Wier & Wind project

Bert Groenendaal (ATSEA Nova)

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WIER & WIND

Outline

- Introduction to seaweeds and seaweed production methods
- Wier&Wind project:
  - Objectives
  - Technical and non-technical challenges
  - Lessons learnt sofar

What is seaweed?

BROWN SEAWEEDS

- **Saccharina l.**
  (sugar kelp, kombu)
- **Undaria**
  (wakame)
- **Alaria e.**
  (atlantic wakame)

RED SEAWEEDS

- **Gelidium & Gracillaria**
  (agar-agar)
- **Cottonii and Spinosum**
  (carrageenan)
- **Porphyra**
  (nori)

GREEN SEAWEEDS

- **Ulva**
  (sea lettuce)

Seaweed:

Feedstock of the future

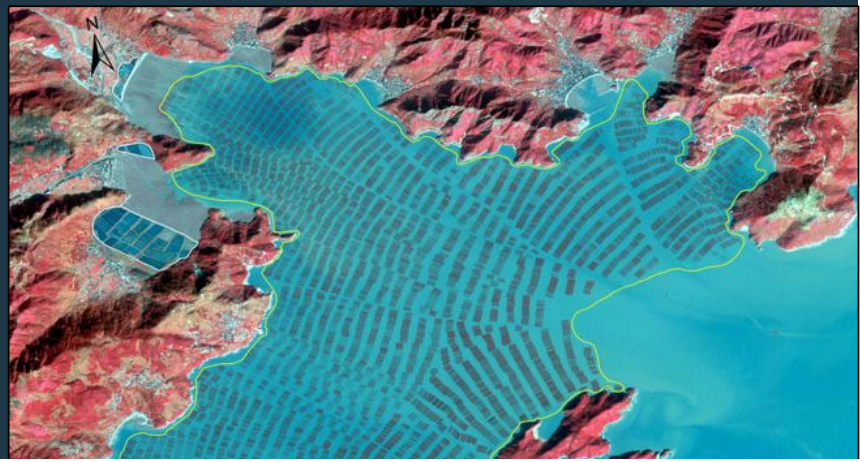
- **Human consumption**
- **Industrial hydrocolloids**
- **Fertilizers, personal care products, etc**

- **Animal feed** (ingredients and supplements)
- **Biochemicals** (e.g. bioplastics, biotextiles)
- **Bioactives and pharmaceuticals**

- **Biofuels**

(Offshore) seaweed cultivation

- 2020: appr. 33 Mio tons of seaweeds are produced worldwide and strongly growth (source: FAO)
- Majority of seaweeds is being cultivated
- Asia is the main producer and consumer of seaweeds
- In Europe:
  - seaweed cultivation is still very immature
  - mostly wild harvesting

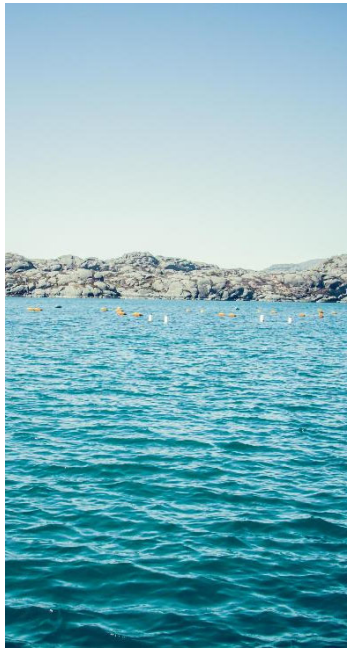


Industrial, fully mechanized

Heavy impact on sea life

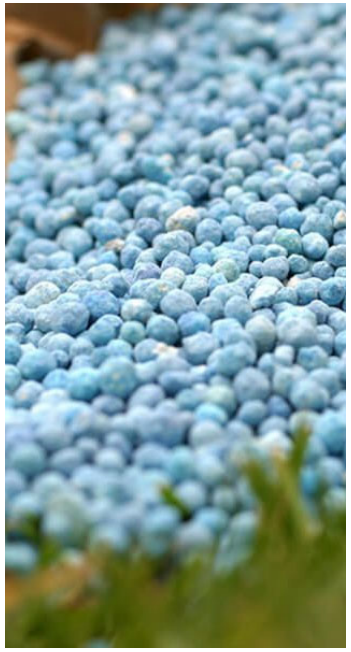
Today’s seaweed wild harvest

Seaweed cultivation



NO LAND USE

NO FRESH WATER USE



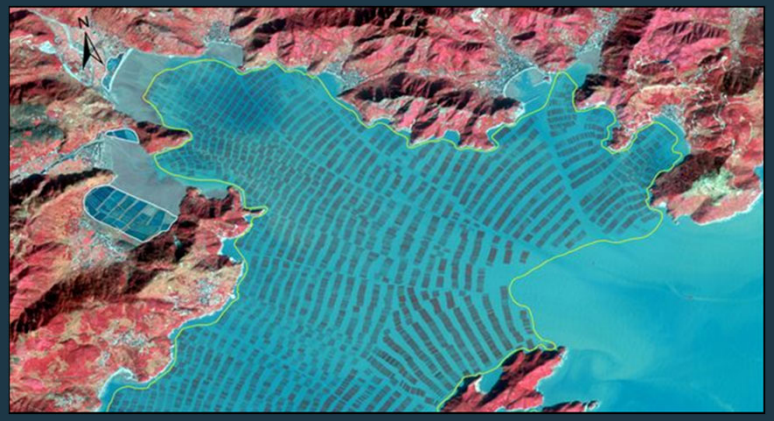
NO NEED FOR FERTILIZERS

NUTRIENT CAPTURE (BIOREMEDIA-TION)

CO2 CAPTURE

POSITIVE IMPACT ON BIODIVERSITY

Today's seaweed farms



Lots of small-scale seaweed farms

Manual / labor intensive

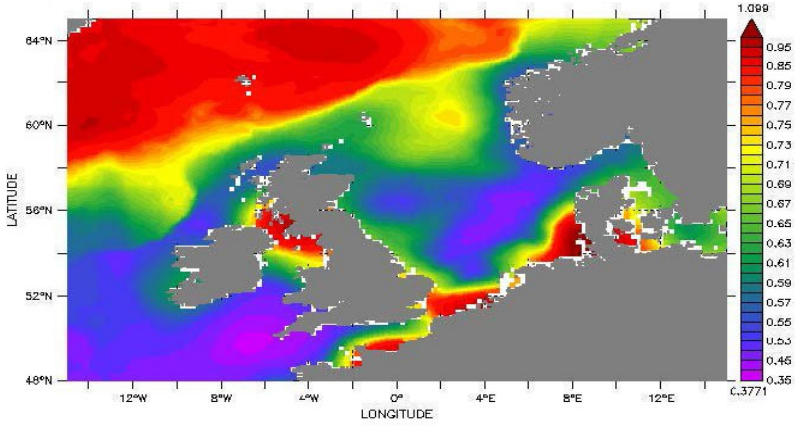
Mostly 1D (long lines)

However, Europe has an opportunity

“Shallow” North Sea continental shelf is very rich in nutrients

Europe has excellent maritime knowledge and knowhow (cfr. fisheries, oil & gas, marine transport, dredging, wind farms, etc.)

Space available in offshore wind farms (8000 km² by 2030)



Imagine that only 10% of the unused place in North Sea wind farms would be used for seaweed cultivation

- 4.000 seaweed farms of 20 Ha each
- = 16 Mio T of sustainable biomass per year equivalent to 50% of the current global production
- 4.8 Mio T of absorbed CO_2 per year = yearly production of all cars in Europe
- creating at least 20.000 direct jobs and another 20.000 indirect jobs.

Project Wier & Wind

- **Project aim:**
  Design, build and mechanically operate a robust 2 ha offshore seaweed farm in an offshore wind farm in the Belgian part of the North Sea
  - Successful demonstration of large scale seaweed farming in a realistic environment
  - Increase quality and quantity of seaweeds as cultivated under offshore conditions
  - Lower the cost per kg of seaweed by fully mechanizing all process steps

- **Period:** July 2019 – June 2022

- **Partners:**
  - Flanders: ATSEA Nova, GeoXYZ, UGhent (dept. Maritime Technology)
  - Netherlands: Murre Technologies, Foundation Noordzeeboerderij, Hogeschool Zeeland, Seaweed Harvest Nordsea

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NOORDZEE BOERDERIJ

AtSeaNova

GEOXYZ

GHENT UNIVERSITY

UNIVERSITY OF APPLIED SCIENCES

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SEAWEED HARVEST

Murre Technologies
Total solutions for food processing

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Project Wier & Wind

Main advantages of seaweed farms in combination with offshore wind farms:

1) Multiple use of space
2) Protection of the offshore wind farm
3) Ecosystem services such as bioremediation, increased biodiversity, etc.

Final result: Development and demonstration of a reliable, robust and mechanized 2 ha seaweed farm as reference for future large scale seaweed farms in offshore wind farms in the North Sea and other locations

Location: In (or in close proximity to) an offshore wind park

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Challenges

Main challenges

- To identify an offshore wind park that accepts our installation
- Regulations & paperwork
  - Boat specifications, insurances, safety plan & training, authorization, UXO survey
- Offshore conditions (extreme weather conditions, currents, etc.) requiring a highly robust mooring system
- Mechanisation of seaweed cultivation activities

Serious financial impact

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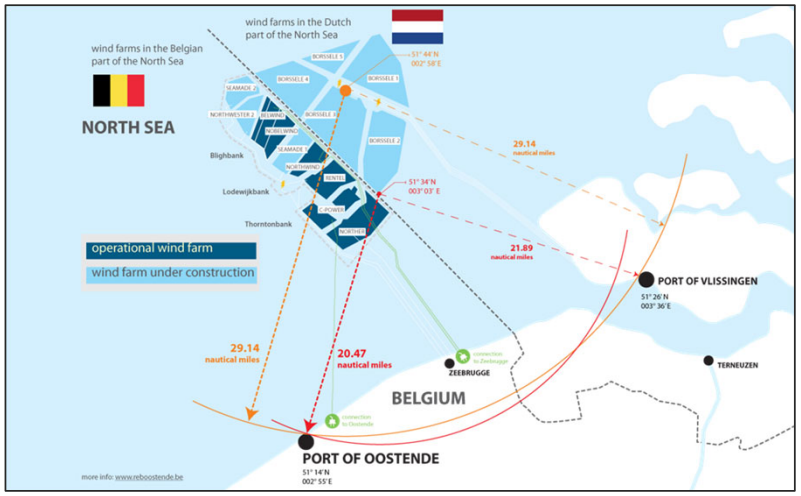
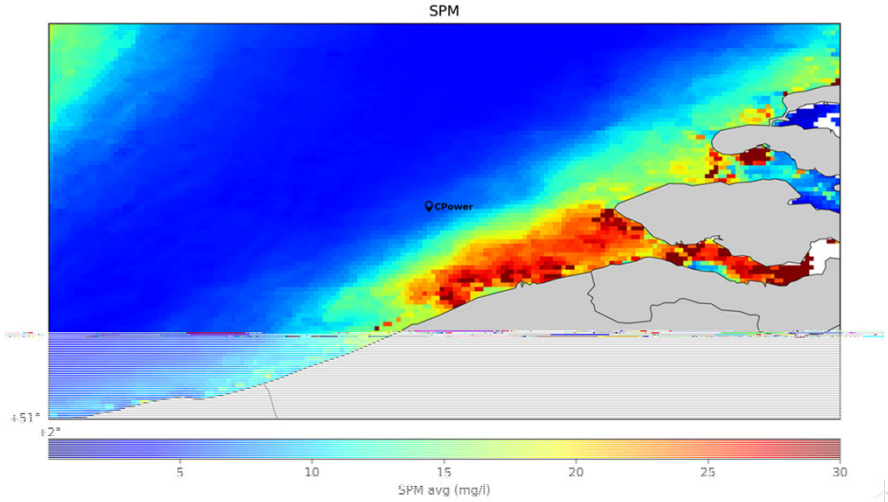
Location

Location requirements:

- Belgian part of the North Sea
- In (or in close proximity to) an offshore wind park
- At least 20 m depth
- Sufficient amounts of nutrients (N, P)
- Limited turbidity
- 2 ha farm in area of at least 15 ha





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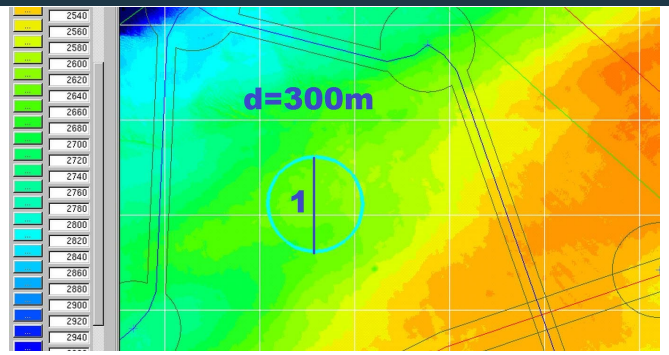
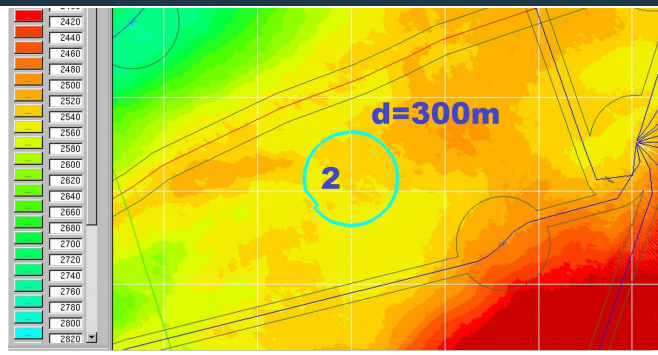
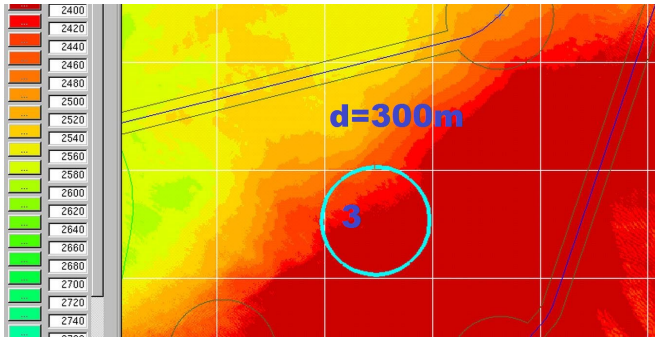
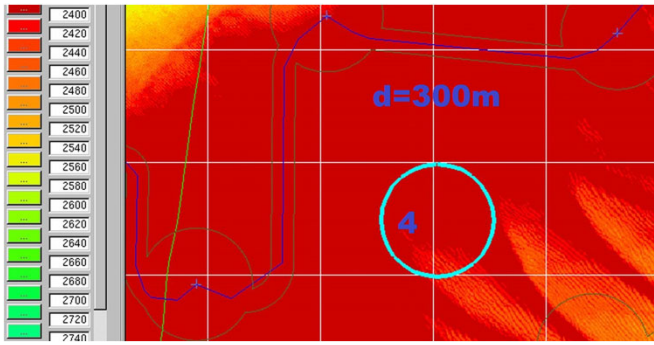
Location

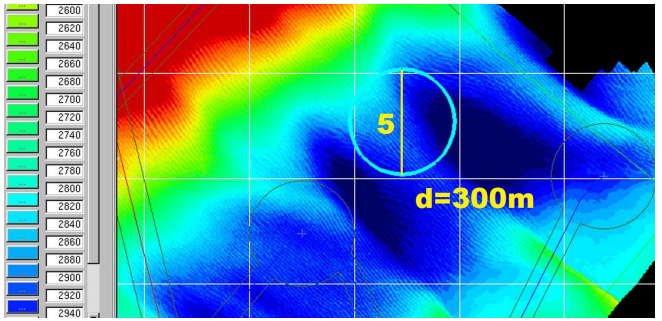
NORTHER wind park

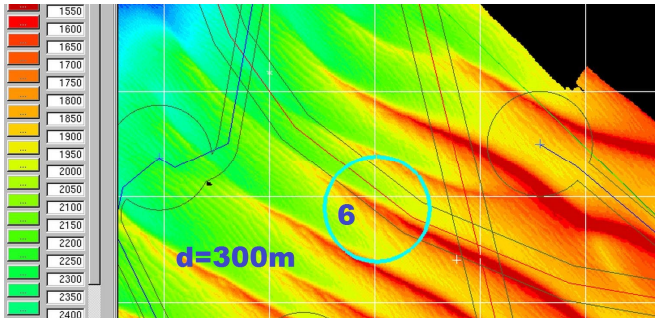












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Training

GWO training: Global Wind Organization

What:

- GWO First Aid : 2 days
- GWO Sea Survival 1 day

GWO certificates are valid for 2 years

Medical offshore check-up

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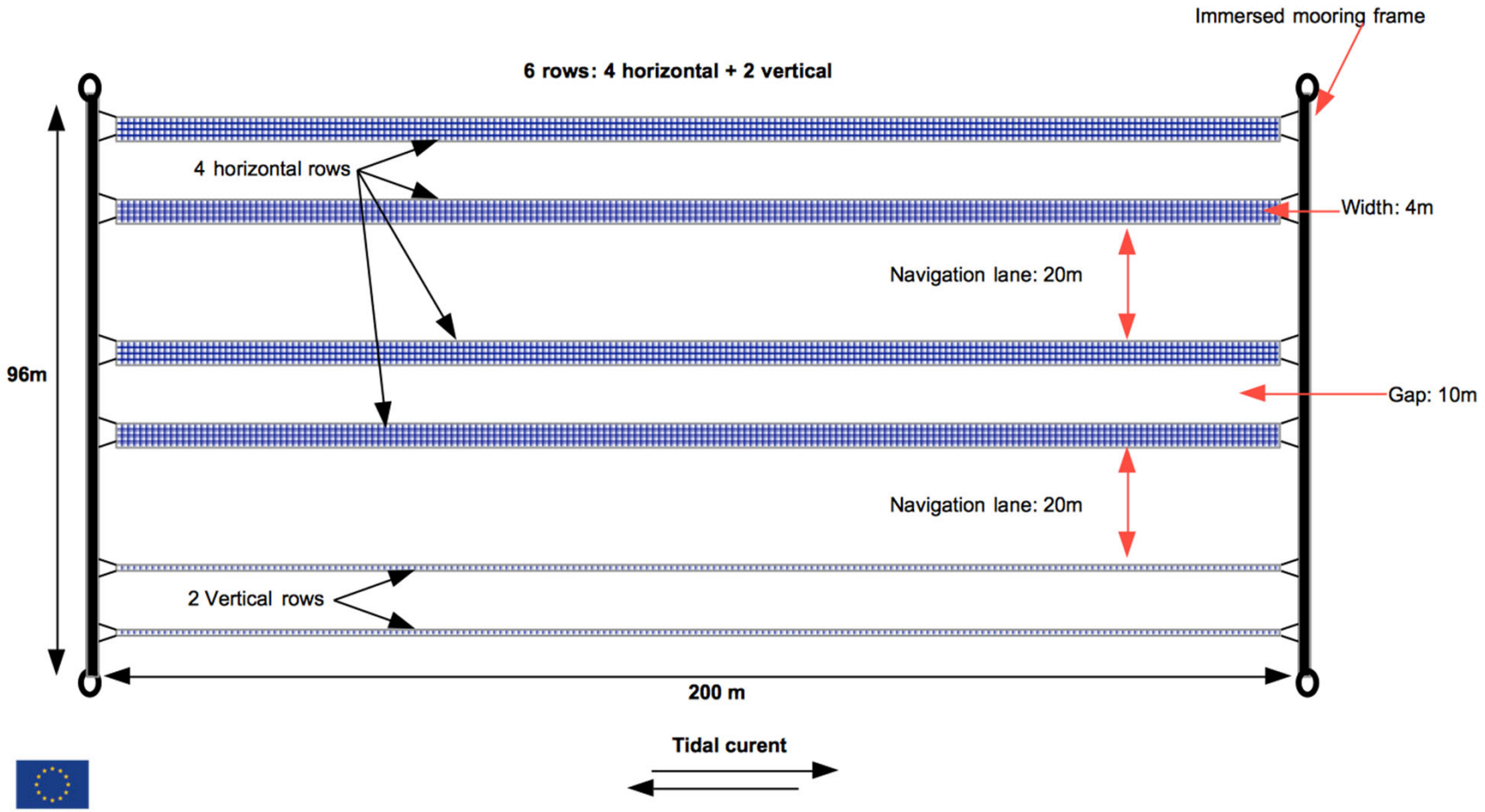
Offshore seaweed cultivation system



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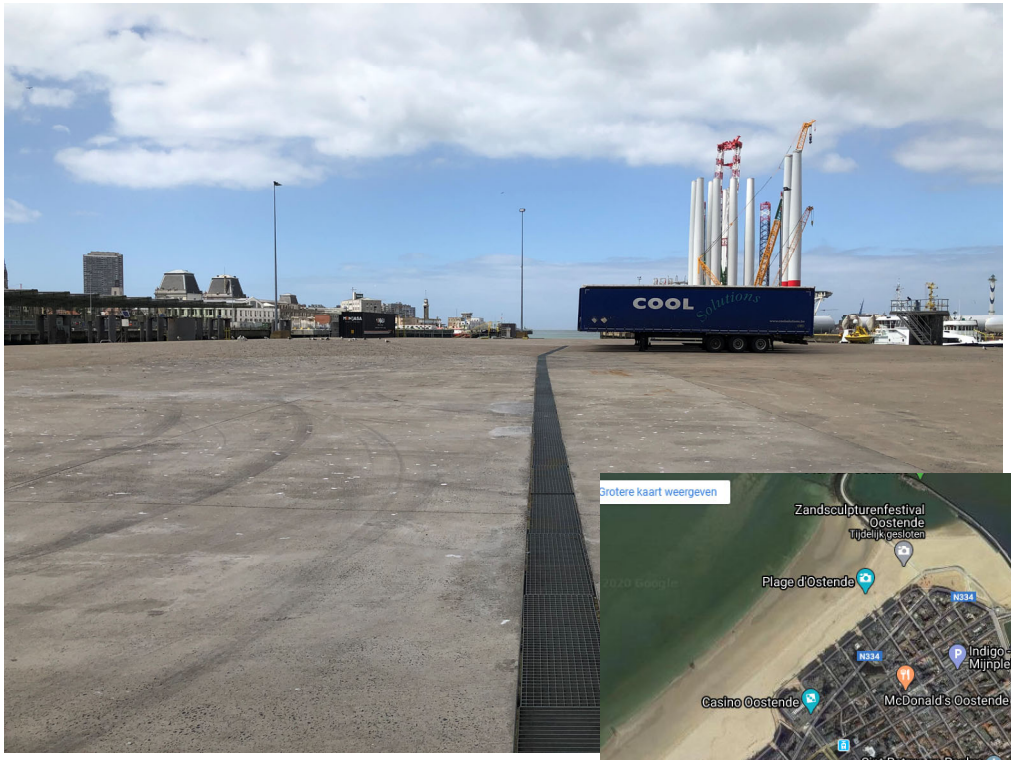
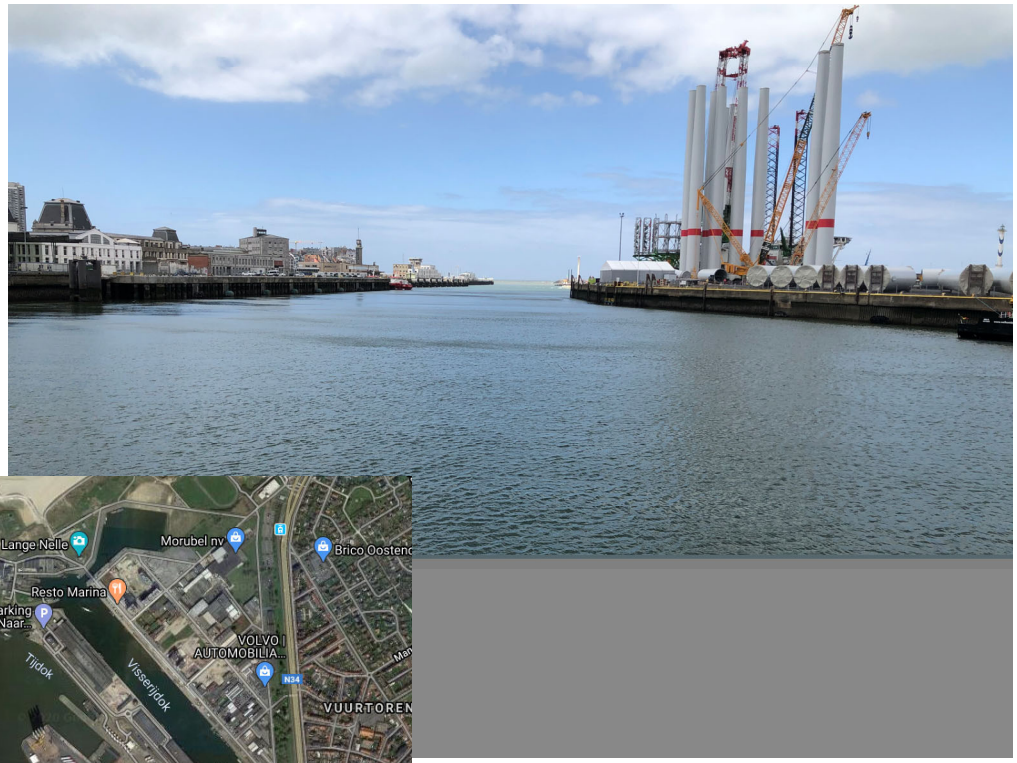
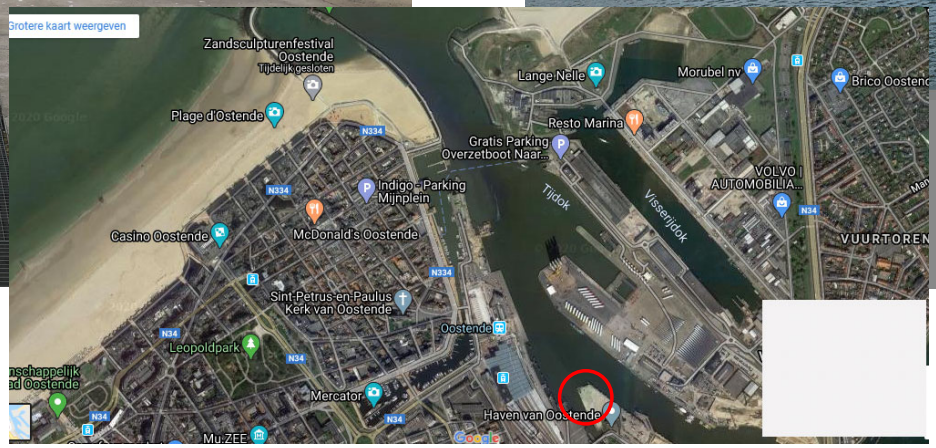
Location to build up farm in Ostend







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Seeding, cleaning & harvesting module

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Lessons learnt sofar …

- Pioneering project requires a lot of preparation (50% technical, 50% non-technical)
- Offshore activities are equivalent to complex operations, high safety regulations, and high costs
- Involve all stakeholders (project partners, wind park, governmental organizations, subcontractors, suppliers, etc.)
- Be patient, don’t rush
- Communicate and collaborate
- Lots of interest in Wier & Wind project from all over the world

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Acknowledgement

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