

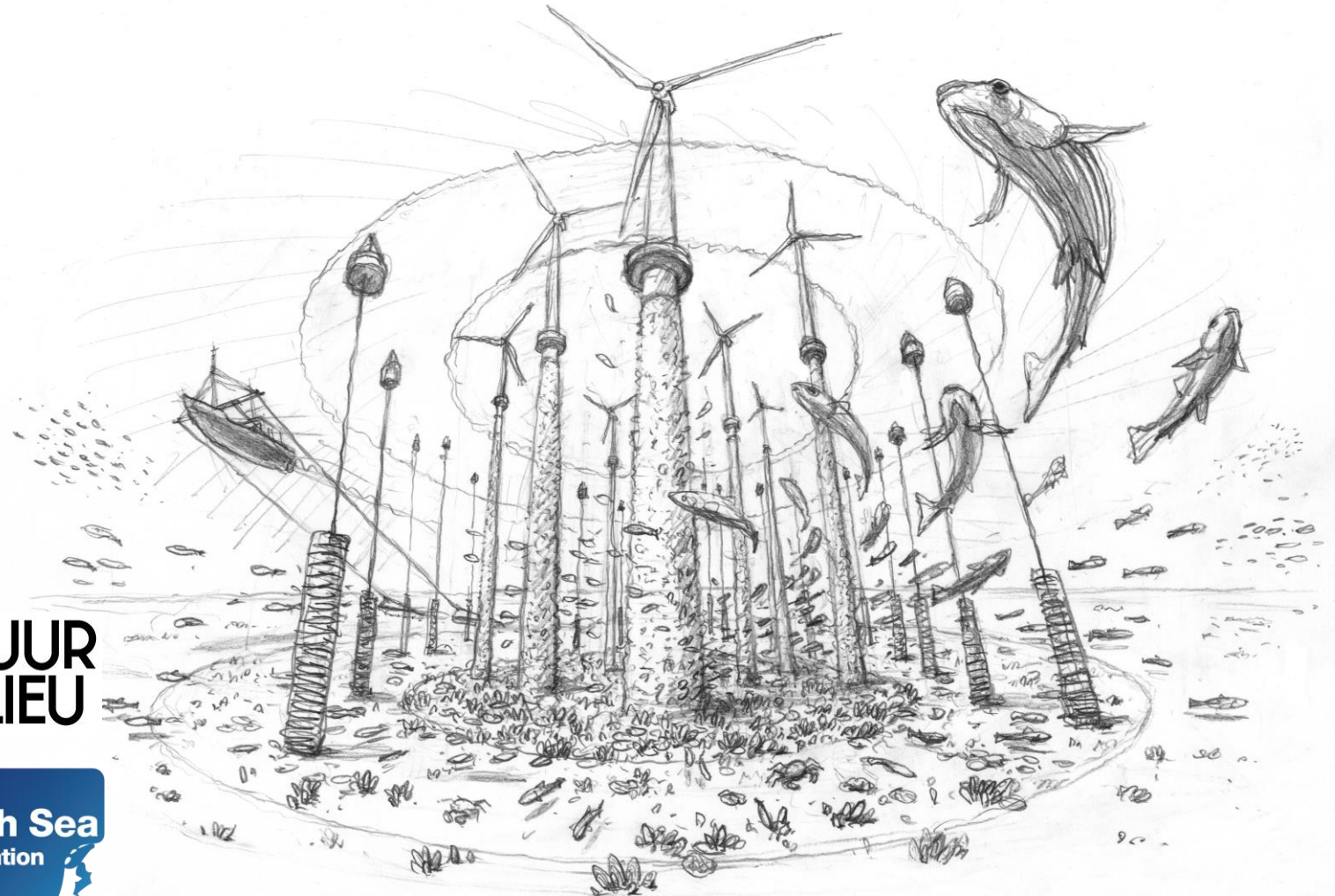
Who's talking?



© Oscar Bos



The Rich North Sea



**NATUUR
& MILIEU**

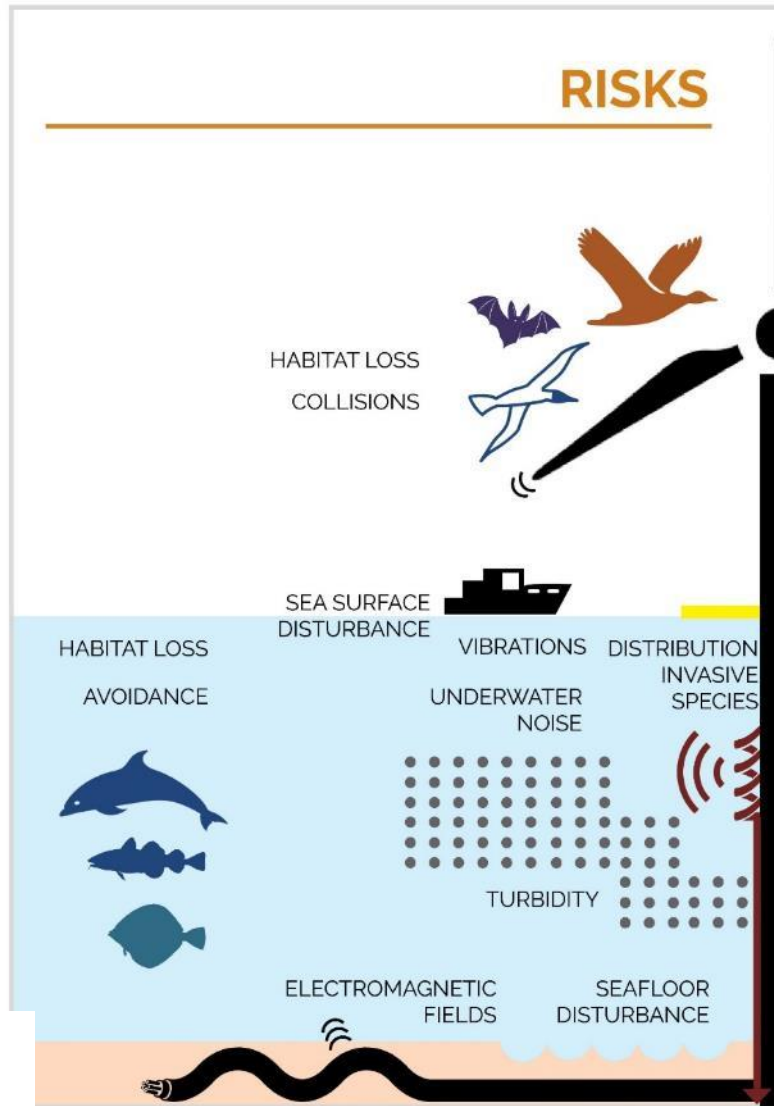


Picture from North Sea Reef Vitalization For Ecosystem Services project (North Sea ReViFES).

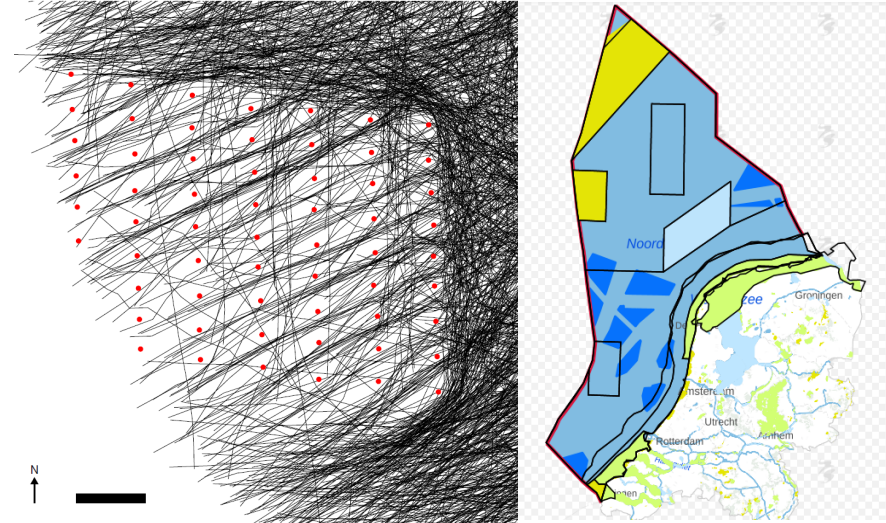
The Rich North Sea Partners



Reducing risks



Avoid



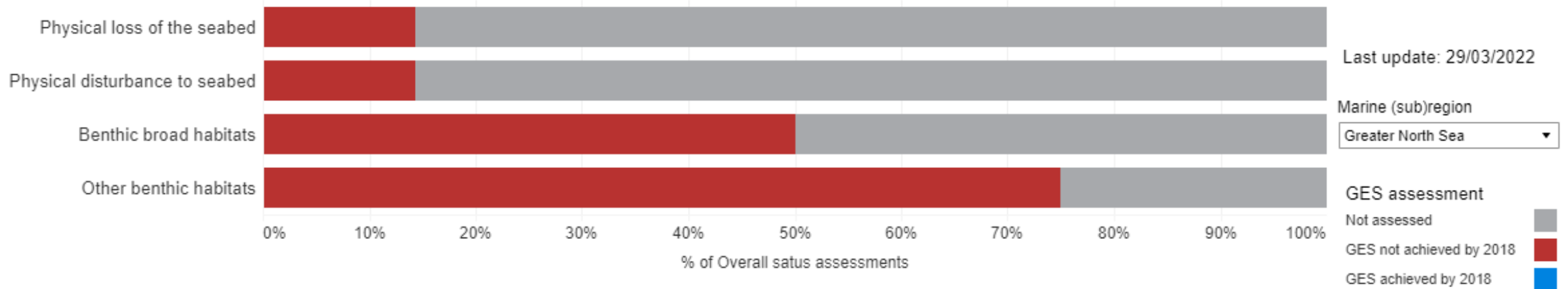
Minimize



As reported in 2018 (MSFD part 1)

Source: <https://water.europa.eu/marine/assessment-module/national-summaries/nl/overview#nat-overview-gesextent>

GES Descriptors	Features	GES achieved	
Pressure-based descriptors	D2 Non-indigenous species	Newly-introduced non-indigenous species	GES achieved by 2018
	D5 Eutrophication	Eutrophication	GES expected to be achieved later than 2020, Article 14 exception reported
		Eutrophication	GES expected to be achieved later than 2020, Article 14 exception reported
		Eutrophication	GES expected to be achieved later than 2020, Article 14 exception reported
	D7 Hydrographical changes	Benthic broad habitats	GES achieved by 2018
		Hydrographical changes	GES achieved by 2018
	D8 Contaminants	Acute pollution events	GES expected to be achieved later than 2020, no Article 14 exception reported
		Contaminants - non UPBT substances	GES expected to be achieved later than 2020, Article 14 exception reported
		Contaminants - non UPBT substances	GES expected to be achieved later than 2020, Article 14 exception reported
		Contaminants - UPBT substances	GES expected to be achieved later than 2020, Article 14 exception reported



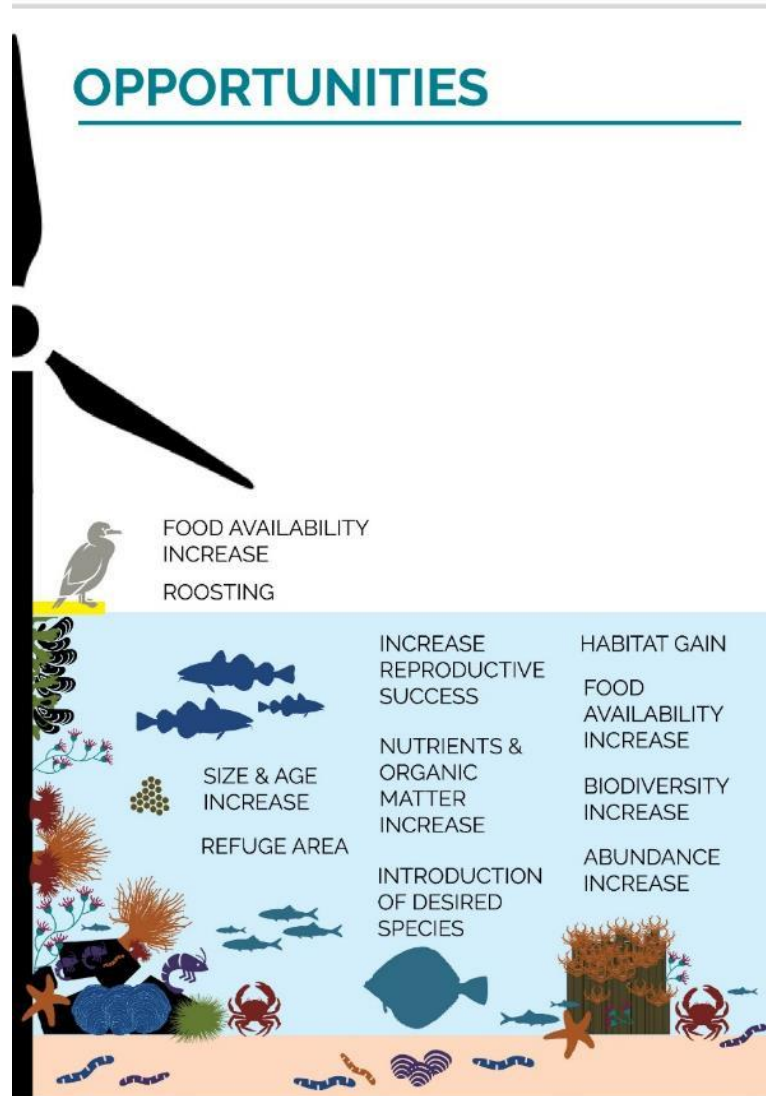
State-based descriptors	Features	GES achieved	
State-based descriptors	D1 Fish	Demersal shelf fish	GES expected to be achieved later than 2020, no Article 14 exception reported
	D1 Cephalopods	Not reported	
	D3 Commercial fish and shellfish	Commercially exploited fish and shellfish	GES expected to be achieved by 2020
	D1 Pelagic habitats	Pelagic broad habitats	GES expected to be achieved later than 2020, no Article 14 exception reported
		D6 Sea-floor integrity/D1 Benthic habitats	Benthic broad habitats
		Other benthic habitats	GES expected to be achieved later than 2020, no Article 14 exception reported
		Other benthic habitats	GES expected to be achieved later than 2020, no Article 14 exception reported
		Physical disturbance to seabed	GES expected to be achieved later than 2020, no Article 14 exception reported
		Physical loss of the seabed	GES expected to be achieved later than 2020, no Article 14 exception reported
	D4 Food webs/D1 Ecosystems	Ecosystems, including food webs	Unknown

Using opportunities

Restore



Offset



Projects

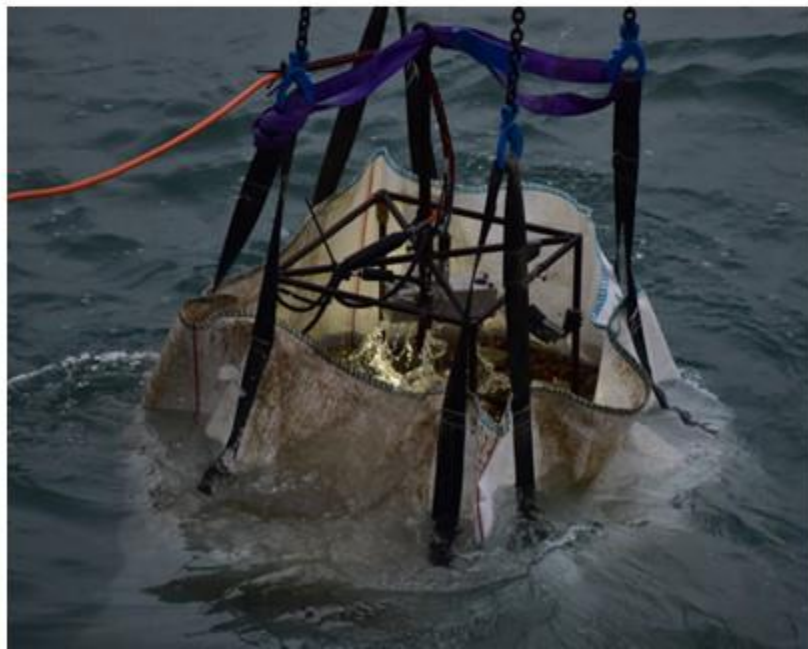
1. Gemini
2. Eneco (Luchterduinen)
3. Vattenfall (Hollandse Kust Zuid)
4. Offshore Test Site
5. Ørsted (Borssele)
6. Blauwwind (Borssele)
7. Oyster hatcheries



Gemini ZeeEnergie



2021-22: ± 58 m³ shells with 3500 flat oysters. 'Loose' deployment over 5 ha; spreaded and big piles



Different
substrates



Gemini ZeeEnergie



- ROV 2023: potentially >200 oysters found
- Larvae 2023: not found (microscope)
- eDNA 2021: *Ostrea edulis* found at reference location before installation
- Oyster movement depends on weight and storms
- Oyster opening correlated to several parameters:

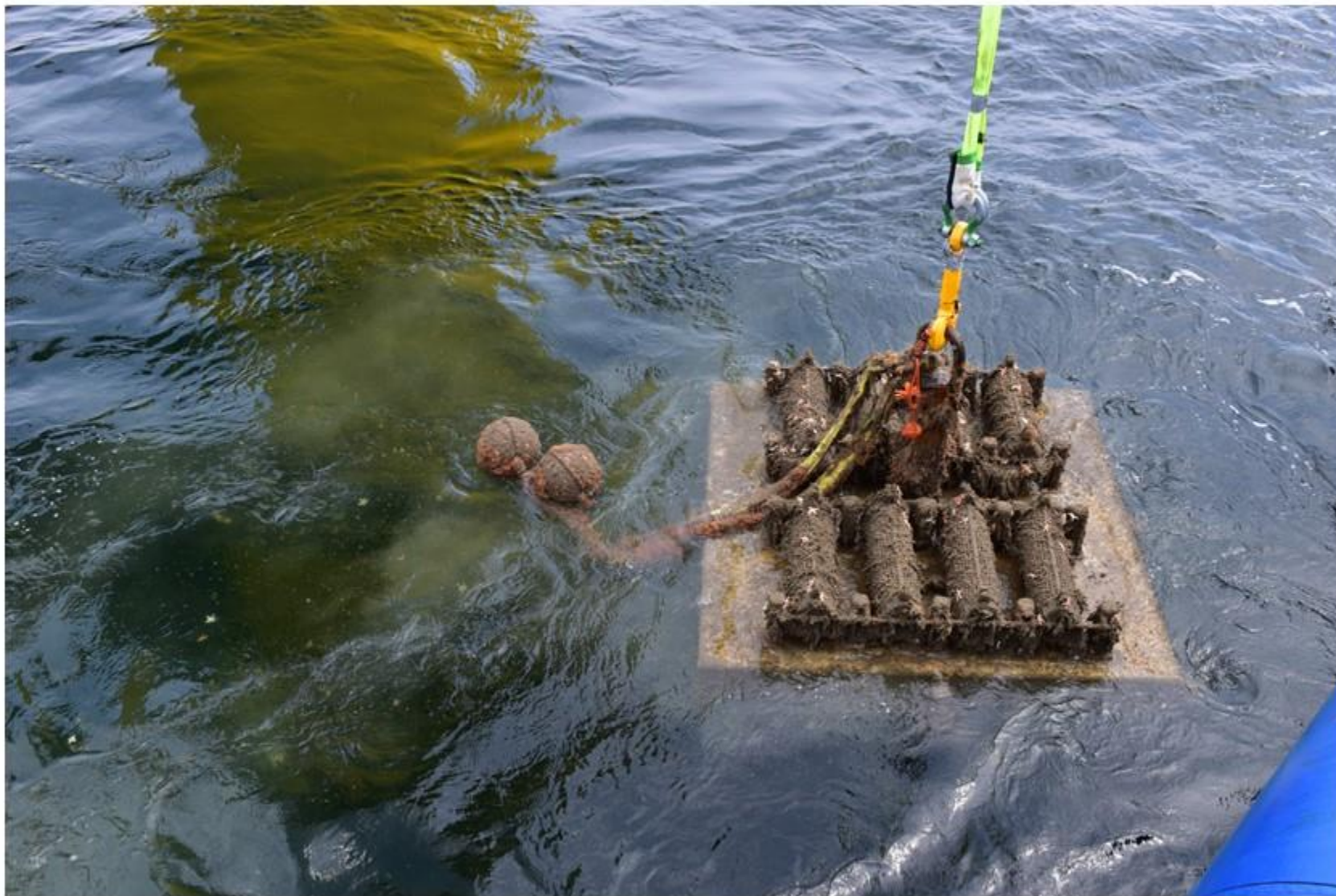


- 2024: Area-wide monitoring with AUV

Blauwwind (Borssele III/IV)



Oct 2020: 2400 flat oysters on scour protection of 4 monopiles



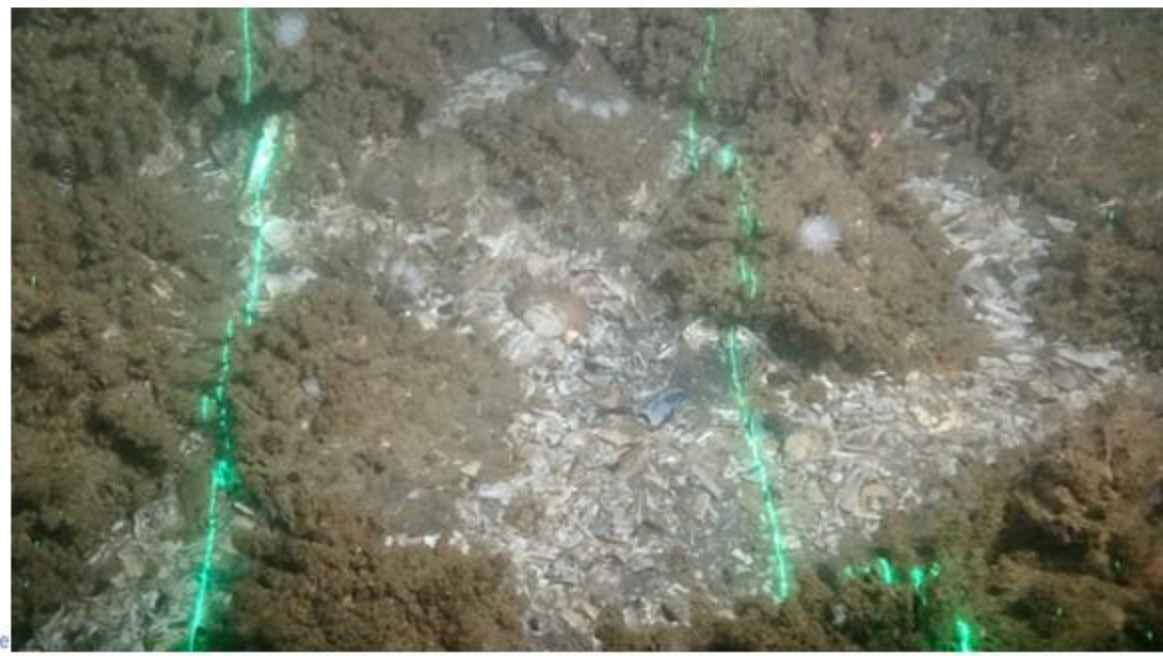
Blauwwind (Borssele III/IV)

July 2021: Deployment of 160 m³ of shell material at scour of 8 monopiles



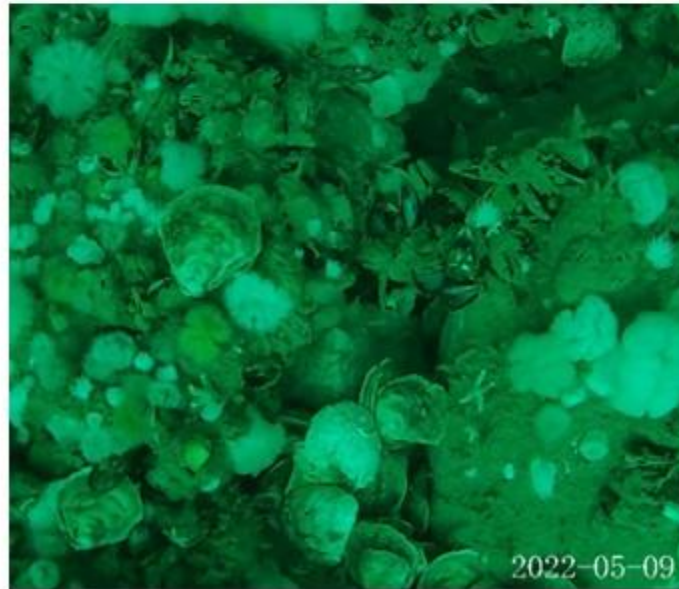
Blauwwind (Borssele III/IV)

- Survival: on average 69% (2020-2023)
 - 118 one or two years old 'spat' found
 - 0/32 Bonamia infections
 - 28/32 Gonad development: ready for reproduction
 - Some flat oyster larvae found, at reference site
 - Shell material still partly there, difficult to see oysters
 - Larger holes baskets: potentially not needed?
-
- Waiting on growth data, ROV & eDNA analyses
 - 2028: last monitoring and decommissioning



Luchterduinen

2019: First pilot project with flat oyster cages on sand (got covered)
2022: 1000 "Loose" oysters deployed on scour protection (unplanned)



2022: New design oyster tables on scour protection with 1000 oysters



Borssele V

North
Sea ReViFES (NWO)

R. ter Hofstede et
al. 2023

Toolbox

Sharing our knowledge

- NID catalogue
 - Artificial reefs, scour protection, add-ons
- Inspirational projects
 - Interactive map
 - Project pages
- Practical information
 - Legal, suppliers, links...

Tue 19:30 (food available!) –

[registration needed \(max 50 pax\)](#)



Discover the toolbox

Start here



Nature enhancements

Find out more about the possibilities for nature inclusive design for marine life

→ [Learn more](#)



Inspirational projects

Discover nature enhancement projects in the North Sea

→ [View map](#)

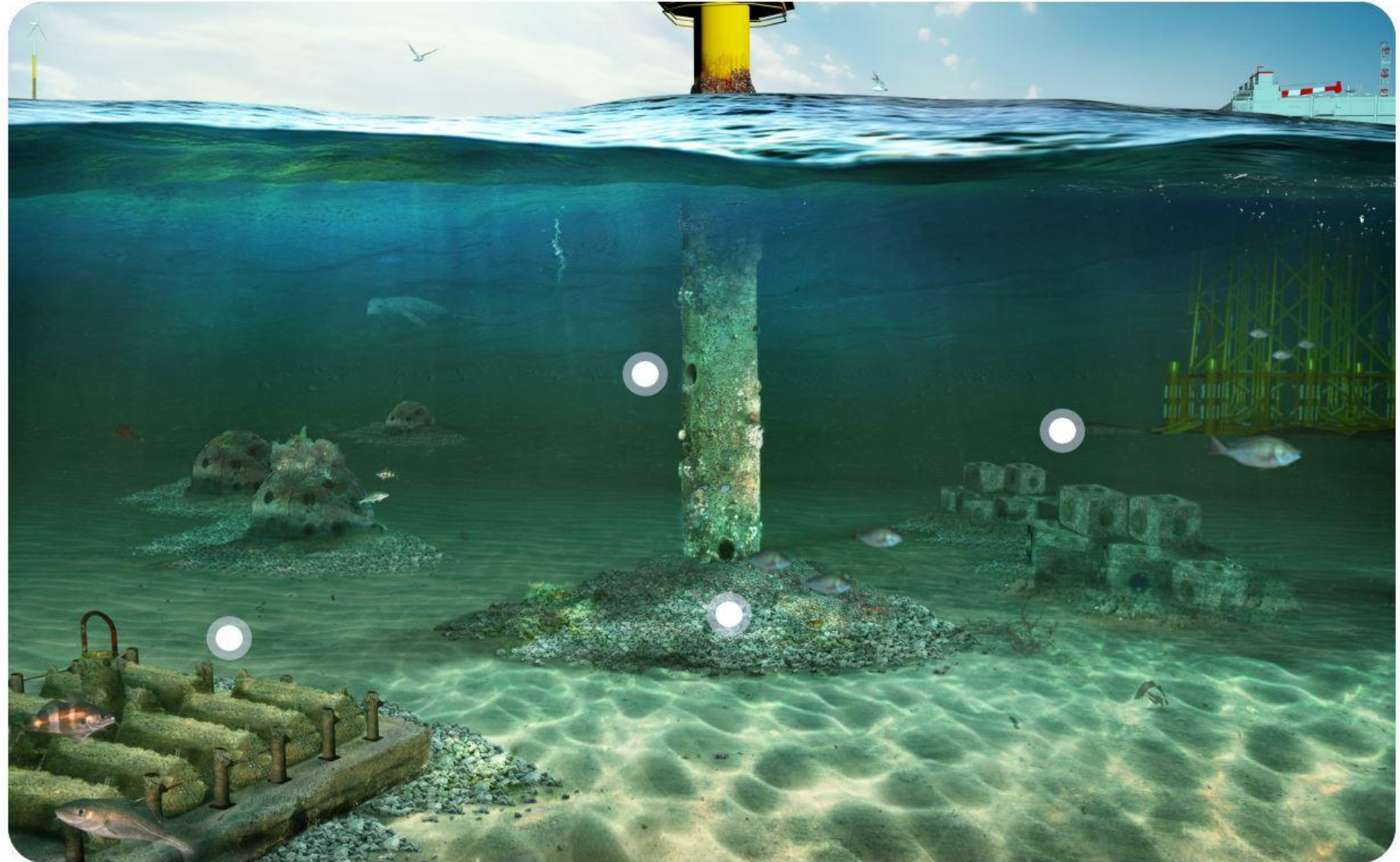


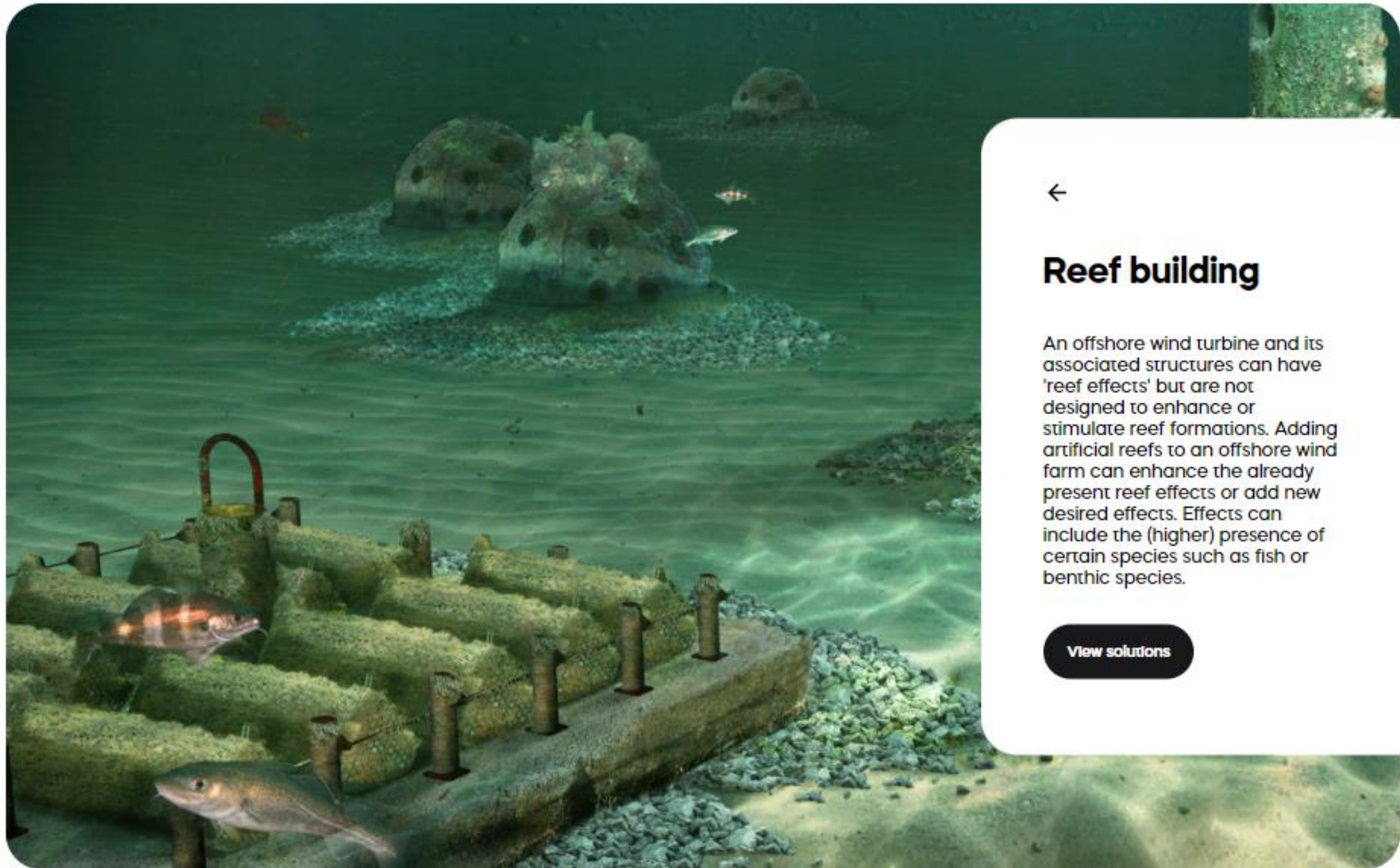
Practical information

All you need to know for creating your own nature enhancement project

→ [Read more](#)

Toolbox demo





Reef building

An offshore wind turbine and its associated structures can have 'reef effects' but are not designed to enhance or stimulate reef formations. Adding artificial reefs to an offshore wind farm can enhance the already present reef effects or add new desired effects. Effects can include the (higher) presence of certain species such as fish or benthic species.

[View solutions](#)

Register your pr...

Full screen



Legend

The Rich North Sea Projects

- Add-on
- Cable protection
- Ecology
- Reef building
- Scour protection

Offshore windareas

- Operational
- Operational before 2030
- Search area after 2030

Natura 2000 (North Sea only)

- Natura 2000 area

All projects

Add-on

Cable protection

Ecology

Reef building

Scour protection



Turbine foundation design creates new home for marine life

Watch

Month

As it falls Rich No collaba enhance water n founda marine enter a video it



Dutch legislat

The Marine Protection & water law are of You need permits from both these laws Read more about the law and how to let Protection & water law are there to proo permits from both these laws so start yo



International legislation

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Insurances

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Training & cer

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Safatv

Find products

- Can be used for
- Product category
- Used on projects
- Supplier



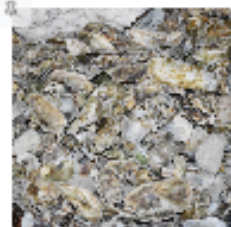
Broodstock structure flat oyster Blauwwind

Van Oord

A broodstock structure for flat oyster made with a concrete slab and oyster cages. The structure has a pole in the middle with a lifting eye for easy handling. It can be placed on a scour protection layer such as rocks or any other stable surface. The oyster baskets require maintenance to prevent overgrowth, but provide protectio..

- Reef building
- Oyster ree pacemere

View website



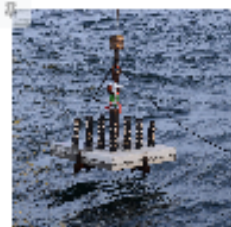
Empty oyster shells

Supplier II

European flat oyster have the preference to settle on species-own material. By deploying clean shell material, chances are highered spatial may take place on the location.

- Reef building
- Scour protection
- Flat oysters in Generi

View website



Broodstock structure flat oyster

N/A

A broodstock structure for flat oyster made with a concrete slab and vertically placed concrete poles on which flat oysters can be glued. The structure has a lifting eye and can be placed on a scour protection layer such as rocks or any other stable surface. No maintenance is needed, and risk of suffocation due to..

- Reef building
- Oyster broodstock pacemere

View website



BlueLinked Reef Tiles

Blue Linked

Each reef tile is so small that it fits in the palm of your hand and its design is optimized to create a stable surface for, for example, the flat oyster so naturally adhere so in BlueLinked's cultivation system. Covered tiles can be "seeded" into the sea, creating better results, faster expansion.

View website

About the location

Coordinates: 56.7100, 5.920025
The Hollandse Kust Zuid wind farm is a pioneering subsidy-free offshore wind farm located approximately 25km off the Dutch coast. This wind farm consists of four plots, covering approximately 225 km². The 1403 megawatt (MW) wind turbines have an installed capacity of more than 1,500 megawatt (MW) delivered by 32 turbines.

VATTENFALL



Project partners Who's Involve

The Rich North Sea researches m as oxygen levels and temperate development of marine life while we seek to understand the differences inside and outside the foundation marine life over time in this unique Zuid (1-4) is Vattenfall's offshore e Vattenfall uses monopiles which 'Wave Reproductive Nests' and the behaviour of the Atlantic cod and around the monopiles.

Royal Netherlands Institute for Sea with monitoring equipment and c





International holistic perspective - cross-sectoral masterplan



Supporting policy & governance – bottle-necks



Learning-by-doing – in- and outside wind farms



We work in a degraded system: only nature positive

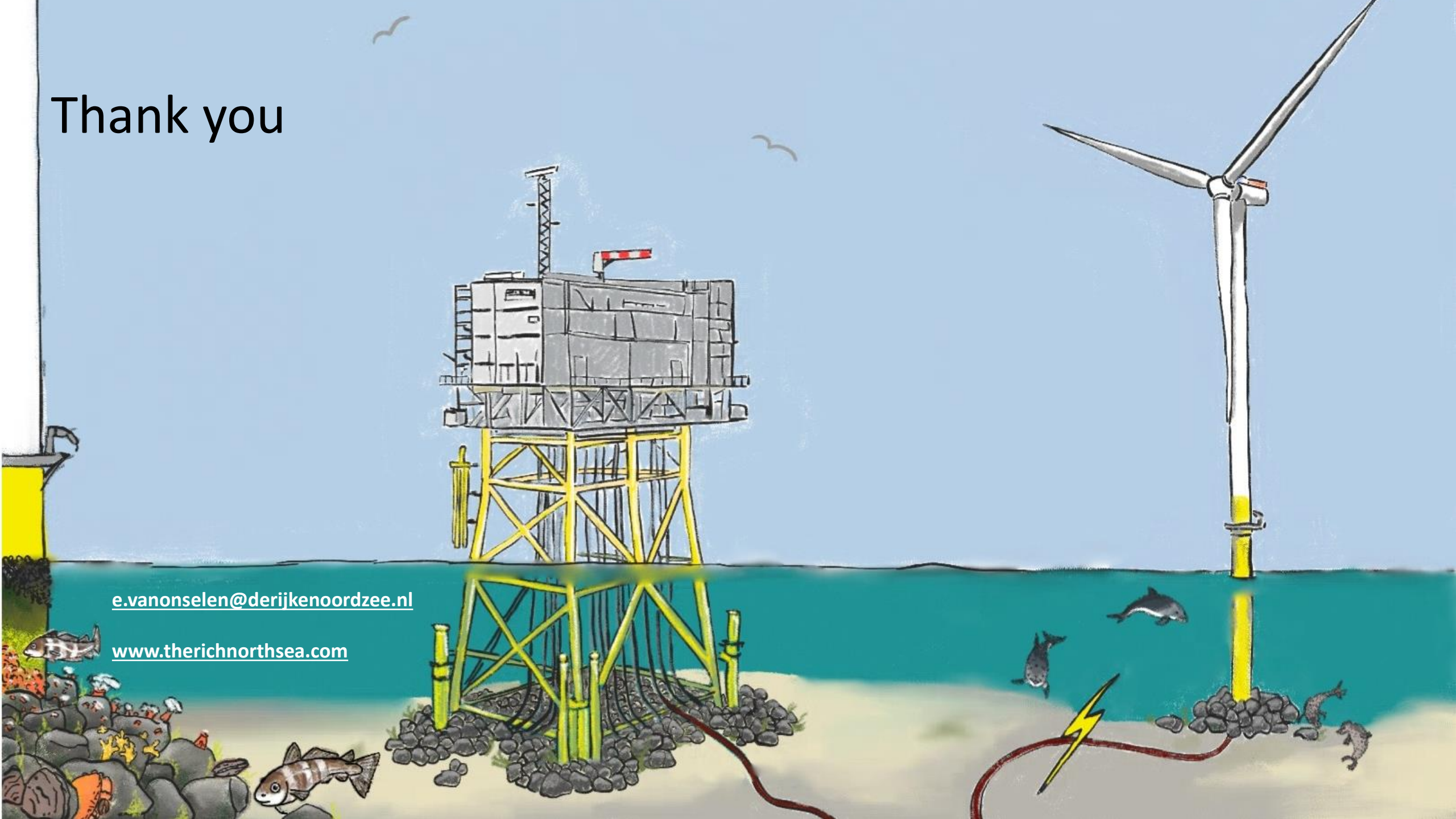


Nature-inclusive tenders AND financial obligations



International knowledge sharing

Thank you



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www.therichnorthsea.com