



PROMOTioN

PROGRESS ON MESHED HVDC
OFFSHORE TRANSMISSION
NETWORKS



Best Paths & PROMOTioN – Utilizing project synergies

6th June, 2018, PROMOTioN Mid Term Conference, Amsterdam



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

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- Topics of common interest in Best Paths and PROMOTioN
- Synergies between the two projects?



Overview of the Best Paths project



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Best Paths EU R&D project

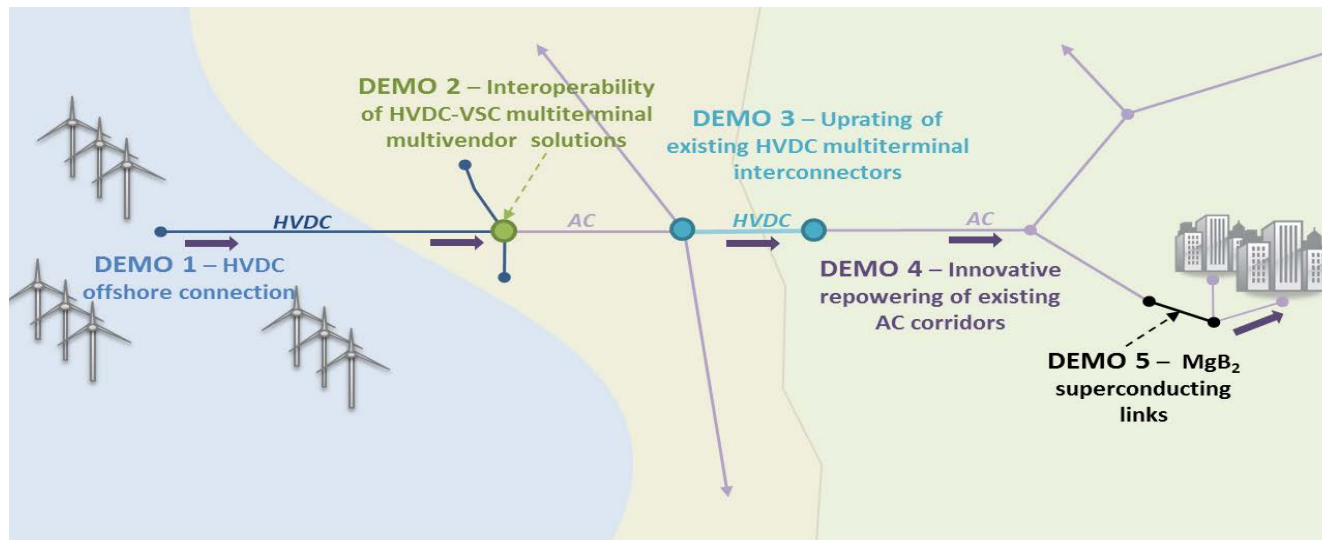


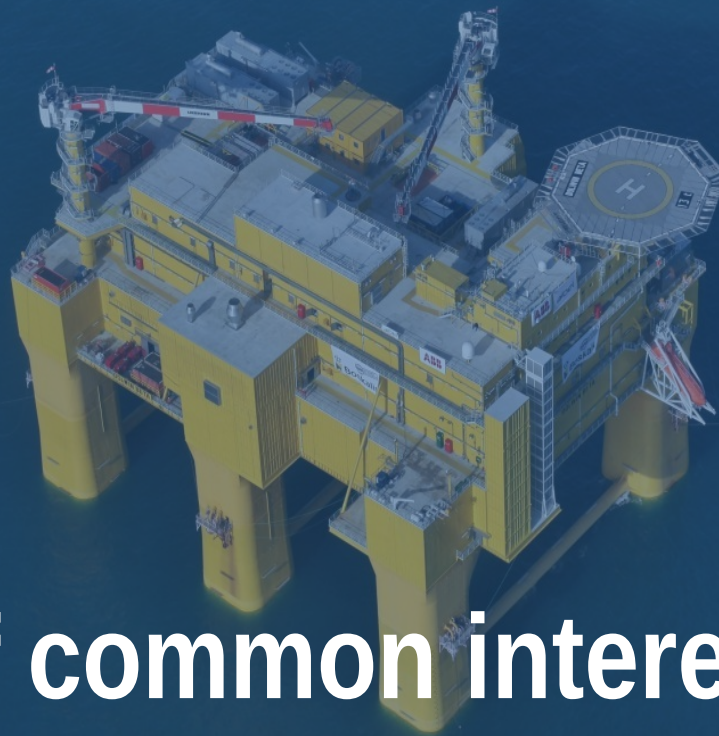
- **BE**yond **S**tate-of-the-art **T**echnologies for re-**P**owering **AC** corridors and multi-**T**erminal HVDC **S**ystems
- October 2014 – September 2018 (4 years)
- Total budget: 62.8M €
- EC contribution: 35.5M €
- 5 Large-scale demonstrations
- Replication and upscalability project
- Coordinated by Red Eléctrica de España (REE)



Best Paths Demos

1. HVDC in offshore wind farms and offshore interconnections
2. HVDC-VSC multivendor interoperability
3. Upgrading multiterminal HVDC links
4. Innovative repowering of AC corridors
5. DC Superconducting cable





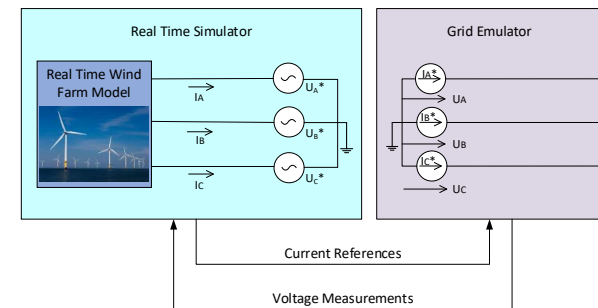
Topics of common interest in Best Paths and PROMOTioN



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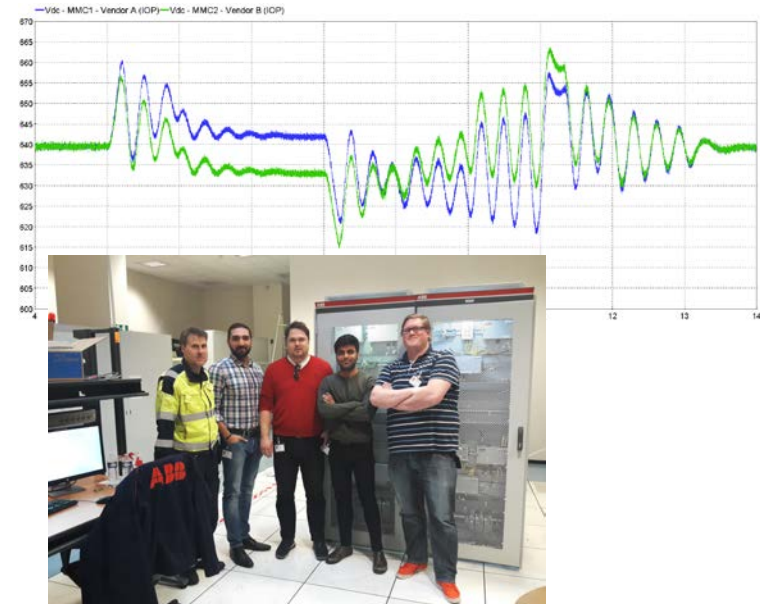
Offshore wind and DCG mockup (BP DEMO 1)

- Development of a DC facility to simulate offshore MTDC DC grids and their interaction with wind generators
- 4-terminal DC grid with MMC prototypes and a Real Time Digital Simulator system to emulate the AC grid
- To investigate the electrical interactions between HVDC link converters and wind turbine converters in offshore wind farms.
- To de-risk the multivendor and multiterminal schemes in terms of resonances, power flow and control



Interoperability in multi-vendor VSC systems (BP DEMO 2)

- Assessment of interoperability (IOP) performed on a wide variety of situations and conditions
- Maximize IOP for multivendor HVDC systems based on recent VSC converters from world-leading vendors
- Recommendations for standardization bodies and stakeholders for future DCG
- EMT / Real-Time simulation
- 15% IOP issues detected
- Methodology to fix IOP issues
- Interactions between Hybrid HVDC Breakers and converters



Synergies between the two projects?



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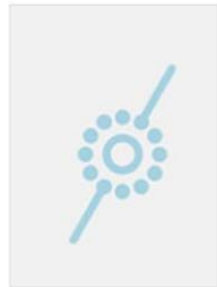
Synergies between the two projects?

- Scope of work
 - Bilateral workshop between Best Paths and PROMOTioN (April 12th, 2018)
 - No overlap between both projects!
- Communication
 - Dissemination activities (bi-directional)
- Complementarity
 - E.g. interoperability: protection-wise vs. converter-wise (or mixed protection-converter)



Synergies between the two projects?

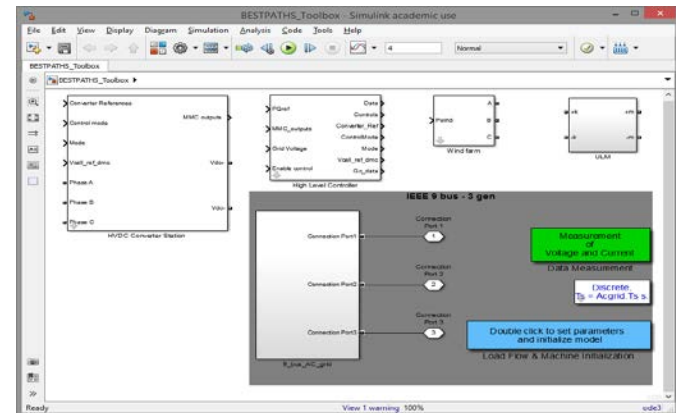
- Continuity
 - From Best Paths to PROMOTiON
 - Yet, some restrictions on deliverables regarding confidentiality
 - But also some valuable outputs from Best Paths made available
 - MATLAB 'Open Access' Toolbox: <http://www.bestpaths-project.eu/>



Simulation toolbox Demo 1

PUBLISHED: 10 FEBRUARY 2017

MATLAB/Simulink toolbox developed by the Demo 1 partners for the grid connection of OWFs using MTDC networks. This toolbox is made of the necessary building blocks of the electrical components and their initialisation scripts. A user manual can be downloaded [here](#).



- Hybrid DCCB model available in Hypersim
- A matter of people! (partners involved in both projects)

APPENDIX

DISCLAIMER & PARTNERS

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The opinions in this presentation are those of the author and do not commit in any way the European Commission

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