

## Distributed frequency and synchronization control in an offshore wind farm with HVDC-LCC link

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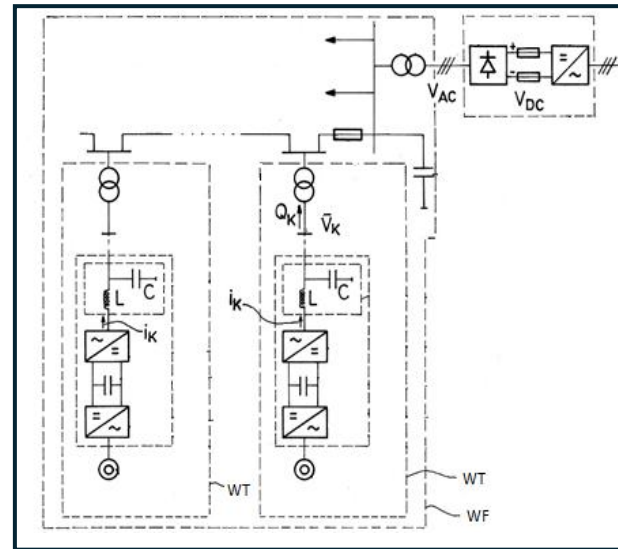
### Summary/Characteristics

Distributed system to control the frequency and synchronization of wind turbines in an offshore wind farm connected to the grid through a high-voltage direct current (HVDC) link using a diode rectifier station. It uses the capability of wind turbines to contribute to voltage-frequency control based on the distribution of reactive power. It is less complex and costly, more flexible, and eliminates additional elements used in current solutions.

Potential licensees or industrial partners and wind turbine manufacturers are sought to co-develop and bring the technology to the market.

### Innovative Aspects

- Distributed voltage and frequency control instead of centralized systems, eliminating the need for an additional capacitor bank.
- Synchronization of wind turbines through the reactive power channel, a novel technique that decouples frequency regulation from active power.
- Individual regulation at each wind turbine terminal.
- Ensures safe operability, as wind turbines always operate within their admissible limits.



*Distributed voltage and frequency control of an offshore wind farm*

### Competitive Advantages

- Reduced infrastructure costs by eliminating additional components.
- Simplified implementation: simple, flexible solution that is easily scalable to different wind farm sizes.

- Higher operational reliability by distributing the control function among all wind turbines.
- Optimized space and weight thanks to the use of smaller capacitors.
- Direct integration into offshore wind farms, enabling HVDC-LCC transmission efficiently and economically.

### Technology readiness level

Proof of concept tested. TRL 3.

### Intellectual and Industrial Property Status:

Spanish patent granted. Title: "Método y sistema para el control de tensión y frecuencia en una red aislada".

### Type of collaboration sought:

Technical cooperation agreements and/or licence agreements are sought with industrial partners to continue developing the technology and incorporate it into the company's product portfolio.