Offshore wind power grid connection architecture

Software framework for cost effective design and simulation

CONTEXT

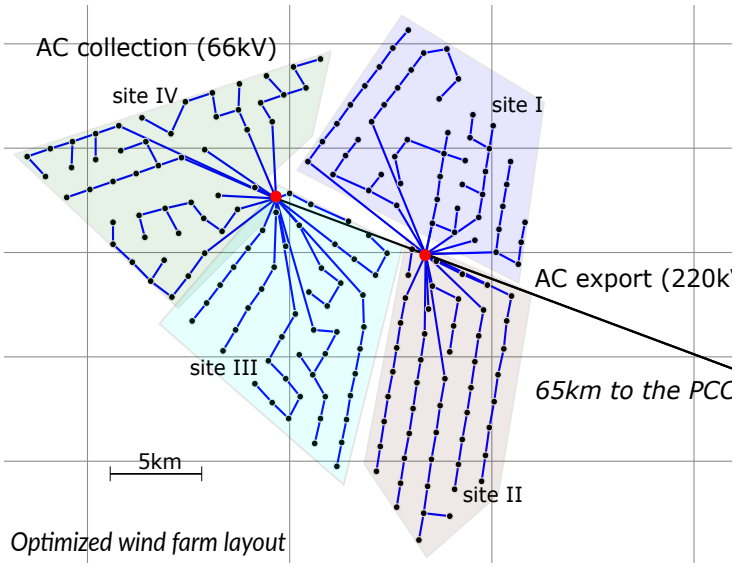
Large offshore wind farms will be important players within the future energy landscape. What is the expected benefit for a project is an essential issue from investor side, considering both technical and financial aspects. LCOE is a standard indicator which allows to assess the economic viability of a project. In this framework, the design of the offshore wind farm electrical grid has a real contribution to the whole LCOE.
Question is then: what is the best technological solution and associated design to connect offshore wind farm power to the grid? We propose a generic tool for facilitating grid connection systems design and supporting expert decision.

TECHNOLOGY DESCRIPTION

The proposed tool performs :

- Technology comparison (AC/DC)
- Voltage levels optimization
- Substations design and positioning
- Cables selection and routing

- CAPEX studies based on dedicated cost models
- System availability analysis
- Power losses calculation
- Life-cycle cost & performances analysis



Optimized wind farm layout

APPLICATION DOMAIN

Several technology options for grid connections supported:
- Full AC: MVAC collector/HVAC transmission
- Hybrid: MVAC collector/HVDC transmission (MMC converter)
- Hybrid: MVAC collector/HVDC transmission (DRU converter)
- Full DC: MVDC collector/HVDC transmission

ADVANTAGES

Robust & near-optimal design

Short computation times

Dynamic user interface

Expert decision support

Models & data library

Large technical scope

TRL SCALE

1 2 3 **4** 5 6 7 8 9

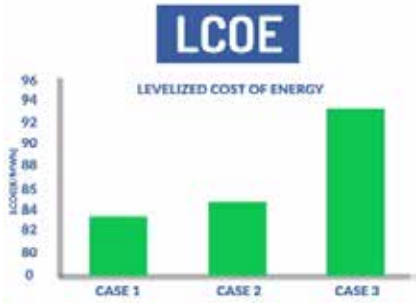
Interfaced software prototype for offshore wind farms grid connection systems pre-design studies.

DELIVERABLES

Software prototype
Technical support
Technical reports
Models & data library

SCIENTIFIC REFERENCE

Swann Gasnier, "Decision support framework for offshore wind farm electrical networks : robust design and assessment under uncertainties", PhD Thesis, 2017



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