2C NOW

Climate change impact on offshore wind

DURATION: 18 months (2023-2025) | **BUDGET:** €725K

CONTEXT

Over the lifetime of an offshore wind farm, wind resource could change, leading to a change in the associated energy production. This would then have an impact on the initial business plan. Climate change could also affect the length or intensity of seasons and have an effect on the balance between energy supply and demand. **The intensity and frequency of extreme winds can also vary and have an impact on the design of wind turbines or on foundations, mooring lines, substations and electrical export cables. Extreme waves and rising sea levels must also be taken into account as they are design factors for these systems.**

OBJECTIVES

- To provide stakeholders in the French offshore wind energy sector with various appropriate indicators to assess the evolution of wind resources, associated production and design conditions over the coming decades.
- To assess the uncertainties of current approaches and reduce the risk of a conservative approach, in order to lower CAPEX and improve the business plans of farm developers

MAIN ACHIEVEMENTS

- Production of indicators specific to offshore wind in terms of the impact of climate change on energy production, as well as changes in waves and water levels
- Characterisation of the evolution of extreme events and their intensity
- Estimating wind turbine mast fatigue based on the evolution of wind and wave conditions
- Characterisation of the impacts on the coastline for the landing of electrical cables and their connection to the grid

CONCLUSION

The results of 2C NOW suggest a slight decrease in average wind conditions that could impact wind power production on the French coasts by 2050. They also show an increase in the intensity of extreme events, particularly waves, which determine the technologies design. These trends are more pronounced in scenarios with high greenhouse gas emissions. This should be viewed with caution, given the high level of uncertainty associated with the results from the various climate projection models.

TECHNOLOGIES

STAGES OF THE VALUE CHAIN

Preliminary studies | Design | O&M

MAIN OUTPUTS

- **Exhaustive literature review** covering the main trends and physical mechanisms of climate change, highlighting their application to the offshore wind sector
- **Analysis of the effects of climate change** on wind resources and the design of offshore wind farms
- **Online plateforme** comprising:
  - **Graphs showing changes in wind, waves and water levels** on each French metropolitan coastline, enabling the effects of climate change to be quantified (free access)
  - **Statistics specific** to offshore wind (access restricted to project partners)

PARTNERS

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