

Design of stand-alone O&G water injection system fed by wind generation with battery support

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- Offshore wind power + O&G facilities:
 - Reduction of CO₂ emissions;
- Industry project example:
 - Win Win Project (DNV-GL);
- Operational challenges:
 - Wind resource intermittence.

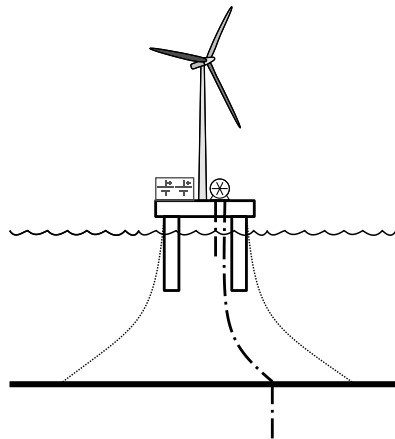


Figure 1: Isolated system (non-submersible pump).

- Proposed system:

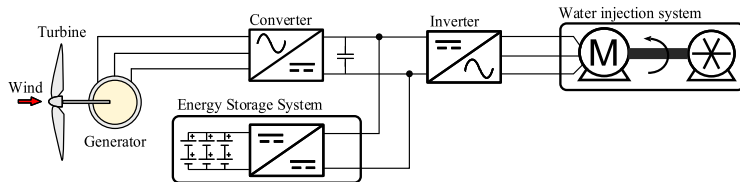


Figure 2: Topology to interconnect a WIS to a wind turbine and BESS with DC current connection.

- Proposed method:

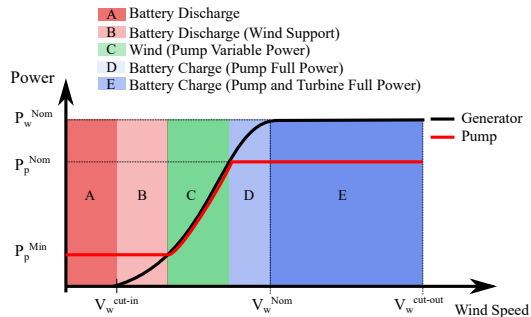


Figure 3: Regions classifications for generator-pump operation with battery.

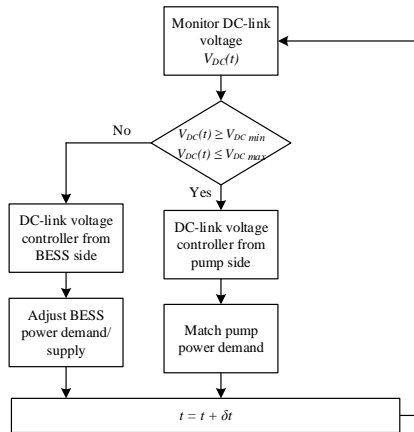


Figure 4: Flowchart for the control scheme proposed.

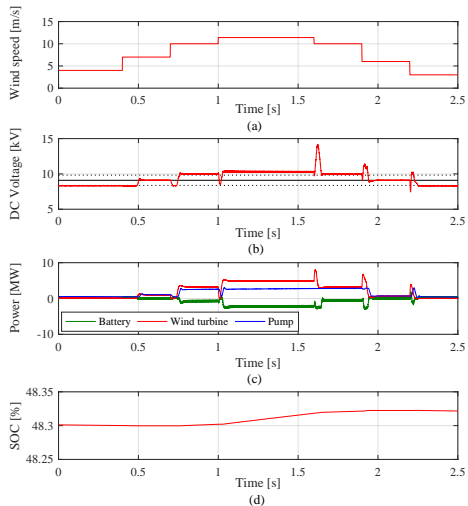
- **Energetic analysis**

- Reduced number of pump's stops; and
- Limited physical space to insert the storage system on the platform.

Table 1: Sensitivity analysis results.

Battery Energy (kWh)	-	100	500	1000	1500	2000	2500	
Number of Stops	1534	1275	1176	1073	1014	968	931	
Stops Time (h)	Avg.	12.01	12.73	12.97	13.34	13.41	13.42	13.33
	Max.	99	99	99	96	96	96	94
Energy Delivered (GWh)	163.72	164.72	165.17	165.61	165.94	166.22	166.49	
Unused Energy (GWh)	66.74	65.73	65.28	64.84	64.52	64.23	63.97	

- Dynamic analysis



Proper system performance achieved!

