MEDOW

MULTI-TERMINAL DC GRID FOR OFFSHORE WIND

Newsletter
October 2015
Issue 4

Welcome

Welcome!

Welcome to the fourth MEDOW newsletter!

The MEDOW (Multi-Terminal DC Grid for Offshore Wind) project is investigating DC (direct current) grids for transmitting offshore wind power. MEDOW researchers are working on the technology that we hope will form the basis of a future European 'supergrid'.

Please pass the newsletter to those who you think will be interested and ask them to contact me to join the mailing list.

A newsletter will be issued 3-4 times per year and will aim to communicate not only news from MEDOW but also news of interest to the wider research community and the public, so contact me if you have news from the DC grids, HVDC, offshore wind, power electronics or renewable energy communities that can be included in the next issue.

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MEDOW is funded by the Seventh Framework Programme of the European Union under grant agreement no. 317221

PEOPLE

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Farewell!

October saw us say a fond farewell to two of our post-doc Experienced Researchers, Sahar Pirooz Azad and Rodrigo Teixeira Pinto

Sahar joined MEDOW in October 2014 from the University of Toronto. She has just completed her 12 month contract at KU Leuven where she worked in the team of Prof. Dirk Van Hertem on relaying protection algorithms for DC grids. Sahar has now moved back to Canada to take up an academic post at the University of Alberta.

Rodrigo started work in the team of Oriol Gomis-Bellmunt at UPC in October 2014 having moved from TU Delft. Rodrigo's MEDOW work focussed on post-fault restoration of DC grids. He has now moved to Germany for an R&D role at Siemens.

The MEDOW project would like to say a big 'thank you and farewell' to Rodrigo and Sahar — and we hope to see them again soon!

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Network Training

Network training week at UPC, Barcelona December 2015

As an 'Initial Training Network', we aim to give our researchers wide-ranging training in the technical and supporting skills that they need to embark upon successful and productive research careers in the private sector as well as in academia.

Our last meeting took place in June in Roskilde. You can see reports on what we did on our website.

Our next training week will take place 30 November - 04 December at Universitat Politècnica de Catalunya in Barcelona.

Training is expected to include:

⇒ a session on "Entrepreneurial and Commercial Skills"

⇒ Visits to the premises of MEDOW partners Alstom Renovables and Cinergia

⇒ Assembly Meeting of the project where researchers will present their work and results

Whenever possible, our 'network training activities' will be open to researchers from outside the network so as to ensure that as many people as possible benefit from the project.

Want to take part?

Email Cath Roderick
RoderickCH@cardiff.ac.uk

At our next network event, certain activities will be open to researchers from outside the network. check our website for details soon!

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Network Training

IEEE International Energy Conference Leuven, Belgium
ENERGYCON 2016

Save the date: EnergyCon 2016

In April 2016, KU Leuven will host the IEEE International Energy Conference. The Conference Chair will be Prof. Dirk Van Hertem

Technical sessions are expected to include:

Multi-energy systems
- ICT for smart grids
- Data processing and visualization in the power system
- Electric vehicles

Transmission
- Planning
- Operation and Control
- HVDC and HVDC grids
- Connection of offshore resources
- Modelling and analysis

Distribution
- Integration of distributed energy sources
- Modelling and analysis
- Operation and control

Markets and Policy for electricity and gas
- European Energy policy towards 2030 and beyond
- Security of supply
- Market modelling
- Market design
- Regulation

Energy conversion
- Devices (power electronics, drives, …)
- Innovative energy technologies
- Power to gas
- Energy storage (electrical, thermal,…)

Partners:
IEEE
KU Leuven

Visit the EnergyCon website

As part of the conference, MEDOW will host an 'HVDC Day' - more details in the next newsletter!

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Secondments

During the period May—August 2015, three MEDOW researchers went to Cardiff University on secondment. Here, Kevin Schönleber of Alstom Renovables, tell us of his experience…

Kevin's secondment period was chosen to take advantage of the presence of other MEDOW researchers at CU, namely work package member Marc Cheah as well as Abel Ferreira, Jorge Gonçalves, Tibin Joseph, Gen Li, Mohammad Meraj Alam and Qing Mu.

The main objective was the exposure of the researcher to a daily academic atmosphere at the university facilities which is not present at his industrial home institution. It also led to a closer collaboration within the Cardiff-based researchers of the same work package, improvement of English language skills and wider discussions with other non-MEDOW researchers.

The daily work was mainly simulation with computer programs and informal discussions on the research with work package colleague Marc Cheah and MEDOW fellow Abel Ferreira. An introductory work was performed on the system definition to study resonances and harmonics in HVDC-connected wind power plants (WPP). The modelling was aligned between the two software programs PSCAD and Digsilent PowerFactory. The former is frequently used at CU to simulate the dynamic behaviour of power electronic-based power systems while the latter is mainly used in industry for different purposes (e.g. harmonic load flow, short-circuit analysis, power flow calculations, frequency sweeps, among others).

After the definition of the wind power plant and the transmission system, the models were developed mutually by Marc in PSCAD and Kevin in Digsilent PowerFactory. This approach resulted in a significantly faster model building as errors were detected in an early stage. The work is intended to be continued after the secondment.

The local linkage and contacts of CU to UK-based industrial partner Alstom Grid in Stafford allowed Kevin to participate at a one-day visit to the state-of-the-art HVDC voltage-source converter demonstrator facility and present the research work to Alstom Grid staff. This training activity was a good opportunity to get feedback from industrial experts in the field. A group of researchers also had the opportunity to visit Europe's only university-owned lightning test facility, the *Morgan-Botti Lightning Laboratory*, of the High Voltage Engineering group at CU.

The outcome of the secondment was the first draft submission of a journal paper as well as submission of a conference paper.

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Results

Research outputs

IET Generation, Transmission & Distribution, volume 9, issue 11

Ancillary Services in Electric Power Systems with HVDC Grids (Robert Renner)

17th Conference on Power Electronics and Applications – EPE'15-ECCE Europe, 08-10 September 2015, Geneva

Analysis of Deviations on the Optimal Power Flow Operation of MTDC Networks: A Comparison between Droop Control and the DVC Strategy (Rodrigo Teixeira-Pinto)

Scaling method for a multi-terminal DC experimental test rig (Marc Cheah-Mañé)

Modular multilevel converter electrical circuit model for HVDC applications (Abel Ferreira)

A New Topology of Fast Solid-state HVDC Circuit Breaker for Offshore Wind Integration Applications (Ataollah Mokhberdoran)

A DC grid primary protection algorithm based on current measurements (Sahar Pirooz Azad)

Active Filtering Based Current Injection Method for Multi Modal SSR damping in an AC/DC System (Tibin Joseph)

Extension of Power Transmission Capacity in MMC-based HVDC Systems through Dynamic Temperature-Dependent Current Limits (Jorge Gonçalves)

Side-by-side connection of LCC-HVDC links to form a DC grid (Qing Mu co-author)

10th Annual CIGRE Canada Conference on Power Systems 31 August—02 September 2015, Winnipeg

A New Coordinated Voltage Control Scheme for Offshore AC Grid of HVDC Connected Offshore Wind Power Plants (Jayachandra Naidu)

MEDOW also plans to participate actively in future large international conferences, including IEEE EnergyCon 2016 and European Wind Energy Association conference EWEA 2015

Take a look at the full list on our dissemination webpages at www.medow.engineering.cf.ac.uk

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Results:

HVDC Doctoral Colloquium, September 2015

In September 2015, six MEDOW researchers presented papers at the 6th Annual HVDC Doctoral Colloquium alongside fellow researchers from UPC, DTU, KU Leuven, Porto, Cardiff, Imperial College London, ABB, DONG Energy, Norwegian University of Science & Technology and Chalmers University

The HVDC Doctoral Colloquium first took place in 2010 and has grown into an international meeting of some of the most active European universities in the HVDC domain, providing an opportunity for PhD students and researchers to present and exchange their work.

The 6th HVDC Doctoral colloquium was hosted by Danmarks Tekniske Universitet (DTU) in Roskilde on 16-18 September 2015.

The colloquium allows researchers and PhD students to discuss the research they are doing in the rapidly growing field of HVDC transmission for integration of large scale offshore wind power plants and offshore grids. The colloquium covers topics such as HVDC transmission, control of RES, protection of DC grids, modular multi-level converters (MMC), AC/DC grids interaction and stability and scaled laboratory set-ups.

The event was co-organized and supported by the FP7 ITN MEDOW consortium, the Nordic Energy Research OffshoreDC consortium and the WINDGRID network.

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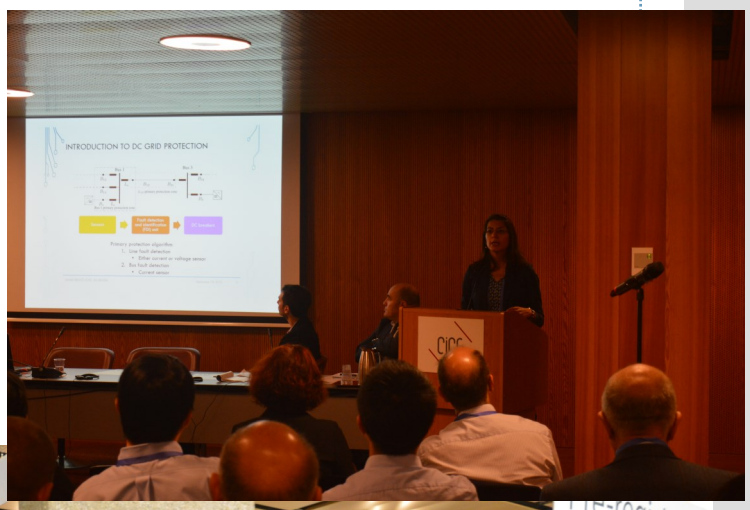
Results:

17th Conference on Power Electronics and Applications – EPE'15-ECCE Europe

In September 2015, 8 MEDOW researchers presented their work in paper and poster form at EPE'15

Participating in international conferences as a group helps MEDOW researchers to disseminate their work and make contacts with others in the research community

See more details on our Dissemination webpages.



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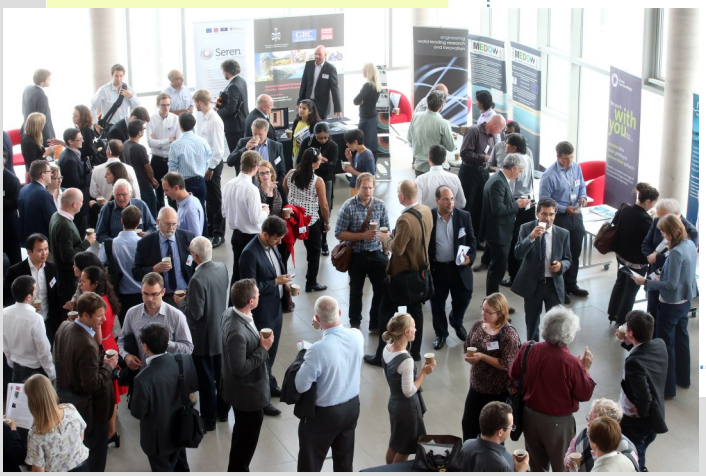
Communication: MEDOW at the Vision2020 Energy Cluster meeting

In July, we took the opportunity to exhibit MEDOW to attendees and speakers at the inaugural meeting of the Vision2020 Energy Cluster

Vision2020 is an innovation platform for research organisations and companies participating in the 'Horizon 2020' EU funding programme.

Cardiff University co-ordinates the Energy Cluster, which is a group of Vision2020 members with a strong interest in energy research.

MEDOW took part in an exhibition of Cardiff University energy projects and UK innovation companies. Delegates at the meeting included representatives from a wide range of European universities, from industry and from the European Commission.



Above: Cath Roderick discusses MEDOW with Alan Haigh, Head of Department – Horizon 2020 Energy and Transport, INEA Executive Agency - European Commission

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Communicating our work beyond Europe

MEDOW's researchers have taken advantage of opportunities to present their work across the world….

United States

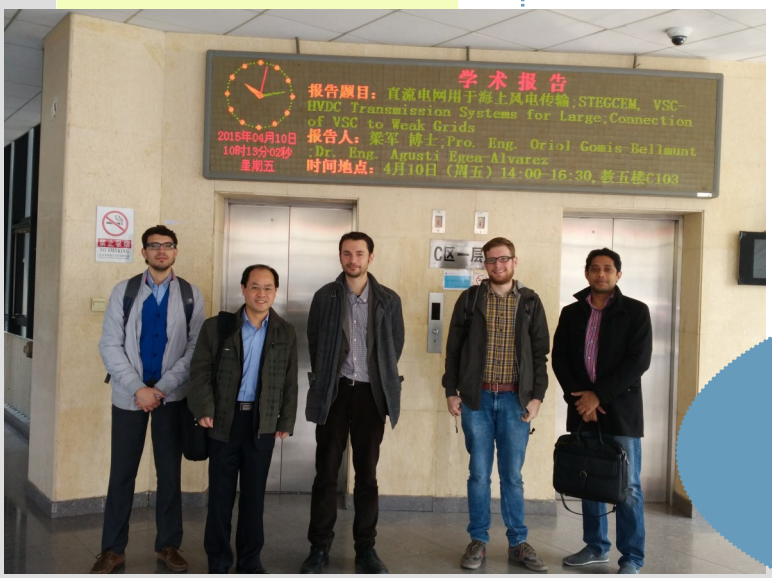
In July 2015, Rodrigo Teixeira-Pinto and supervisor Oriol Gomis presented MEDOW to the National Wind Technology Centre of the US government's National Renewable Energy Laboratory (NREL).

South Korea

Rodrigo also organised a *Special Session on recent advances towards the development of high-voltage direct current (HVDC) multi-terminal networks at 9th International Conference on Power Electronics – ECCE Asia (ICPE 2015-ECCE Asia)* in Seoul in June of this year.

China

ESRs Jorge and Tibin, ER Agustí and supervisors Jun, Oriol and Yalou were all together at China Electric Power Research Institute in Beijing in April. They conducted a series of talks and seminars at various schools, universities and research centres.



See us communicating MEDOW in other languages: ESR Marc Cheah was profiled by Spanish energy news site Smart Grids Info

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Communication

So in which other ways does MEDOW communicate its work?

As a Marie Curie project, MEDOW has communication high on its agenda. We aim to communicate with as wide a variety of people as possible so as to share our work, to increase its impact and to let European taxpayers know how their money is being spent! We are keen to find news ways of sharing our project news, so do get in touch with us if you can help!

Public outreach

We have already taken part in a number of activities with people outside the research community including participating in a 'renewable energy project day' at a school in Cardiff and hosting a group of Spanish and Swedish school students at a workshop on 'HVDC Towards the Future' in Barcelona.

MEDOW in One Minute

Take a look at out bite-size explanation of MEDOW and life as a Marie Curie researcher on Youtube.

Facebook

https://www.facebook.com/medowproject

LinkedIn

Group: 'MEDOW'

In the press

Articles on MEDOW have targeted a wide range of audiences in renewable energy news-site reNews, in the national newspaper of Wales and on OffshoreWind.biz

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MEDOW Consortium

Members and roles

MEDOW is co-ordinated by Cardiff University and has four other university partners, five private sector partners and one associate partner.

Collectively, staff from the partners organisations have the wide-ranging experience and expertise to provide the appointed researchers with broad-ranging training in DC grid technologies.

All partners will host at least one researcher, and associate partner National Grid will provide training and steering to the consortium.

MEDOW partners:

- Cardiff University (Co-ordinator)
- Universitat Politècnica de Catalunya
- Control Intel.ligent de l'energia
- Alstom Renovables España
- Universidade do Porto
- EFACEC
- Katholieke Universiteit Leuven
- Elia System Operator
- Danmarks Tekniske Universitet
- China Electric Power Research Institute
- National Grid (Associated Partner)

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Useful Information

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A DC grid based on multi-terminal voltage-source converter is a newly emerging technology, which is particularly suitable for the connection of offshore wind farms. Multi-terminal DC grids will be the key technology for the European offshore 'supergrid'.

The project's anticipated achievements will greatly contribute to integrating offshore wind power into the onshore AC grids of European countries and to the European 'supergrid'.

Read more about supergrid at friendsofthesupergrid.eu

MEDOW offers a development path to researchers across Europe in the area of DC grids, in addition to fostering greater ties between industry and academia in this key development area.

The MEDOW project has received funding from the Seventh Framework Programme of the European Union under grant agreement number 317221.

Deadline for contributions to next newsletter: 11 January 2016

www.medow.engineering.cf.ac.uk

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