

## Power control of series-connected wind farms through HVDC-LCC link

### Summary/Characteristics

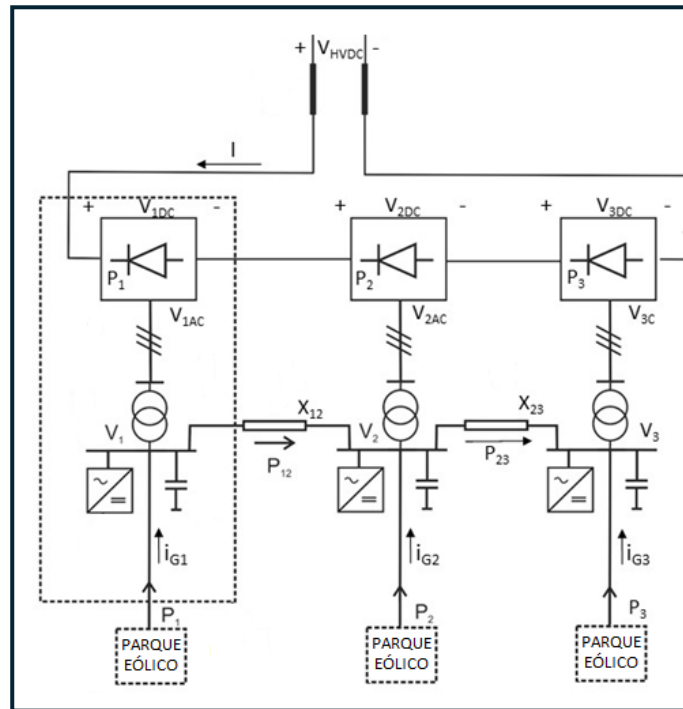
The Power Control Group at Universidad Carlos III de Madrid has developed this system that connects isolated wind farms, such as offshore or marine farms, in series through a high-voltage direct current (HVDC) link.

The system controls the power injected into the DC bus by each rectifier station, distributing individual voltages and achieving an ultra-high-voltage link. Control at each bus is performed through the power flow in an AC interconnection line, based on voltage angle control described in a previous invention.

Technical collaborators or potential licensees are sought to further develop and implement the technology.

### Innovative Aspects

- Use of HVDC-LCC technology, which is more mature, efficient and reliable than HVDC-VSC technology.
- Enables series connection of multiple rectifier stations, distributing the HVDC-LCC link voltage among them.
- Rectifier stations are less complex, more compact and lower cost.
- AC interconnection system between collector buses, allowing balancing of power injected by each station.



Power control scheme of series-connected wind farms through HVDC-LCC link

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### Competitive Advantages

- Lower investment and operating costs due to simpler, more compact and cheaper rectifier stations.
- Higher efficiency and reliability by using HVDC-LCC technology.
- Smaller size and weight of offshore stations, reducing logistical and infrastructure costs.
- Improved stability of isolated grids through dynamic power sharing between interconnected wind farms.

### Technology readiness level:

Proof of concept tested. TRL 3.

### Intellectual and Industrial Property Status:

Granted Spanish patent. Title: "Method and system for controlling a set of wind farms connected in series to a high-voltage direct current (HVDC) link."

### Type of collaboration sought:

License Agreements and/or Technical Cooperation Agreements are sought to further develop the technology and incorporate it into the industrial partner's portfolio.