

## *Welcome!*

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'.

The newsletter is issued 3-4 times per year and aims to communicate not only news from MEDOW but also news of interest to the wider research community and the public.

*Cath Roderick and Karolina Rucinska, MEDOW Project Officers*



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## *Editorial*

Three months left ...

In the spirit of the New Year, MEDOW project team reflects on the achievements and future plans.

**“The MEDOW project’s most important contribution is how it managed to bring together academia and industries to work on MTDC grid development, towards a sustainable Europe. In addition, this collaborative project provides the platform for training and developing early career researchers in order to fill the shortage of skilled and experienced work forces in the field of power systems”. Dr Jun Liang**

So far all majority of Work Packages objectives have been completed, many papers have been published and students have finished their contracts. While they are busy writing their dissertations we take January edition of the newsletter as an opportunity to highlight teamwork achievements.

## International recognition for MEDOW project

### MEDOW has been showcased in Research EU results magazine

Since December 2015 when of Climate Change negotiations in Paris 2015 took place, heads of states, organisations, and industries have begun a steady progress toward zero carbon world.

In November 2016 CORDIS has published a special issue dedicated to offshore wind energy. To achieve that issue shed light on eight projects, including the MEDOW project.



**“Yes, I do believe the outcomes and findings of the MEDOW project can be used as a roadmap for the development of future offshore DC grids.”**

Dr . un Liang, quoted above, has been interviewed for the magazine asking to reflect on the process, results, and contribution of the MEDOW project.

The success of the project has motivated the consortium to consider applying for future funding to continue the project under MEDOW 2.

## *Farewell to*

*Jorge Goncalves, Marc Cheah, Tibin Joseph, Abel Ferreira, Ataollah Mokhbederon, Alejandro Bayo Salas and Gen Li*

Since the last issue, nine out of twelve early career researchers have finished their contracts. They have worked very hard right to the very end. For example, Meraj Alam has spent his last months on his secondment in Belgium (see photos below).



So far they have attended conferences in Europe, Northern America, and China. Their work has been published in prestigious journals (see next page) as well as communicated to members of the public and industry.



They don't seem to stop their progress anytime soon. Gen and Tibin are still planning to present their work at international conferences before applying for work in academia and the industry.

To find out more about their achievements go to [dissemination](#) page.

## Results

### *The most recent publications*

- Adeuyi, O. D., Cheah-Mane, M., Liang, J., & Jenkins, N. (2016). [Fast Frequency Response from Offshore Multi-terminal VSC-HVDC Schemes](#). *IEEE Transactions on Power Delivery*.
- Sainz, L., Monjo, L., Pedra, J., Cheah-Mane, M., Liang, J., & Gomis-Bellmunt, O. (2016). [Effect of wind turbine converter control on wind power plant harmonic response and resonances](#). *IET Electric Power Applications*.
- Mokhberdoran, A., Silva, N., Leite, H., & Carvalho, A. (2016). [Unidirectional Protection Strategy for Multi-terminal HVDC Grids](#). *Transactions on Environment and Electrical Engineering*, 1(4), 58-65.
- Mokhberdoran, A.; Carvalho, A.; Silva, N.; Leite, H.; Carrapatoso, A. (2017) [Application study of superconducting fault current limiters in meshed HVDC grids protected by fast protection relays](#), *Electric Power Systems Research*, Vol.143, 292-302.
- Ajabi-Farshbaf, R., Azizian, M. R., Shazdeh, S., & Mokhberdoran, A. (2016). [Modelling of a New Configuration for DFIGs Using T-type Converters and a Predictive Control Strategy in Wind Energy Conversion Systems](#). *International Journal of Renewable Energy Research (IJRER)*, 6(3), 975-986.
- Göksu, Ö., Sakamuri, J. N., Rapp, C. A., Sørensen, P., & Sharifabadi, K. (2016) [Cluster Control of Offshore Wind Power Plants Connected to a Common HVDC Station](#). *Energy Procedia* 94: 232–240 Open access
- Raza, M., Schönleber, K., & Gomis-Bellmunt, O. (2016). [Droop Control Design of Multi-VSC Systems for Offshore Networks to Integrate Wind Energy](#). *Energies*, 9(10), 826. Open access

**Take a look at the full list on our  
dissemination webpages at**

[www.medow.engineering.cf.ac.uk](http://www.medow.engineering.cf.ac.uk)

## 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 and science project days 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 our bite-size explanation of MEDOW and life as a Marie Curie researcher on Youtube.

#### Facebook

<https://www.facebook.com/medowproject>

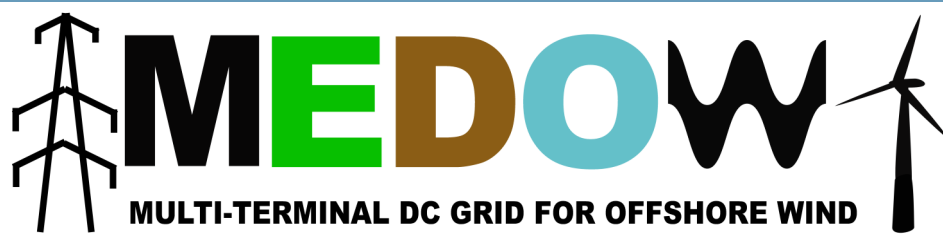
#### LinkedIn

Group: 'MEDOW'

#### In the press

Articles on MEDOW have targeted a wide range of audiences in [renewable energy news-site reNews](#), Spanish site [Smart Grids Info](#), 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](http://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.

[www.medow.engineering.cf.ac.uk](http://www.medow.engineering.cf.ac.uk)



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European Union under grant agreement no. 317221.

