



Wind Power to the Grid



**EPE Wind Energy Chapter – 3rd Seminar
15-16 April 2010, Staffordshire University
UK**

Programme (v. 17, 07 April 2010)

(version 07 April)

General information: http://etec.vub.ac.be/EPE/EPE-WECS-2010/01_Frameset.htm

Wednesday 14 April 2010 afternoon: Study visit at CONVERTEAM

General Information

Converteam (UK) operates in all Converteam Group activities, Marine, Oil & Gas including Offshore, Renewables with a particular focus on Wind energy, and Industry. In addition to its facilities in Rugby, Converteam has two more main locations in Kidsgrove and Glasgow. All three include Research & Development, system design, engineering and manufacturing divisions. The Kidsgrove site is the home of MV3000e variable speed drives from 22kW to 5MW. The site has design, manufacture and support capability and its key outputs are now liquid cooled DELTA modules and complete converters for the renewable energy markets as well as traditional industries. KSC also manufactures and supports the GEM80 range of PLC products and provides repairs, spares and technical support for legacy products made by English Electric, GEC/ Cegelec Industrial Controls and Alstom Power Conversion.

14h00 – 14h15 Coffee

14h15 – 15h15 Welcome to Converteam

15h15 – 15h45 Question & Answer

15h45 – 17h00 Factory Tour

Thursday 15 April 2010

8h15 – 9h00: Registration (Tom Ruxton Foyer)
Upload of presentation and full papers

9h00 – 9h20: Opening session (Tom Ruxton Lecture Theatre-F14)

Chair: Sarath Tennakoon, Staffordshire University, UK

Co-Chair: Jean-Luc Thomas, CNAM and SUPELEC, France

Address by Professor Christine King, The Vice Chancellor, Staffordshire University

Address by Professor Mike Goodwin, Dean, Faculty of Computing, Engineering & Technology

9h20 – 10h40: Lecture session 1: Keynotes (Tom Ruxton Lecture Theatre-F14):

Chair: Jean-Luc Thomas, CNAM and SUPELEC, France

Keynote 1: Future North Sea Grid and very high power wind farms in the North Sea: Terje Gjengedal, Statnett, Norway

Keynote 2: The importance of power electronics for wind power and other renewable energy sources, Colin Davidson, AREVA, UK

10h40 – 11h10: Coffee break in dialogue session / exhibition area (Tom Ruxton Foyer G1)

Our sponsors:



11h10 – 12h30: Lecture session 2: HVDC (Tom Ruxton Lecture Theatre -F14)

Chair: Sarath Tennakoon, Stafford University, UK

- 9 LCC HVDC Transmission System for Large Offshore Wind Generation to Main Grid and Oil and Gas Platform, Jia Xu, Bing Liu, Raymundo E. Torres-Olguin, Tore Undeland, Norwegian University of Science and Technology, Trondheim, Norway
- 14 Innovative DC connections for offshore wind and tidal current farms, Pascal Monjean, CONVERTEAM Belfort & L.2.E.P. (Laboratory of Electrical Engineering and Power Electronics (L.2.E.P.), H.E.I) Lille, France, Benoît Robyns, Christophe Saudemont, Laboratory of Electrical Engineering and Power Electronics (L.2.E.P.), H.E.I. Loïc Leclere, Abdollah Mirzaian, Converteam, Belfort, France,
- 35 A controller for hybrid HVDC using in a off shore wind farm applications, Raymundo Torres Olguin, Marta Molinas, Tore M. Undeland, Department of Electric Power Engineering, Norwegian University of Science and Technology, Trondheim, Norway
- 36 Connection of Off-shore Wind Farms using Voltage Source Converter HVDC Technology, N M MacLeod, A J Totterdell, AREVA T&D, Stafford, United Kingdom; A Macher and G Hentschel, AREVA T&D, Dresden, Germany

12h30 – 14h00: Lunch (Gallery)

14h00 – 15h30: Dialogue session and Exhibition (Tom Ruxton Foyer-G1)

Fault Ride Through:

- 4 Transformer Based Voltage Sag Generator to test Renewable Energy Systems during Grid Faults in the Laboratory, Christian Wessels, Torge Wehrend and Friedrich W. Fuchs, Institute of Power Electronics and Electrical Drives, Christian-Albrechts University of Kiel, Germany
- 8 The importance of considering DFIG's fault ride-through capability during asymmetric faults, Miren Itsaso, Martinez Aguirre, Ana Susperregui, Gerardo Tapia, Haritza Camblong, Systems Engineering and Control Department, Polytechnic University College, University of the Basque Country, Spain

Small Turbine session:

- 10 Presentation of latest wind turbine design (KM1) utilising jet engine technology, Kevin Frew, Glasgow Caledonian University, United Kingdom
- 24 Performance of a small wind energy generator under different configurations and settings, Camilo José Carrillo González, F. Pérez-Sabin, Miguel Silva, E. Diaz-Dorado, Departamento de Enxeñaría Eléctrica, E.T.S. de Enxeñeiros Industriais, Universidade de Vigo, Spain
- 31 Identification of Control Signals for Optimal Control of Small-Scale Wind Turbines, Ghanim Putrus, Mahinsasa Narayana, Power and Wind Energy Research Group, School of Computing Engineering & Information Sciences, University of Northumbria at Newcastle, Newcastle upon Tyne, United Kingdom
- 37 Control Strategies for Efficiency Optimization of Small Direct-Drive Wind Power Systems, M. Cacciato, A. Consoli, G. Scarcella, G. Scelba, DIEES, University of Catania, Italy , R. Attanasio, T. Bertényi, and Quiet Revolution Ltd, London, UK

Components and System Engineering:

- 5 Minimum DC Link Voltage Operation of Network Bridge Converter of a Wind Turbine with Fully Rated Converters, Dayaratne U.I., Tennakoon S.B, Shammass N., Faculty of Computing Engineering and Technology, Staffordshire University: Knight J, Converteam Ltd. Kidsgrove, United Kingdom.
- 7 Slow speed double fed induction generator, G.Dilevs, Riga Technical University, Faculty of Power and Electrical Engineering, Riga, LATVIA

- 17 Simulation and Experimental Consideration on Power Generation Characteristics of Two Wind Generator Systems, Shinji Kato, Masakazu Michihira, Kobe City College of Technology, Japan.
- 18 High power density permanent magnet generator for wind and tidal turbines, Stéphane Mouty, Abdollah Mirzaian, Loïc Leclere, Converteam SAS, Belfort, France, Frederic Gustin, Alain Berthon, Daniel Depernet, Christophe Espanet, University of France Comte, Femto-ST Institute, France.
- 21 TRV Studies to determine the Impact of an Offshore Wind Farm on a 132kV Distribution Network, Oona Nanka-Bruce, Steve Nurse, Martin Jones, Parsons, Brinckerhoff Westbrook Mills, United Kingdom, Victor Levi, Electricity North West Limited, United Kingdom
- 34 A Fault-Tolerant Modular Grid Interface for Direct-Drive Wind Turbines, Max Parker, Department of Electronic and Electrical Engineering, University of Strathclyde, Glasgow, United Kingdom

Power system operation and control

- 26 Multilevel cascaded H-bridge inverter with integrated battery management for alternative energy applications, Keir Wilkie, D.A. Stone, M.P. Foster, C.M. Bingham, The University of Sheffield, United Kingdom
- 27 Strategies for Reactive Power Control in Wind Farms with STATCOM, Francisco Díaz González, Institut de Recerca en Energia de Catalunya (IREC), Spain, Marcela Martínez-Rojas, Centre d'Innovació Tecnològica en Convertidors Estàtics i Accionaments (CITCEA-UPC), Spain, Andreas Sumper, Oriol Gomis-Bellmunt, Institut de Recerca en Energia de Catalunya (IREC), Centre d'Innovació Tecnològica en Convertidors Estàtics i Accionaments (CITCEA-UPC), Spain
- 28 Reactive power management in Wind Farms using PSO technique, Marcela Martínez Rojas, Andreas Sumper, Oriol Gomis-Bellmunt, CITCEA-UPC, Barcelona, Spain
- 29 Wind Farm Output Smoothing Through Co-ordinated Control and Short-term Wind Speed Prediction, Philip Clemow, Timothy C Green, Carlos A. Hernandez, Imperial College, United Kingdom

15h30 – 16h00: Coffee break in dialogue session / exhibition area (Tom Ruxton Foyer)

16h00 – 18h00: Lecture session 3: Components and System Engineering (Tom Ruxton Lecture Theatre-F14)

Chair: Jean-Luc Thomas, CNAM and SUPELEC, France

Co-chair: Hans-Peter Nee, Royal Institute of Technology, Stockholm, Sweden

- 20 The stability of multiple, high power, active front end voltage sourced converters when connected to wind farm collector systems, Paul Brogan, Renewable Energy - Siemens Wind Power, Wishaw, United Kingdom
- 15 Reliability of the Electrical Parts of Wind Energy Systems – a statistical evaluation of practical experience, P. Lyding, S. Faulstich, B. Hahn, Fraunhofer Institute for wind energy and energy system technology - IWES, Kassel, Germany and P. Tavner, Energy Group, School of Engineering, Durham University, United Kingdom
- 33 A New Advanced Wind-Farm Real-Time Simulator Platform, Antonello Monti, A. Benigni, F. Adler, F. Mura, C. Dick, R. De Doncker, Institute for Automation of Complex Power Systems, E.ON Energy Research Center, RWTH Aachen University, Aachen, Germany

+ wrap session including dialogue session authors of this topic

19h30 – : Gala Evening with music and dance performance in the Gallery: Master of Ceremony Professor Adrian Low

Including Musical performance by Music Technology Students, English Folk dancing performed by Chase Dancers, Morris dancing performed by Stafford Morris dancers and Ceroc dancing

Friday 16 April 2010

9h00 – 9h40: Lecture session 4: Keynote 3 (Tom Ruxton Lecture Theatre –F14):

Chair: Sarath Tennakoon, Stafford University, UK

National Grid about “why do we need these services (ancillary services, load management, etc...)?”

9h40 – 11h00: Lecture session 5: Power System Operation and Control (Tom Ruxton Lecture Theatre-F14):

Chair: Noel Shammass, Stafford University, UK

Co-chair: Tore Undeland, NTNU, Norway

- 1 FACTS Devices for Large Wind Power Plants, Andrzej Adamczyk, R. Teodorescu, R.N. Mukerjee, P. Rodriguez, Aalborg University, Denmark
- 11 Storage Possibilities for Enabling Higher Wind Energy Penetration, Maciej Swierczynski, R. Teodorescu, C.N. Rasmussen, P. Rodriguez, Aalborg University, Denmark, H. Vikelgaard, Vestas Wind Systems
- 12 The Benefits of Intelligent Electric Water Heating Control for Grid Stability and Wind Integration in Ireland, Niall Fitzgerald, Sustainable Energy Research Group, Environmental Research Institute (ERI), University College Cork, Cork, Ireland

+ wrap session including dialogue session authors of this topic

11h00 – 11h30: Coffee break (Tom Ruxton Foyer)

11h30 – 12h30: Lecture session 6: Fault Ride Through (Tom Ruxton Lecture Theatre):

Chair: Jouko Niiranen, ABB, Finland

- 3 Low Voltage Ride Through of Doubly Fed Induction Generator- Crowbar vs. Stator Current feedback solution, C. Wessels, F.W. Fuchs, Institute of Power Electronics and Electrical Drives, Christian-Albrechts-University of Kiel, Germany
- 16 Fulfilling Grid Code Requirements with Direct Power Controlled Voltage Source Converters in Wind Power Applications, Ralf Lohde, Friedrich W. Fuchs, Institute for Power Electronics and Electrical Drives, Christian-Albrechts-University of Kiel, Germany
- 25 Operation of DFIG Wind Turbines under unbalanced voltage sags using stationary frame control, Adrià Junyent-Ferré, Oriol Gomis-Bellmunt, Lluís Trilla-Romero, IREC Catalonia Institute for energy research, Centre d'Innovació en Convertidors Estàtics i Accionaments (CITCEA-UPC), Montserrat Mata-Dumenjó, Alstom Ecotecnia Àrea de Disseny Elèctric, Departament d'Innovació, Spain

12h30 – 14h00: Lunch (Gallery)

14h00 – 15h00: Closing session (Tom Ruxton Theatre)

Chair: Sarath Tennakoon, Stafford University, UK

Co-Chair: Jean-Luc Thomas, CNAM and SUPELEC, France

15h00 – 16h00: Visit of Laboratory. Gallery bar is open for drinks