





Showcasing the effectiveness of Ocean Multi-use practices in the North Sea and Baltic Sea.



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The project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101093888. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

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North Sea German Pilot FINO3

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About The Pilot

The **ULTFARMS** German **North Sea** pilot at **FINO3**, operated by Forschungs- und Entwicklungszentrum Fachhochschule Kiel GmbH, is located 80 km west of Sylt, near the DanTysk Wind Park. This site provides an ideal environment for **exploring multi-use offshore aquaculture** — an increasingly important approach as **open sea space becomes more contested**. The pilot focuses on **developing sustainable shellfish and seaweed farming**, cultivating sugar kelp, blue mussels, and **european oysters**. To make offshore aquaculture viable in extreme conditions, the project **adapts advanced cultivation techniques**, **monitoring** technologies to **enhance efficiency, sustainability, and profitability**.

Main Achievements

• Longline system experience:

The installed longline system provides valuable insights into the feasibility of offshore wind park-associated aquaculture. The recent mussel harvest provides invaluable growth data for offshore sites which will fuel business model analysis and suitability predictions.

• European Oyster Cultivation:

Implementation of an on-bottom growth system for both **aquaculture** and **restoration efforts** aimed at reviving the **European oyster** (*Ostrea edulis*), a species that was once dominant but is now regionally extinct, **within the German Bight**.

• Cutting-edge Sensors And Remote Monitoring:

Novel sensor installation of the bbe Moldaenke GmbH, Phycoprobe. This device now allows for real-time detection of potentially harmful microalgae at the FINO3. This information will reduce unnecessary sea-missions and will indicate proper harvest times.

Main Challenges

Distance & Logistics

- Long distance to the nearest suitable harbor requires precise planning for installation, operation and deinstallation.
- Efficient logistics coordination is crucial for maintaining smooth offshore operations.

Harsh Offshore Conditions:

- Extreme environmental factors, including wave heights up to 17.9m (50-year period) and surface water speeds of a maximum of 1.2 m/s, pose operational challenges.
- Demands intensive nearshore testing and adaptation of equipment to withstand tough conditions.

Regulatory Framework & Compliance

- Legal regulations for offshore multi-use (MU) activities are still evolving in Germany.
- Requires close coordination with authorities to ensure compliance and facilitate project development.

Piloted Solutions

Large-scale Aquaculture System:

The tested longline systems with a total length of 250 meters provide valuable insights into the feasibility of offshore aquaculture.

Multi use & Co management Approach: Close stakeholder involvement between all involved interest groups, from wind park operators to shipping companies to aquaculture producers.

Long-term Datasets and Analysis: Thanks to FINO3, a plethora of environmental data are accessible which are the foundation of performance models and, therefore, custom system design solutions that have proven to work.

Application

Scientific

Multi-Use & Co-Management

Integration of offshore aquaculture into wind parks.

Synergy Effects

Proven examples of co-design & co-management.

Data Generation & Analysis:

Generation of growth data for macroalgae (*S. latissima*), mussel (*M. edulis*) and European oysters (*O. edulis*) to investigate risk factors, and business case parameters.

Commercial

Vessel Optimization

Guidance on safe, efficient vessel layouts for offshore aquaculture.

Aquaculture System Design

Expertise in longline setups, handling protocols, and sustainability.

Mooring Technology

Successful solutions for extreme offshore conditions.

Regulatory Support

Advice on offshore aquaculture permitting and compliance.

FINO 3
GERMAN NORTH SEA

Sectors covered:

-  Seaweed aquaculture
-  Nature restoration
-  Renewables
-  Oyster aquaculture
-  Mussel aquaculture