 600 Towards wind turbines supporting power systems	Aud. 500 Structural design, probabilistic design	
12:30	Lunch				WEDNESDAY 14:00 - 18:00 SEANERGY 2020 Planning for offshore RES in the North Sea ROOM 1101A
14:00	Aud. 2000 100% renewable electricity in the EU by 2050? (Panel)	Aud. 700 Offshore structures	Aud. 500 Assessment of Microscale Wind		
15:30	Coffee break				
16:00 - 17:30	Poster session (Poster Area)				
17:00	WinWinD 3 product launch reception (WinWinD stand 11730)		EWEA networking event (EWEA stand 11434)		
19:30	Conference Dinner				
Time	THURSDAY, 17 MARCH 2011				
08:00	Registration and Welcome coffee				
09:00	Aud. 2000 New control concepts	Aud. 700 Operation of electricity systems with large amounts of wind power	Aud. 600 Social and environmental acceptance	Aud. 500 Rotor aerodynamics	
10:30	Coffee break				
11:00	Aud. 2000 Condition monitoring systems	Aud. 700 Supply chain: challenges and opportunities for a growing industry	Aud. 600 Electricity market integration	Aud. 500 Predictability of wind conditions	
12:30	Lunch				
14:00 - 16:00	Exhibition visiting time				

- Plenary and panel sessions
- Policy, Industry, Markets & Regulation
- Finance
- Technology
- Wind Resource
- Grids
- Scientific Sessions



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