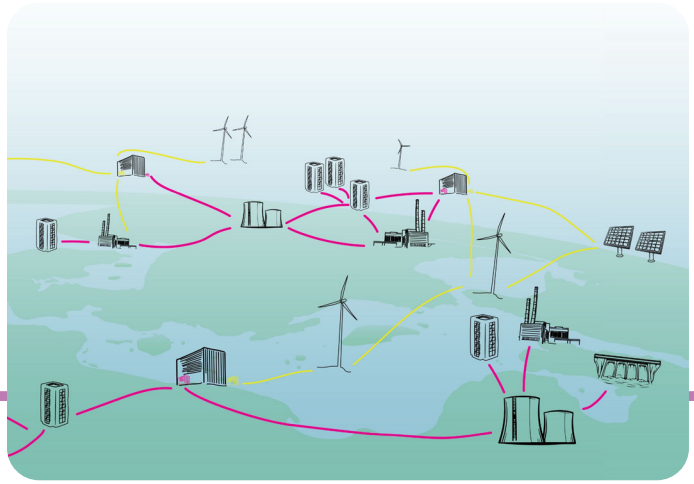
Techno-economic optimisation: unlocking HVDC technologies in your transmission grids

We offer techno-economic analyses (TEA) for TSOs, renewable energy developers and equipment manufacturers. We compare various grid structures (AC & DC) and technologies based on our clients' precise performance indicators and support them in upgrading their power transmission systems and equipment.



OVERVIEW

As an internationally recognised expert in HVDC power transmission systems, we have the unique knowledge and test facilities necessary to offer our clients guidance for developing HVDC solutions and support in evaluating the benefits of HVDC technologies.

We support our clients with our proven in-house TEA tools and simulation software which are fed by our wide range of research activities in HVDC equipment and systems.

Our contribution to numerous important European projects stands as proof of the quality of our services.

OUR ADDED VALUE

- TEA software suite featuring state of the art data on existing and emerging technologies.
- All-in-one expertise, from equipment to systems, from technological concepts to prototypes.
- An expert team capable of studying complex scenarios such as multi-terminal HVDC grids.

GRID CONSULTING SERVICES

We enable our clients to compare multiple transmission solutions which include different technologies, scenarios and precise key performance indicators (KPI).

Offshore/onshore topology studies

- Offshore inter-array collection studies
- Offshore wind connectors (HVAC, HVDC, MVDC, superconductors, etc.)
- HVDC and HVAC for transmission systems

Technologies covered

- AC substations, switchgear, and cables
- Existing DC equipment and cables
- DC equipment under development (DC Circuit breakers, superconductors, DC protections...)
- Offshore, onshore

Various scenarios covered

- Energy prices
- Power flow
- Grid evolution

Precise KPIs covered

- CAPEX, OPEX & TOTEX
- Availability
- Losses
- Levelised Cost of Energy (LCOE)

Comparison of various solutions and configurations based on selected KPIs

Other specific needs can be discussed.

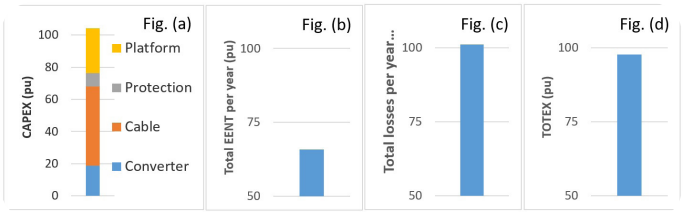
NSWPH CONSORTIUM

Working towards the first meshed Multi-Terminal Direct Current grid in Europe.

Our mission

Evaluate possible protection and topology solutions for a European MTDC grid by comparing the technical and economic benefits of each solution. The *North Sea Wind Power Hub* (NSWPH) consortium asked us to perform this analysis and to demonstrate the feasibility of the offshore meshed HVDC grids they proposed, thereby paving the way for the most ambitious offshore wind energy project in Europe.

Optimised solution based on selected KPIs



Accomplishments

An innovative hub-and-spoke concept was proposed by the consortium to collect power from offshore wind farms in energy hubs and transmit this energy to shore via a flexible European network. The hub-and-spoke concept is based on modular converter blocks, in bipolar configuration at a rated voltage of 525 kV with dedicated metallic return. These standardised blocks offer a cost-effective solution for collecting the massive amount of energy produced in the North Sea.

We analysed 3 different aspects of this concept:

- Methodology for system adequacy design
- Methodology for protection design
- AC and DC interconnection comparison

Key take aways

The client specified that the TOTEX (capital expenditure + operational expenditure) analysis was the most relevant approach to take for evaluating which protection & topology solutions to implement in MTDC grids. Using TOTEX as the key indicator, we were able to select the most efficient solution for our client.

This service was performed for the North Sea Power Hub consortium.

OFFSHORE WIND FARM CONNECTIONS

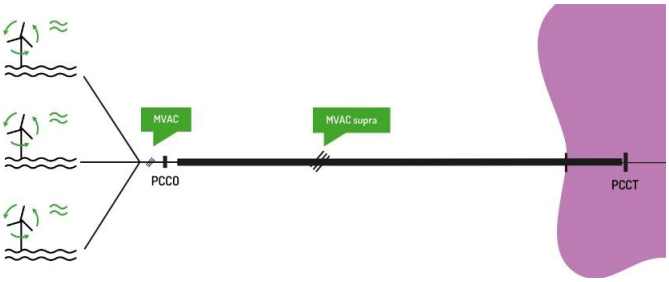
5 configurations of inter-array & export architectures for offshore wind farms.

Our mission

Compare 5 different technical solutions for offshore wind farms' connection to onshore grids in order to select the best solution based on the defined KPIs.

The main configurations that we studied combined state of the art technologies: MVAC, MVDC, HVAC, HVDC and superconductive cable systems.

Example of one analysed architecture



Accomplishments

Our contribution was carried out in 2 main phases:

- Techno-economic analysis of the 5 configurations to find the optimal solution according to the defined KPIs. Following this analysis, a design phase was carried out on the most efficient configuration.
- A bill of materials was extracted from the design phase.

Key take aways

An optimal configuration was presented to the client, including the energy collection at the wind farm level to its transmission to the onshore substation.

This service was performed for the French transmission system operator RTE.

CONTACT

For additionnal information or to ask for a quote, please contact:

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