

# 2C NOW

## Climate change impact on offshore wind

**DURATION: 18 months | LAUNCH: 2023 | BUDGET: €725K**

### CONTEXT

Over the lifespan of offshore wind farms which is more than 25 years, the wind resource, or in other words the wind distribution, might evolve leading to a modification of the associated energy production, impacting the business plan established during the creation of these farms. Climate change could also affect the length of the seasons or their intensity and therefore impact the balance between supply and demand in the energy sector. **The intensity of extreme wind events as well as their frequency can also change and impact the design of the wind turbines as well as the foundations, moorings, substations, and export cables. Extreme wave and water level events are also to be considered because they are dimensioning for these systems.**



### TECHNOLOGIES



### STAGES OF THE VALUE CHAIN



Preparatory studies



Design



O&M

### OBJECTIVES

- To provide the French offshore wind sector stakeholders with different appropriate indicators to assess the expected evolution for the next few decades in terms of wind resources, associated production and design conditions
- To assess uncertainties of current approaches and reduce risk of conservatism, leading to reduced costs for renewables energies and better business plans for developers

### SCIENTIFIC CONTENT

#### Literature, trends and physical mechanisms

- Literature review about trends and associated uncertainties
- Identification of physical mechanisms behind these trends and link to the offshore wind sector

#### Impact of climate change on resource and yield

- Comparisons between climate models, long-term measurements and state-of-the-art reanalyses
- Validation of the climate models in a spatial way, at the different places of interest for the development of offshore wind farms
- Production of offshore wind-specific metrics and statistics for different horizons, but also continuously

#### Impact of climate change on design

- Comparisons between climate models, long-term measurements and recent reanalysis for waves and water levels
- Development of statistics and indicators for the evolution of distributions
- Characterisation of the evolution of extreme occurrences and intensities
- Estimation of the fatigue on the turbine tower according to the evolution of the wind distributions and the sea levels
- Characterisation of the impact on the coastline for the cable landing and the onshore grid connection

### EXPECTED RESULTS

- **Exhaustive literature review** report including main trends and physical mechanism of climate change keeping in mind the application to offshore wind sector
- **Analysis of climate change effects** on wind resource and offshore wind farm design
- **Online platform** including comparison/validation graphs for wind, waves and water levels on each French metropolitan seafloor, offshore wind-specific wind and resource metrics and statistics to quantify climate change effects, and metrics on extreme events of wind, waves and water levels

### PARTNERS



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