BIODHYL Project

Newsletter #3

Studying biofouling in the context of offshore renewable energies

APRIL 2026

OUR OBJECTIVES

- To gain a better understanding of the early stages of the biocolonisation of an offshore structure by studying the organisms involved and how their populations evolve over time and in response to the environment
- To identify the most reliable and robust techniques and protocols for accurately characterising biofouling automatically

INNOVATIONS

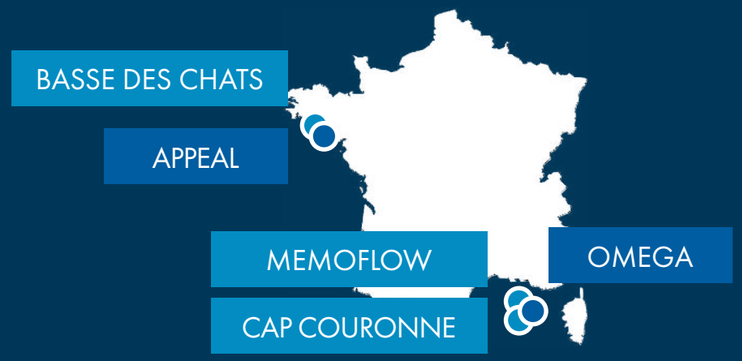
- Identification of the main factors influencing biocolonisation based on different parameters measured on site (depth, temperature, pH, nitrite content, sea currents, etc.)
- Offshore monitoring over several months or even years, involving the development of an innovative protocol

This project benefits from French State funding managed by the ANR as part of the France 2030 investment plan, and financial support from the Brittany, Occitanie, Pays de la Loire and SUD Provence-Alpes-Côte d'Azur regions.

PARTNERS

FRANCE ENERGIES MARINES · EDF power solutions · Ifremer · OW OCEAN WINDS · Rte Le réseau de transport d'électricité · RWE · Shell · TotalEnergies · UNIVERSITÉ DE TOULON

STUDY SITES & TYPES OF MONITORING



FINE TIME & SPACE MONITORING

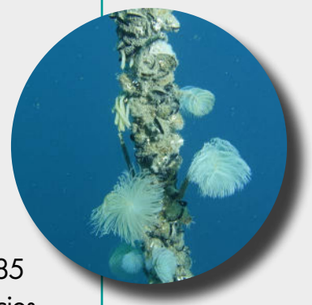
LONG-TERM MONITORING

FIRST RESULTS

EVOLUTION OF BIOFOULING DENSITY

- The biofouling density varied during the first year of monitoring, and this variation was repeated in almost exactly the same way in the second year. The values were, however, below the recommendations set out in the standards (Norsok and DNV-GL).
- After four years of immersion, the density of the biofouling has stabilised at around standard levels.

EVOLUTION BIOFOULING DIVERSITY



- To date, 227 species have been recorded across all samples; this list will soon be expanded to include the results of the latest analyses.
- The approach combining metabarcoding and taxonomic analysis based on morphological criteria has provided a more comprehensive picture of the diversity of biofouling (mitochondrial COI gene = 85 species, 18S ribosomal DNA = 346 species, morphology = 115 species, combined = 465 species).
- Species richness increases over the years, with significant inter-site variability in communities and inter-annual variability.
- Variations in communities are primarily driven by the common mussel (*Mytilus edulis*), the Mediterranean mussel (*Mytilus galloprovincialis*), the marbled scud (*Jassa marmorata*), and two species of hydra (*Coryne* sp. and *Obelia dichotoma*).

FIRST CONCLUSIONS

The deployment of representative materials for a minimum of 2 years is essential for characterising the nature and dynamics of biocolonisation at a site and for ensuring that these factors are considered when determining the design parameters and defining the original state.

The development of an integrative taxonomic approach (morphology and DNA) enhances the comprehensiveness of the results and improves our understanding of the food chain. This provides a better understanding of the diversity of biofouling, as well as of the mobile species associated with or aggregated around structures deployed at sea. It is also possible to detect non-native species.

Assessing the potential for biofouling at different sites will enable the design of structures to be refined, using values that are closer to reality than certain standards based on experience from the North Sea.

SCIENTIFIC COMMUNICATIONS

February 2026

Journées scientifiques de l'éolien, Marseille, France - Quillien *et al.*

Epibenthic biodiversity and biofouling characteristics at offshore sites: spatial and temporal variability

February 2026

Biofouling - Portas *et al.*

A review of biofouling characteristics and issues for offshore renewable energy industry

This review examines the gaps in our understanding of the dynamics of marine biofouling. It suggests avenues for future research aimed at improving maintenance strategies and the environmental integration of offshore renewable energy. Understanding these processes is essential for the long-term sustainability of these technologies.

June 2026

International Conference on Ocean, Offshore and Arctic Engineering (OMAE) 2026 - Damblans & Quillien

Strength of a multidisciplinary approach to enhance biofouling characterization: from comprehensive requirements of engineering and environmental analyses

The study presented here is based on 7 years of R&D and numerous measurements taken on samples submerged offshore for between x and 4.5 years along the French coastline. Based on an approach combining biology and engineering, a protocol is proposed. It enables the collection of representative biofouling characteristics, improves modelling accuracy and paves the way for standardised metrology.

OMAE® 2026

www.france-energies-marines.org/en/projects/biodhyl/