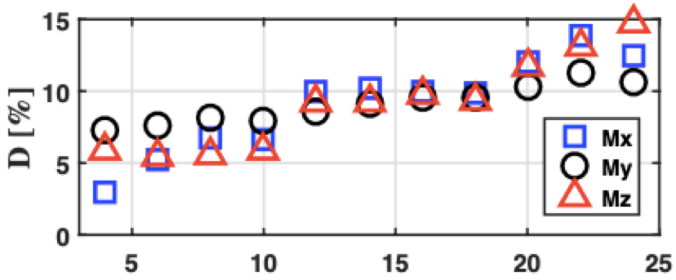
Wind Farm Control: **Loads *vs* Energy Paradigm**



- *At turbine level, increased energy production leads to increase load fluctuations*
- *Also , Yaw-based(…) WF control strategies increase fatigue damage*
- *Lifetime extension of 'old' wind farms becomes more relevant , thus fatigue accumulated damage estimation is critical*
- *As such, 'optimal' operation depends on fast return on investment, turbine age, electricity demand, **energy re-use**, maintenance strategy, etc… multi-poly-objective*

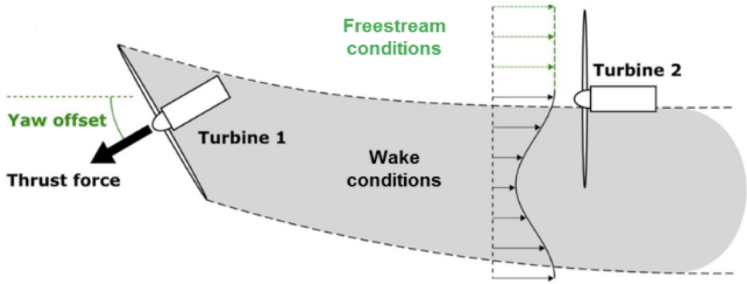
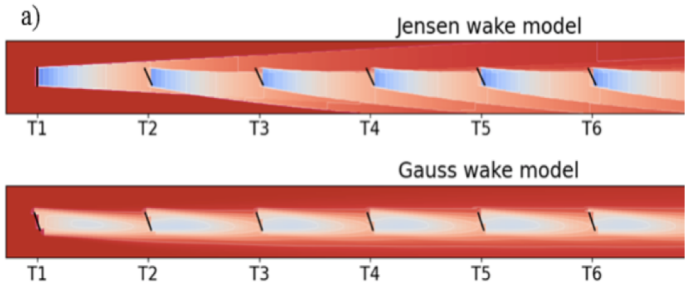
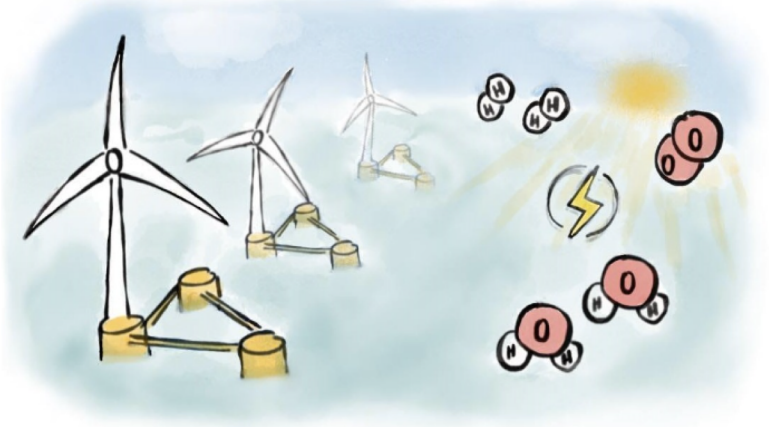


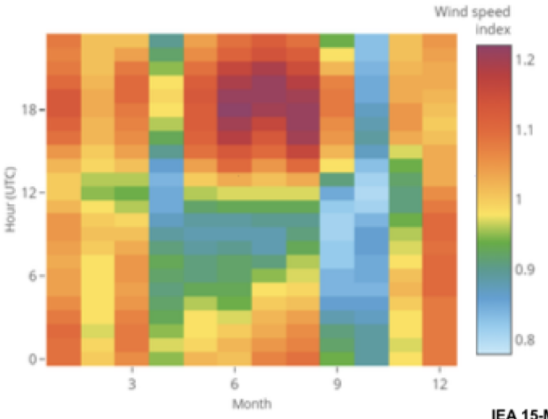
Figure 3.3.1 The concept of yaw-based wake steering [65]



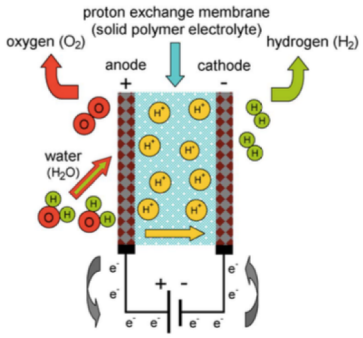
Case study: **Hydrogen production from the WindFloat Atlantic**



- Only Offshore, FOWF in PT
- Off-the-shelf electrolizer (PEM)
- Wind potential from resource assessment
- 2 sizes OWF, w/o O2 production



(a) Hourly vs. monthl



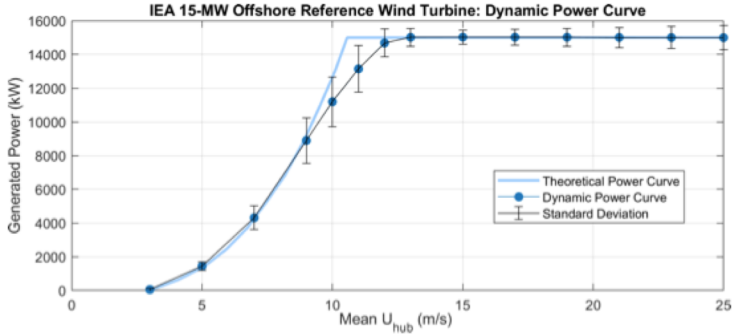
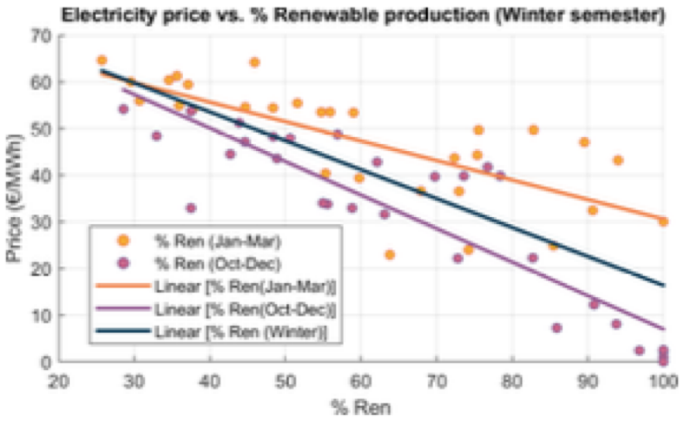


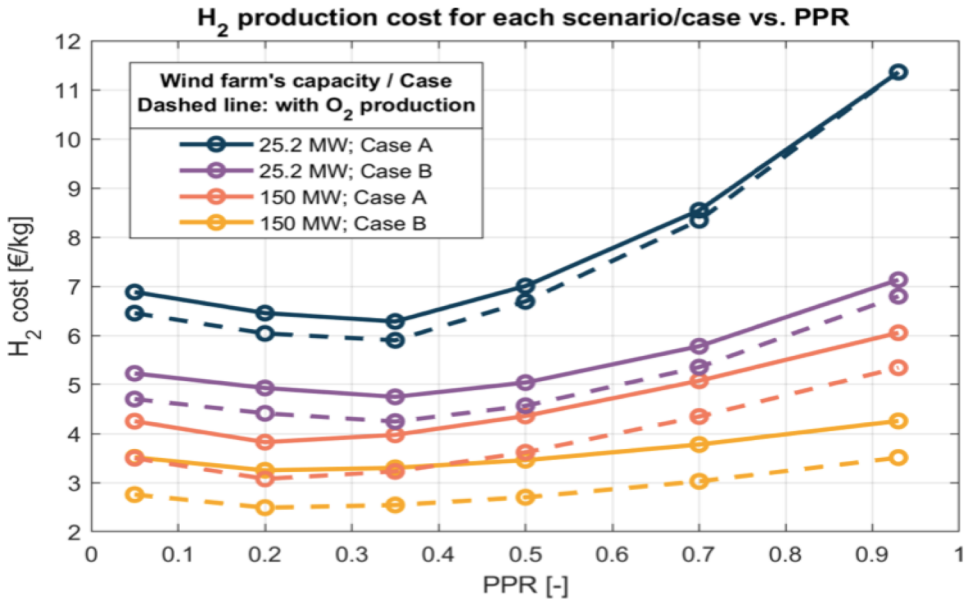
Figure 4.9: Comparison between the turbine's theoretical power curve and the simulated dynamic power curve ($TI = 10\ \%$ for all cases).

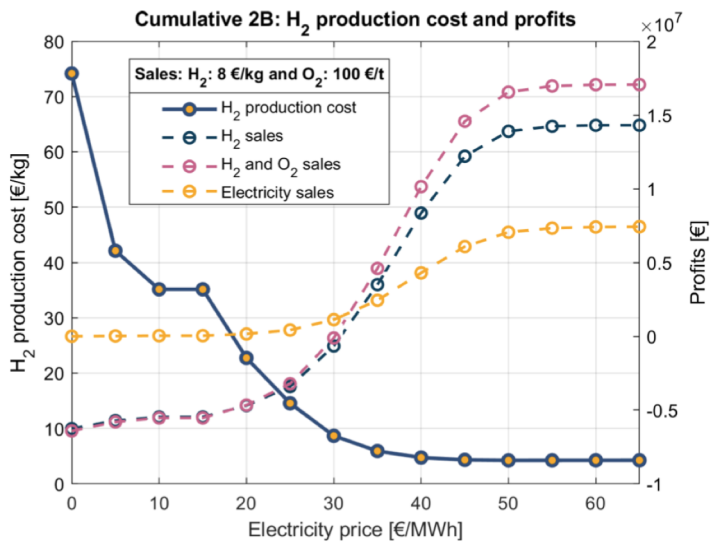
Case study: **Hydrogen production from the WindFloat Atlantic**

- Matching H2 production with curtailment events (REN)
- 2 scenarios (night, +afternoon)
- Mapping H2 production cost
- Hydro/Wind Plant Power Ratio 35%



(a) Winter semester: Jan - Mar; Oct - Dec.





(b) H_2 specific cost and profits by selling H_2, H_2 and O_2 or electricity to the grid.