Building nature-friendly Offshore wind farms

CEDA-NL / IRO Clubavond 12-03-2019

Introduction

Van Oord
Marine ingenuity

Introduction

Van Oord
Marine ingenuity

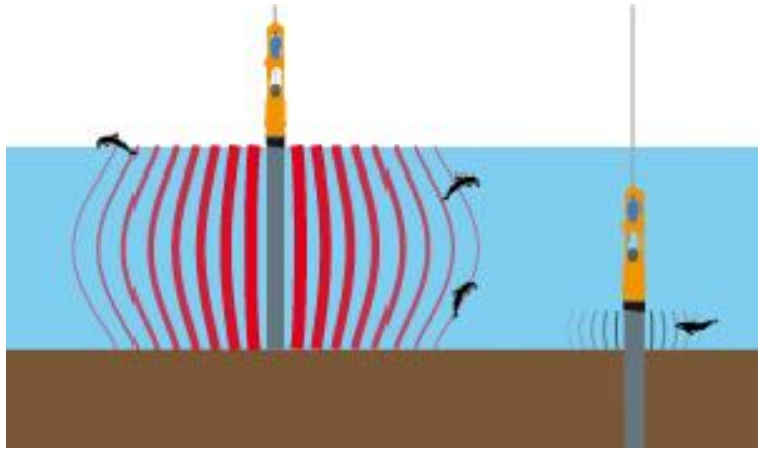
Van Oord Offshore Wind

- Foundation installation
- Tower installation
- Cable laying & burial
- Scour & cable protection

Environmental effects we have to deal with…..

Van Oord
Marine ingenuity

Underwater Noise



Many users ……cumulative effects

Content

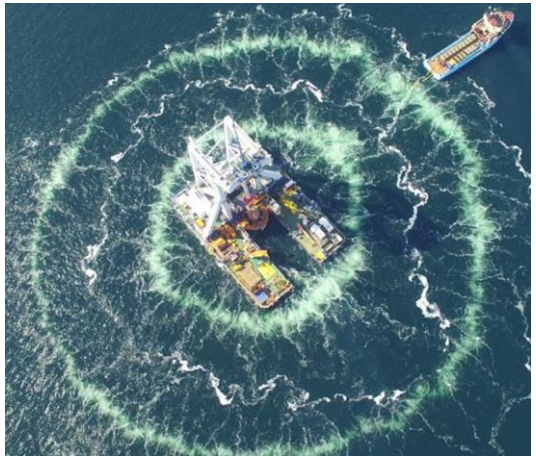
Van Oord
Marine ingenuity

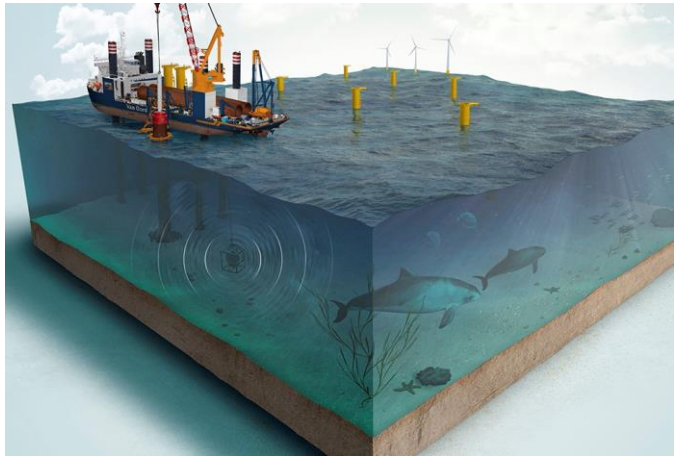
Challenges

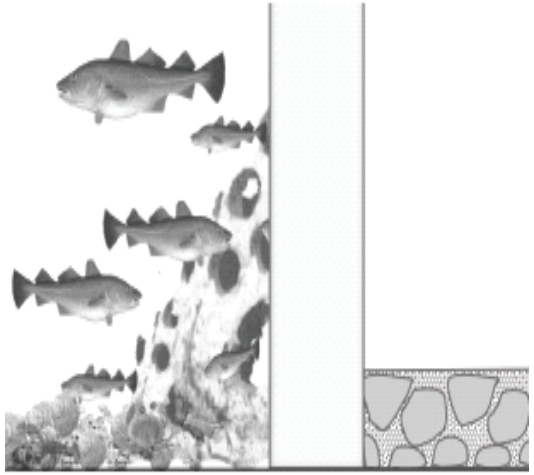
- Installation noise
  - Noise mitigation
  - Mammal deterring system

Opportunities

- Induce biodiversity
  - Shellfish reefs
  - Increase species richness







Mammal deterring system

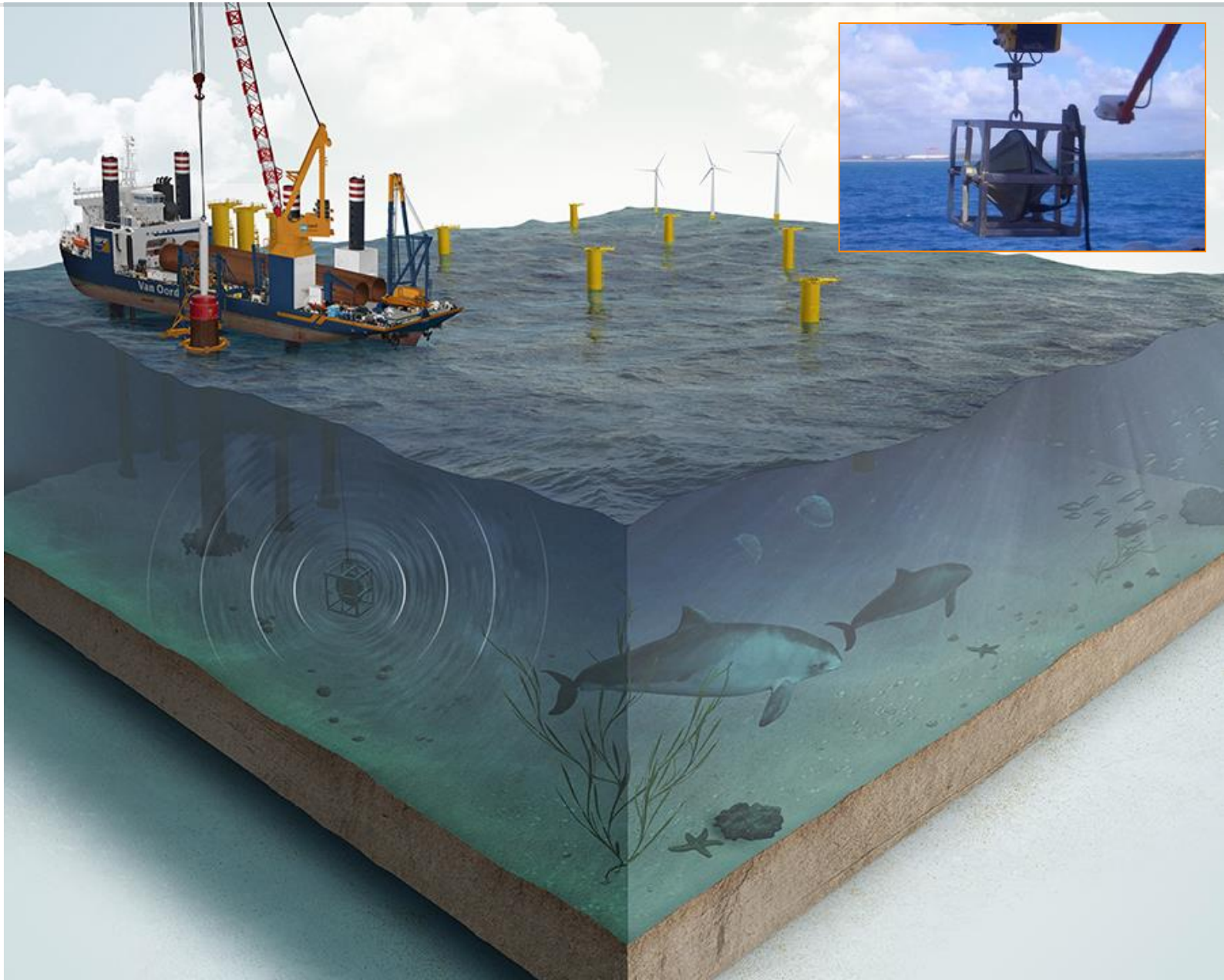
Van Oord
Marine ingenuity

Fauna Guard

- Proactively repels marine fauna from dredging and construction works with specialized (safe) acoustics





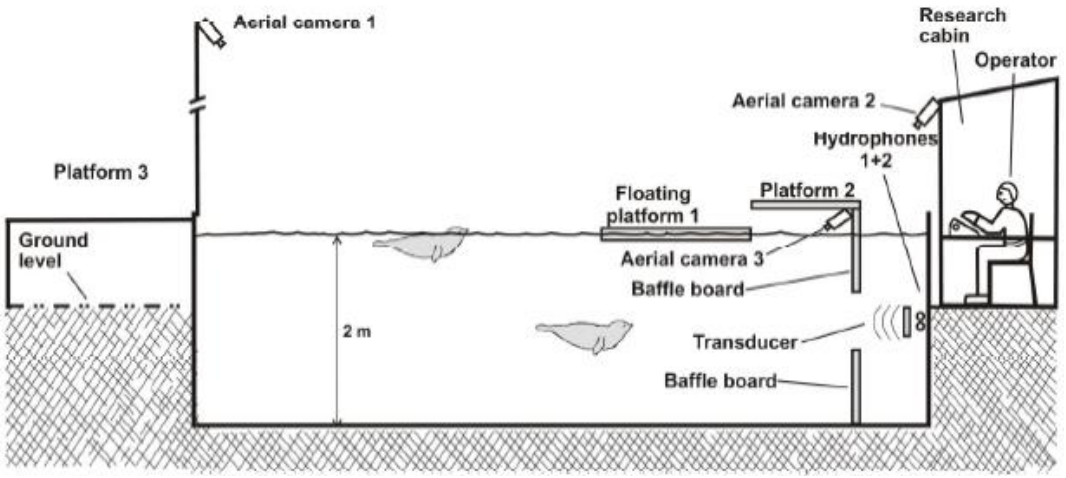


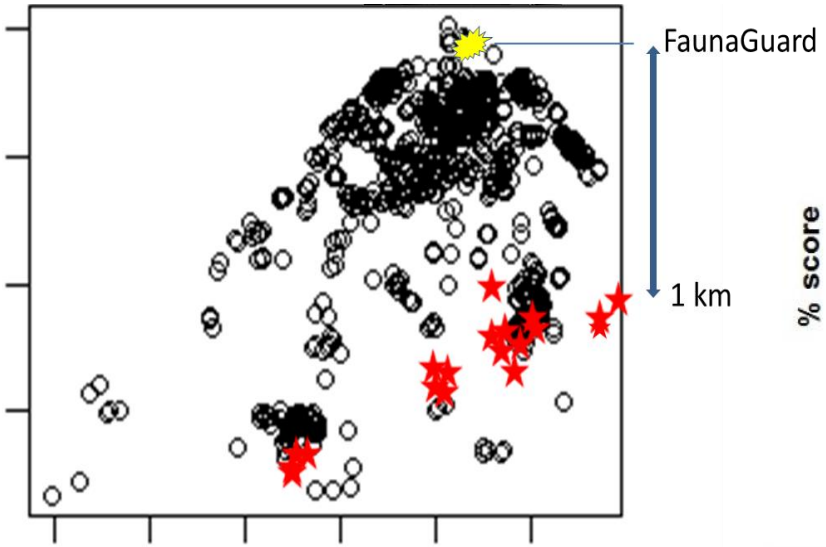
Mammal deterring system

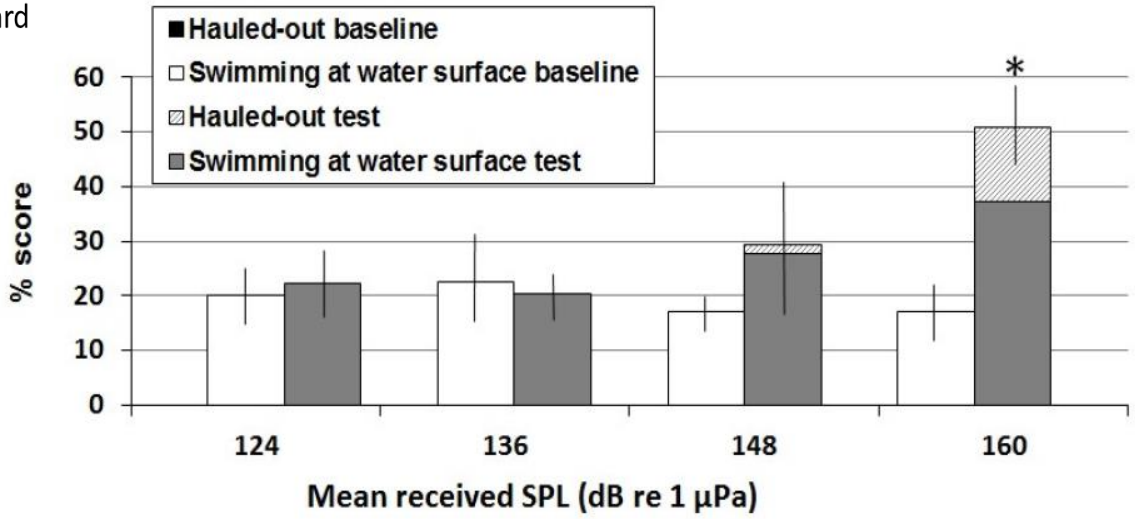
Van Oord
Marine ingenuity

Fauna Guard

- Behavioral response studies to proof effectivity:
  - in captivity – selection of safe sounds
  - In the field – deterrence effect







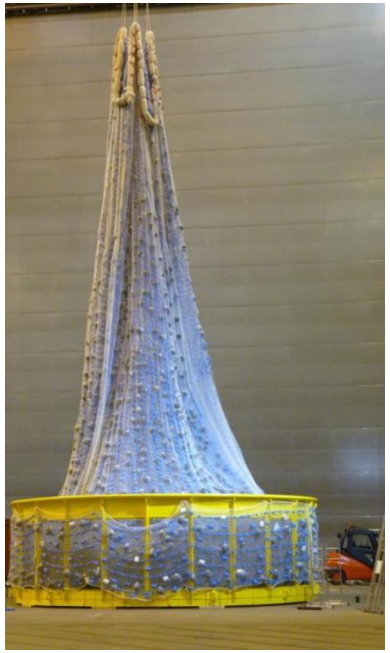
Noise reduction technology

Van Oord
Marine ingenuity

Near-field systems

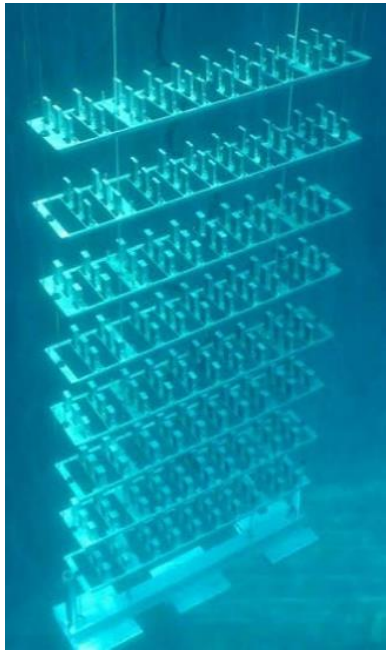
Distance from MP: ≤ 50 m

HSD



IHC IMI

AdBm



Far-field systems

Distance from MP: > 50 m

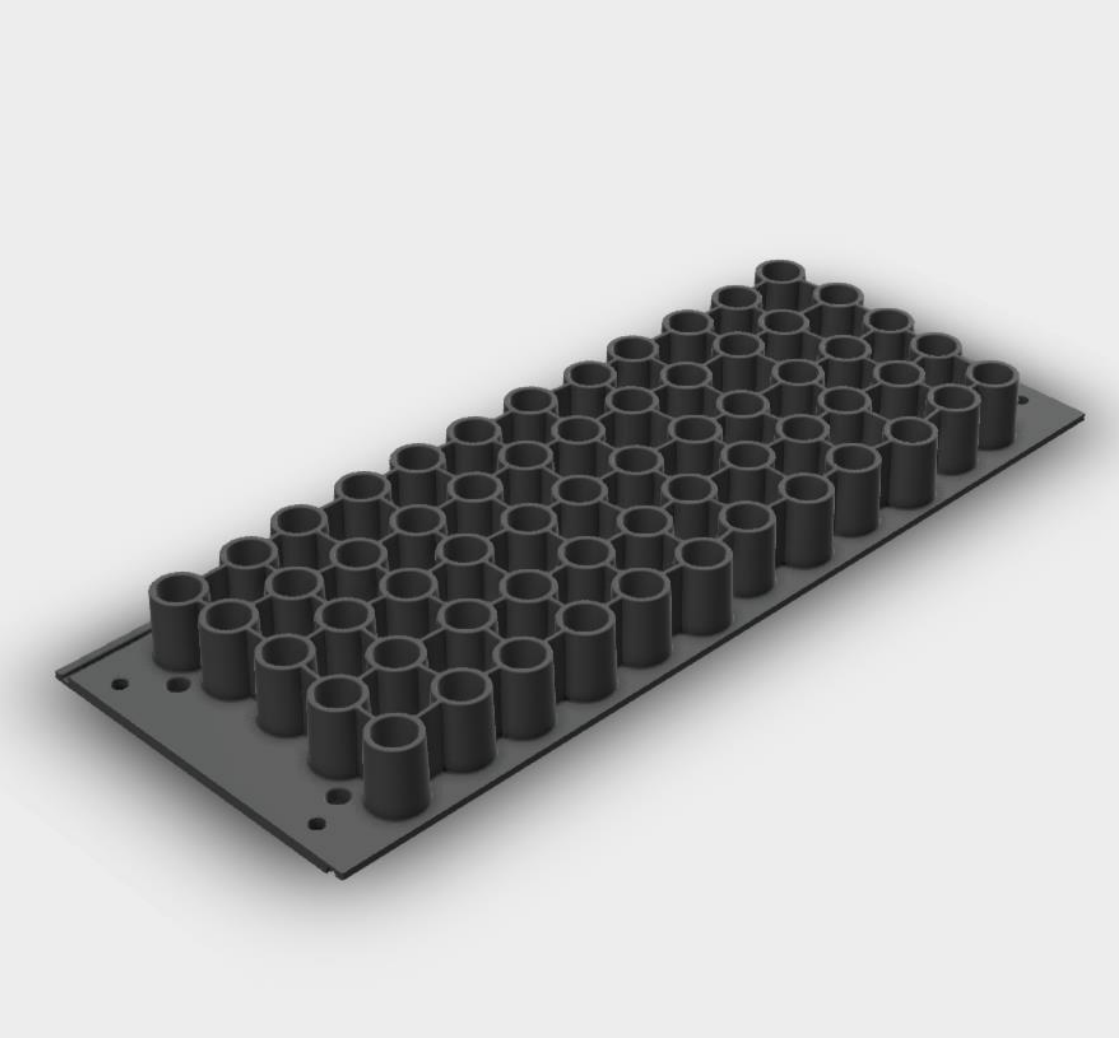
Bubble Curtains

Demonstration AdBm noise reduction technology

Van Oord
Marine ingenuity

Passive Noise Abatement

- First full scale test of the AdbM system
- Helmholtz resonators, tuned to 100 Hz
- Open system, 1 meter between the resonator panels
- Passive system, no continuous power supply necessary
- Potential reduction up to 35 dB



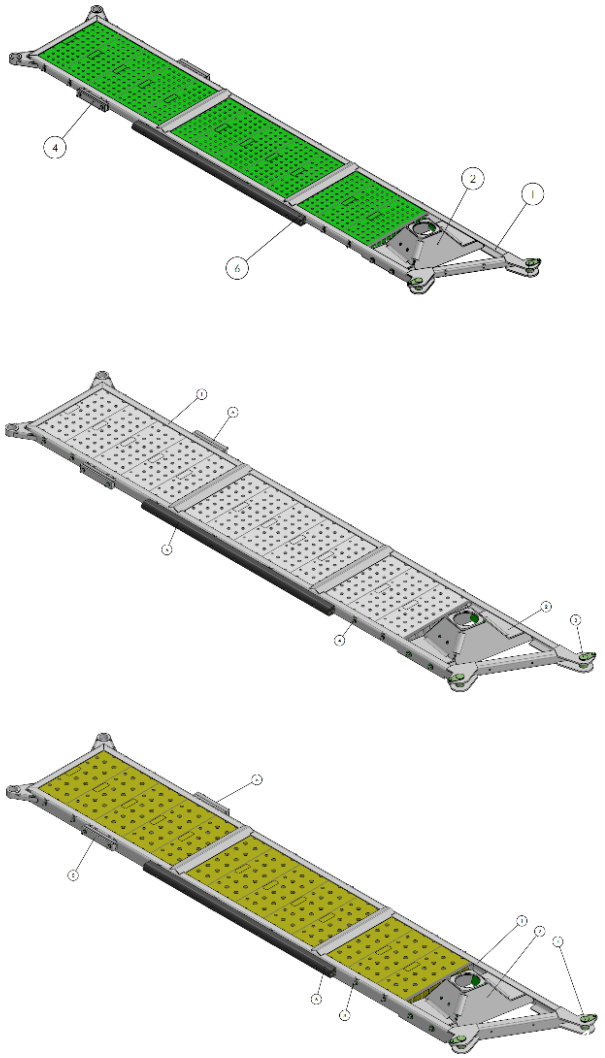
Demonstration AdBm noise reduction technology

Van Oord
Marine ingenuity

Offshore Installation Vessel

Lifting frame

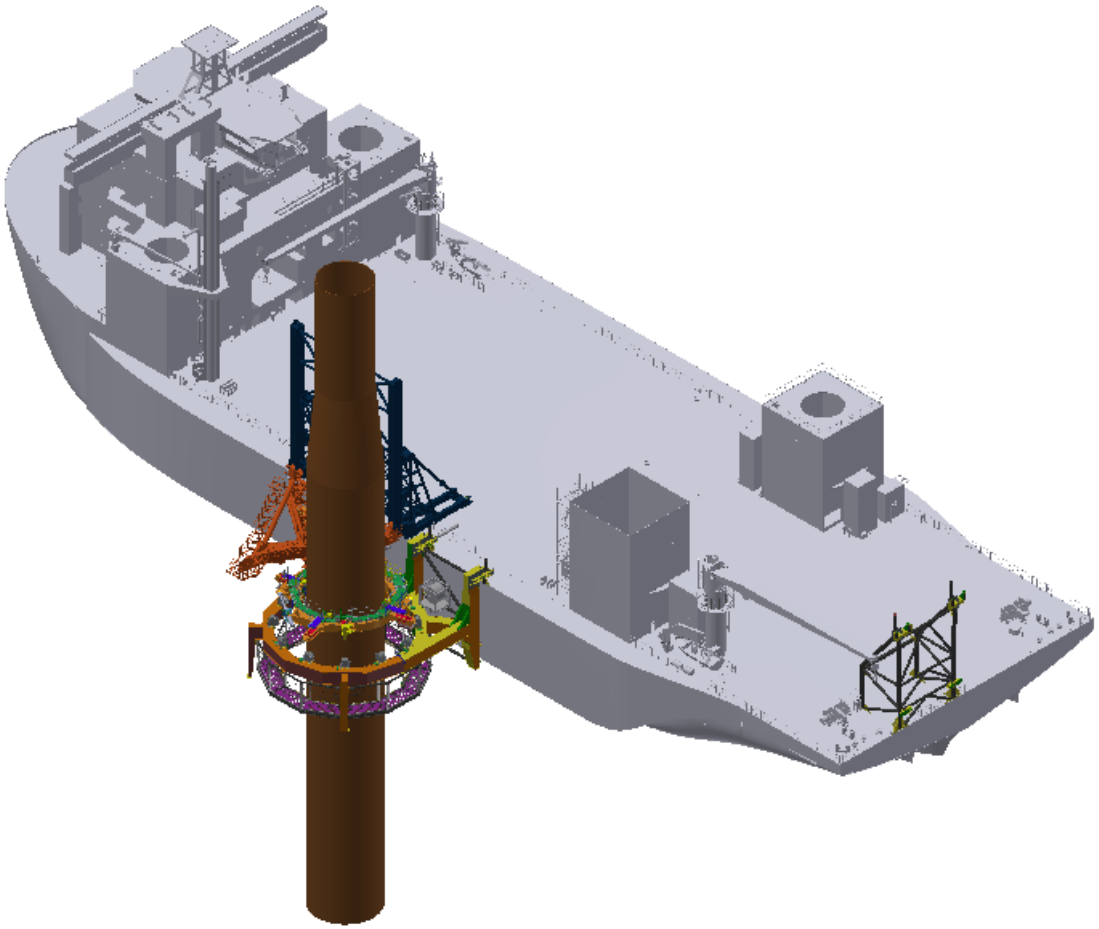
Resonator frames



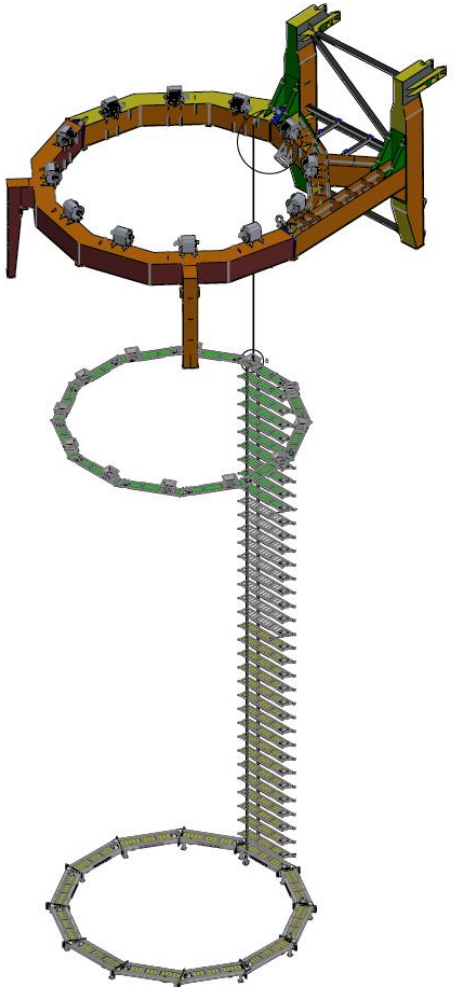
Demonstration AdBm noise reduction technology

Van Oord
Marine ingenuity

Deployment facility



AdBm-system



Van Oord reef guard

Van Oord
Marine ingenuity

Scaling up Great Barrier Reef Coral restoration

Rotterdam, the Netherlands, 27 November 2018 – A consortium consisting of Van Oord, Australian research institute CSIRO, and Delft University of Technology have reached a new milestone. This week they are testing a new method for large-scale coral rehabilitation at the Great Barrier Reef in Australia. Climate change and coral bleaching have resulted in the reef in losing more than half of its coral cover since 1985. The consortium hopes to identify the best method for overcoming a crucial bottleneck in the upscaling of reef rehabilitation.

Method

The consortium partners' rehabilitation method involves harvesting coral eggs and later transplanting the coral larvae in places where coral is meant to grow. This is a proven concept that is already being applied on a small scale and in tanks. In this new test phase, the researchers will analyse on site whether the method can be scaled up. Van Oord's vessels are collecting vast numbers of coral eggs using specially adapted pump systems. It's an exciting process," says Professor Mark van Koningsveld from TU Delft and Innovation Manager at Van Oord, "because we then have to get to the eggs really quickly with the boat containing our pumping and research equipment so we can do our tests; the next opportunity to test this process in the wild isn't for another 12 months, when the coral spawns again."

Fragile eggs

It is important that the fragile eggs are still alive when they reach the storage tank. To make their journey as smooth and safe as possible, TU Delft's and Van Oord's researchers have spent the past few months optimizing the pumping systems. For example, the pump needs to cause no eddies during suction and has to stay floating on the surface of the water. Also, the type of pump turned out to play an important part in the design. Over the coming weeks, testing on location will show how the pumping systems really perform in currents and waves. The researchers will be testing two types of pumps and two types of storage tanks in Australia. During the Dutch lab tests, alternatives were used to mimic the structure of coral eggs as closely as possible, such as fish spawn, peas, blueberries and little balls of gel.

Coral rehabilitation

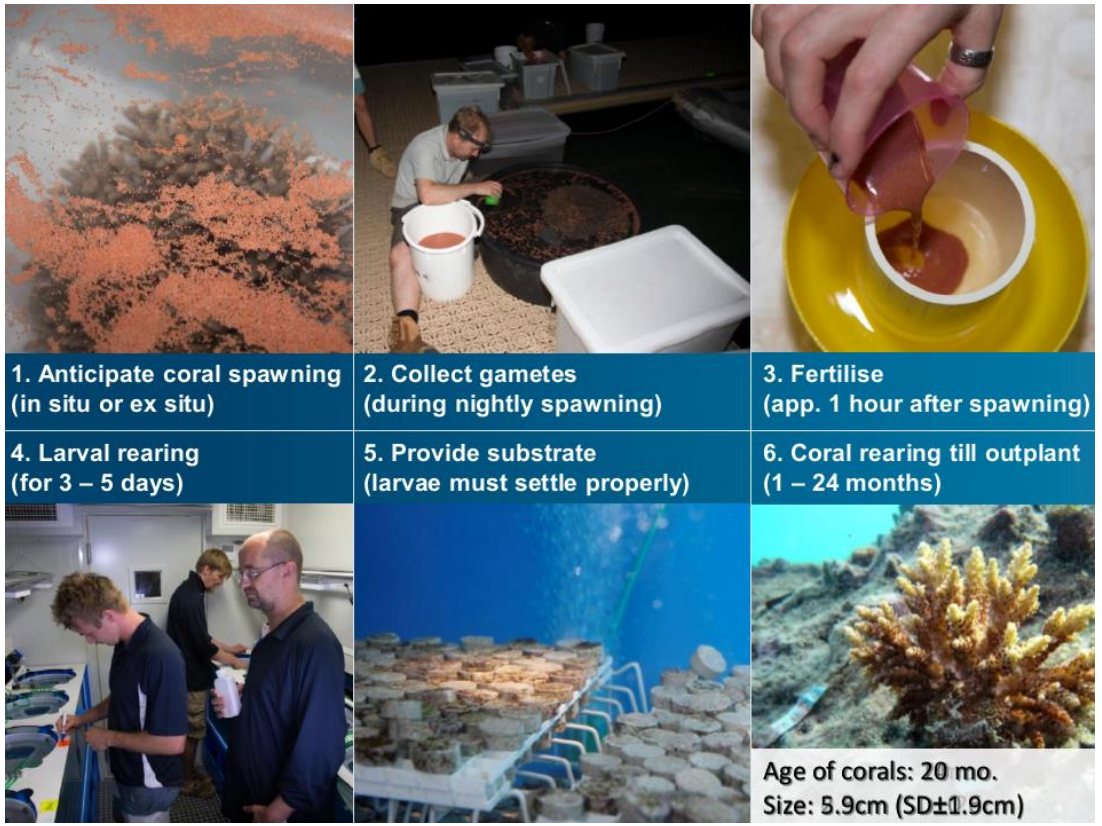
If the pumps and tanks prove to be an effective way of collecting coral eggs on a large scale so they can later be released to settle on the reef, this will be an important step towards the rehabilitation of coral reefs. "With a single ship, we could collect and transport some two billion eggs. That sounds like a lot, but on healthy parts of the Great Barrier Reef, that is only a negligible amount of the available total. However, if we can get them to develop into larvae and subsequently release them in spots where the reef is damaged, that would solve one of the main bottlenecks for the rehabilitation of such reefs", Van Koningsveld explains. "Sufficient scale is essential to maximise the positive effect, besides other management and protective measures that remain necessary to create the best possible conditions for reef rehabilitation."

ReefGuard & Coral Engine

Australian research institute CSIRO has a long track record in coral research. Van Oord has also made its mark in coral research by providing access to existing techniques at scales necessary to develop hydraulic infrastructure, for example its successful development of the ReefGuard and the Coral Engine. Delft University of Technology is the third research partner and is contributing its knowledge of pump systems and hydrodynamic processes.

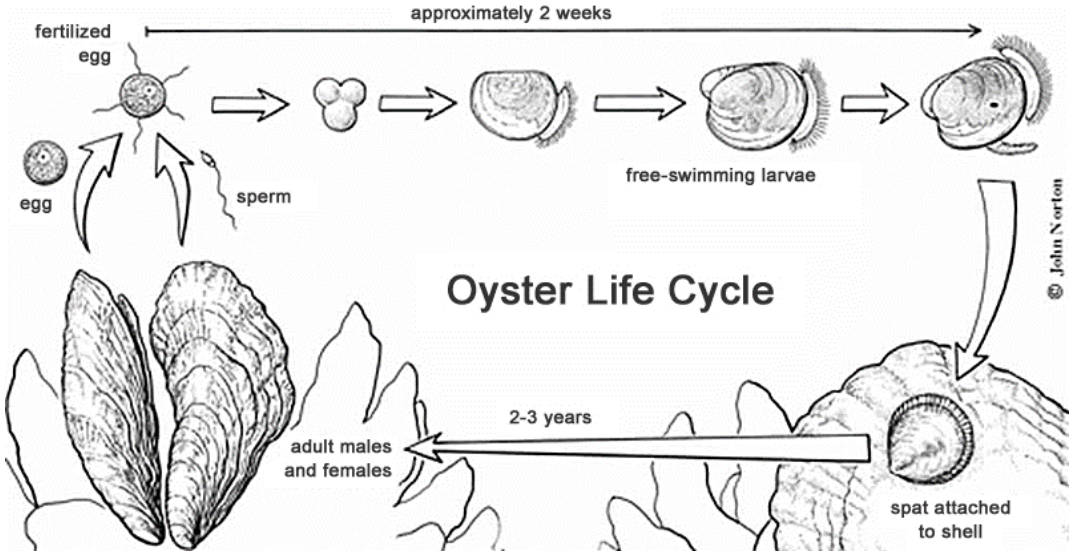
Recruit team

ReefGuard coral in the Bahamas



North sea reefs

Van Oord
Marine ingenuity



?

Oysters – Outplacement Method

Van Oord
Marine ingenuity

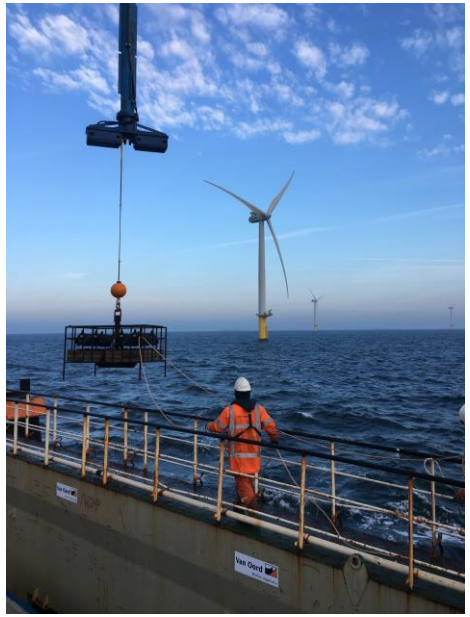
Oosterscheldemuseum

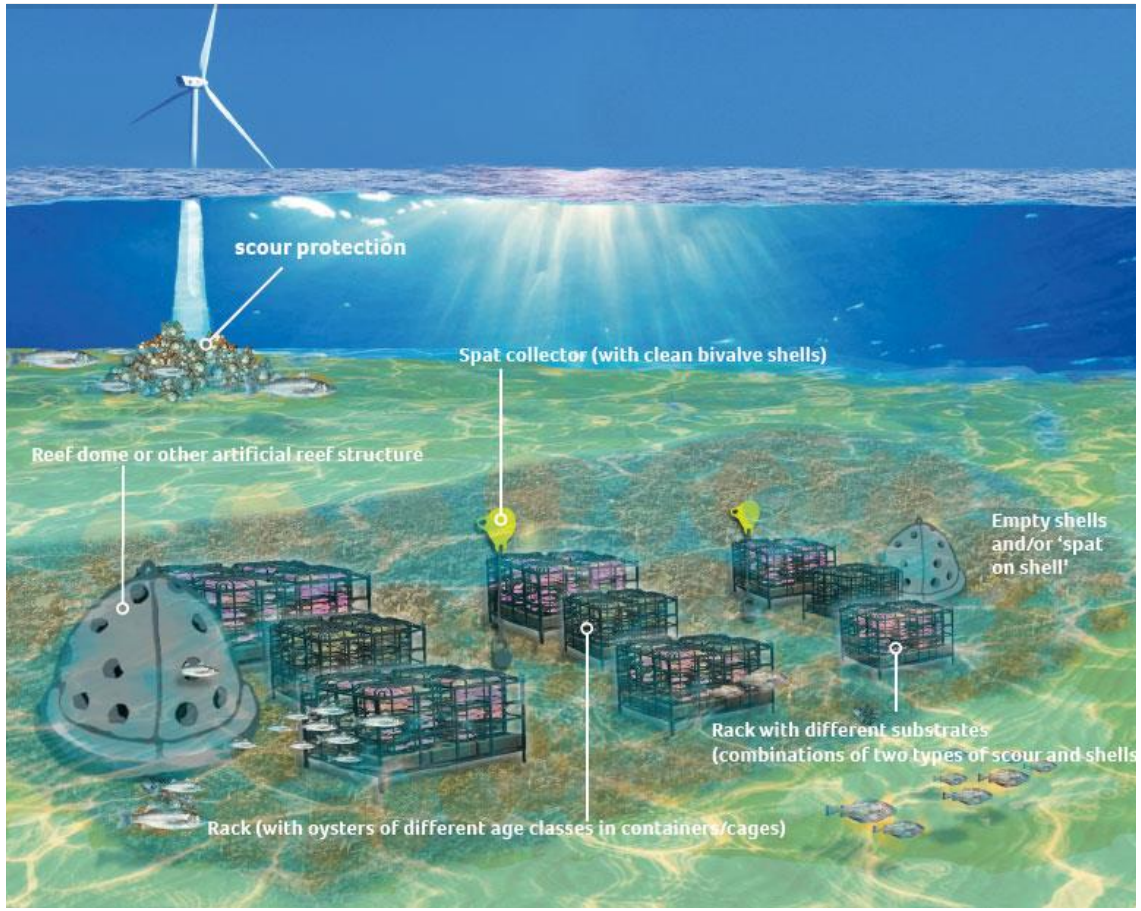
Luchterduinen Windfarm

Van Oord
Marine ingenuity

Flat Oyster Pilot

- October 2018: Oyster cages & Reefballs placed
- July 2019: Placement of substrate cages



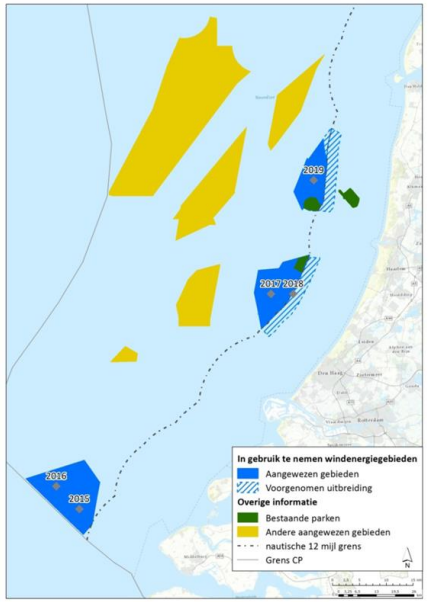


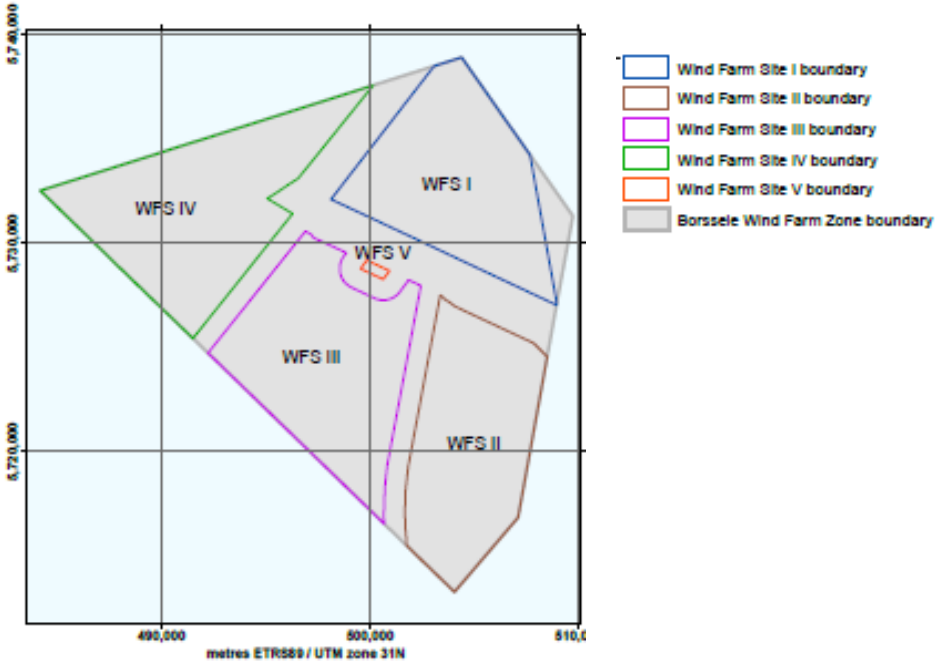
Borssele V: Innovation project

Project Overview

Innovation Site in Borssele OWF

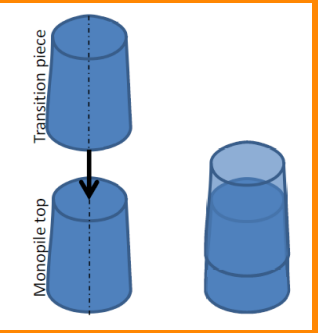
2 MHI-Vestas 9.5 MW – V164 WTGs



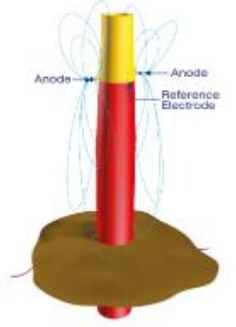


Planned Innovations:

1. Slip Joint
2. ICCP Optimisation
3. TSA Coating
4. Cable routing
5. Eco-friendly Scour

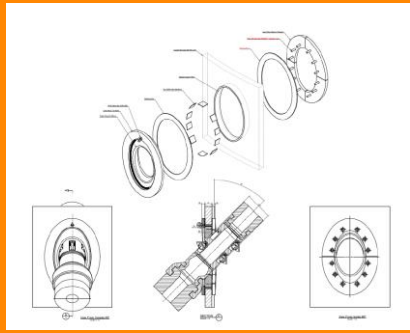


1



2

3



4

5

Borssele V: Innovation project

INVESTRI OFFSHORE

Green Giraffe
The renewable energy financial advisors

Van Oord
Marine ingenuity

UNIVERSITY OF APPLIED SCIENCES

NIOZ Koninklijk Nederlands Instituut voor Onderzoek der Zee

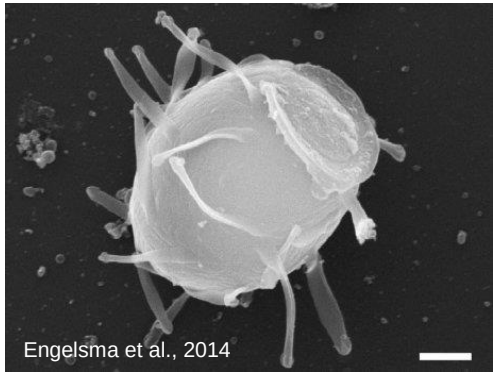
Bureau Waardenburg bv
Adviseurs voor ecologie & milieu

WAGENINGEN UNIVERSITY & RESEARCH

ZEELAND'S ROEM HATCHERY

Borssele V: Innovation project

Van Oord
Marine ingenuity



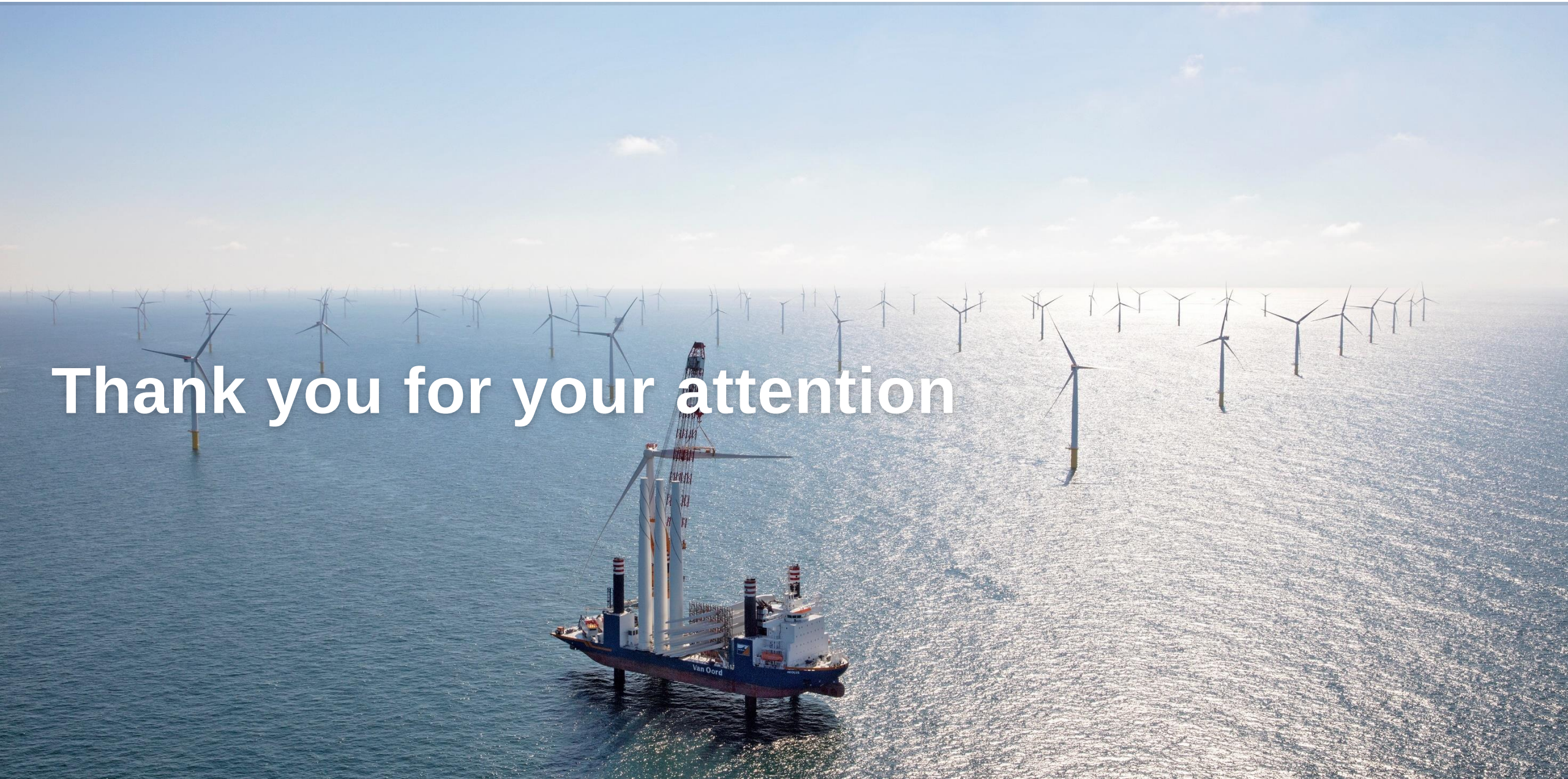
Borssele V: Innovation project

Van Oord
Marine ingenuity

Current experiments & research

- ‘Effects of burial on the Ostrea Edulis’
  - Orientation of importance
- Dislodgement of oysters
  - Experiments in flume tank
- Mobilisation of Oyster Guard

Van Oord
Marine ingenuity



Thank you for your attention