



United – Belgian pilot: synergy between aquaculture of flat oyster and seaweed and oysterreef restoration in windparks

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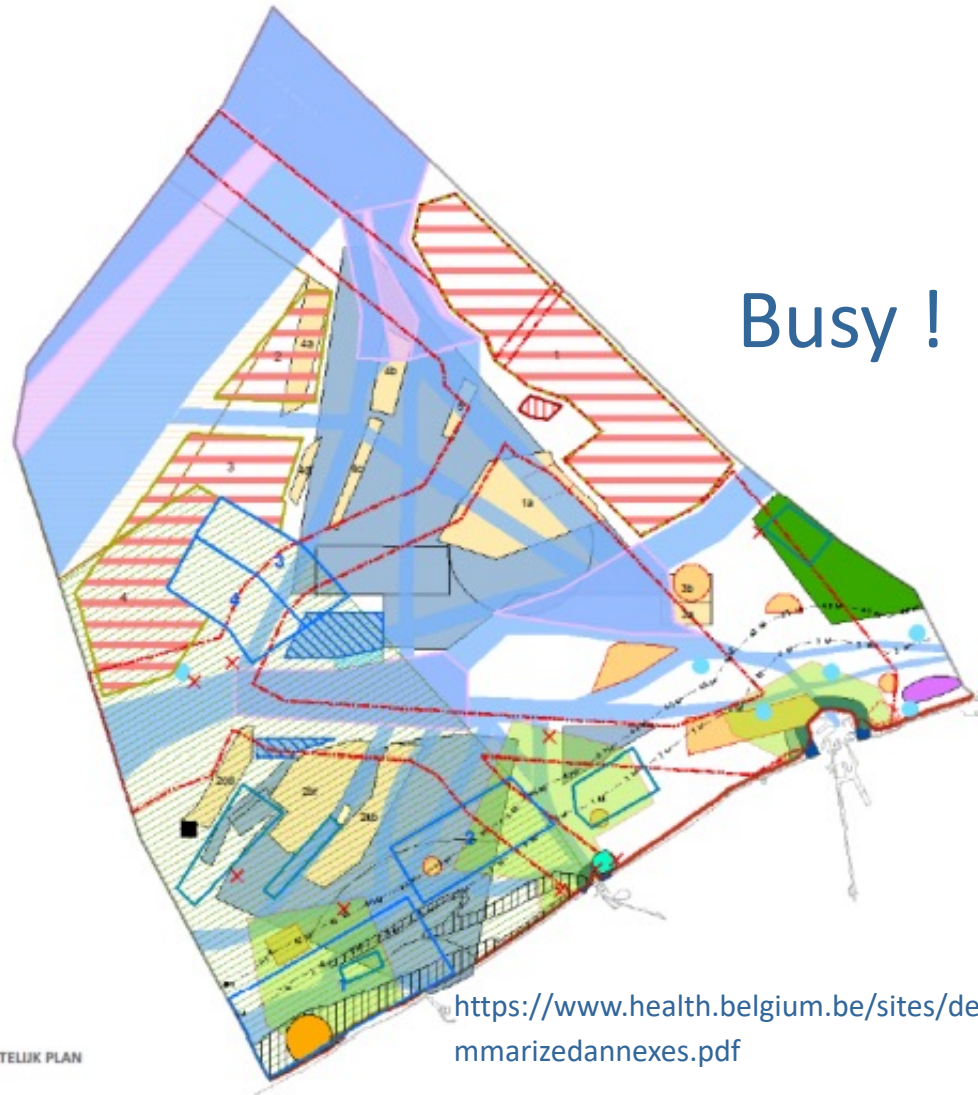
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Belgian part of North Sea : Marine spatial plan 2020-2026

Coastline : 67 km

Surface : 3454 km²



Project zones

Aquaculture

Testing zone coastal protection

Bird directive area

Renewable energy

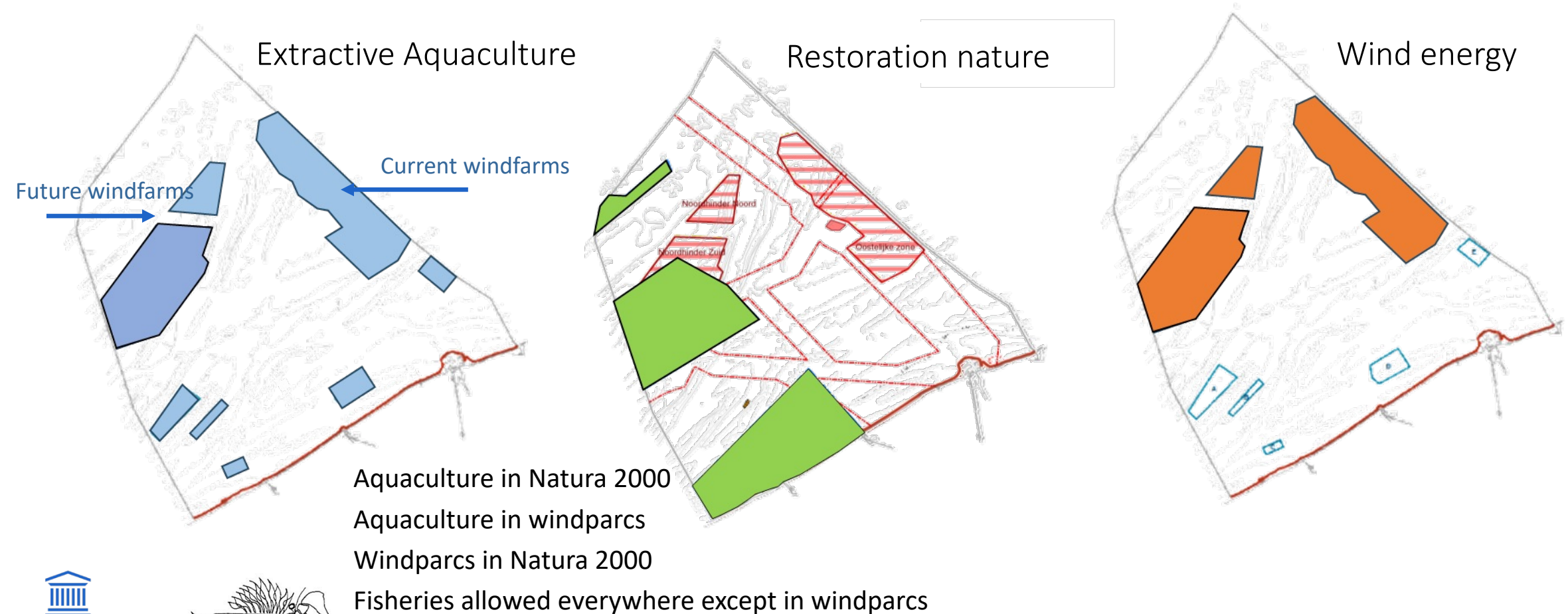
Shipping route

Sandwinning

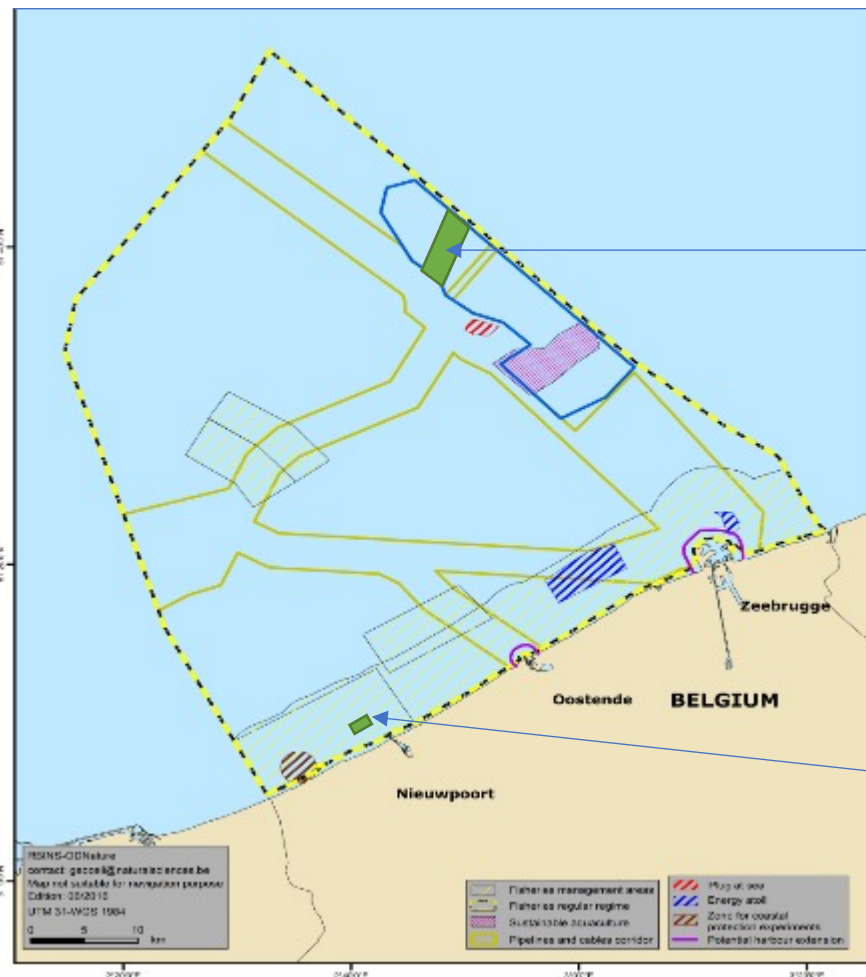
Military



Organisation of BP of North Sea : Marine spatial plan 2020-2026



Belgian pilot : location & partners



Operational phase Belwind
(48 km offshore)

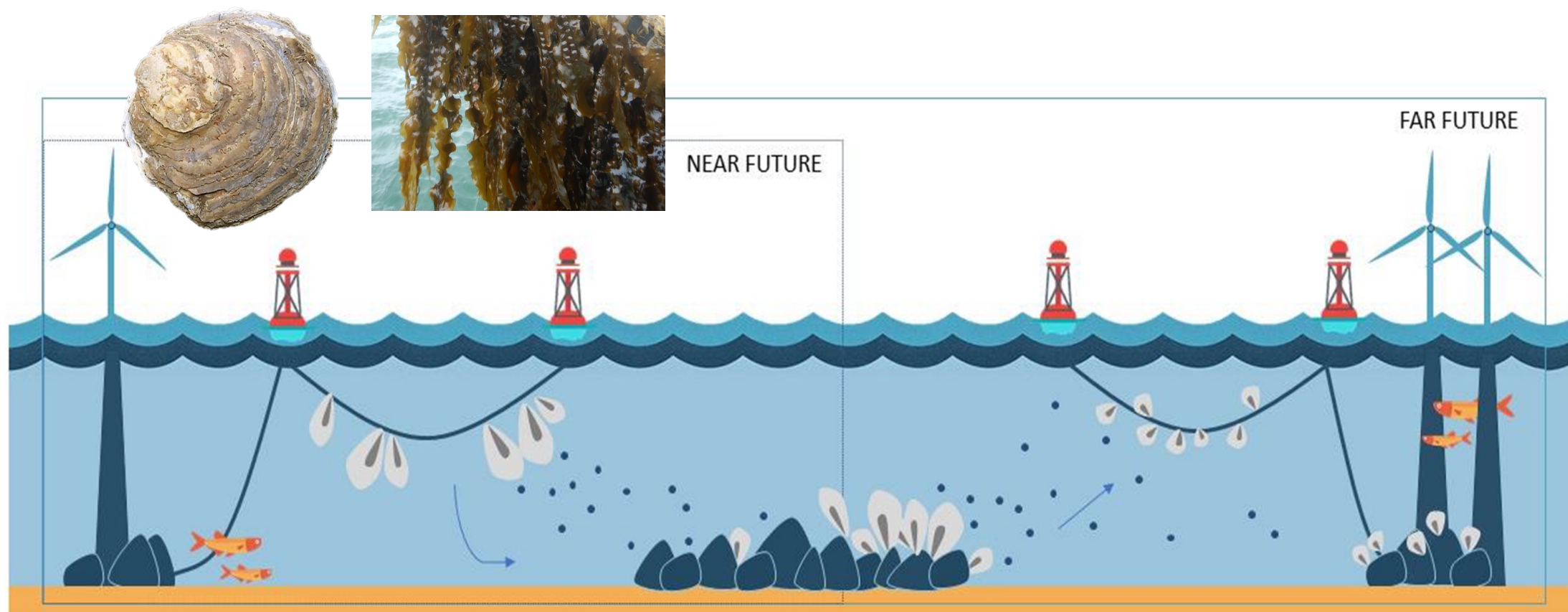
Pre-operational phase Westdiep
(Natura 2000,
5km from coast)



- Multi-use of space
- Multi-use of infrastructure

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Multi-use activities



Objectives Belgian pilot

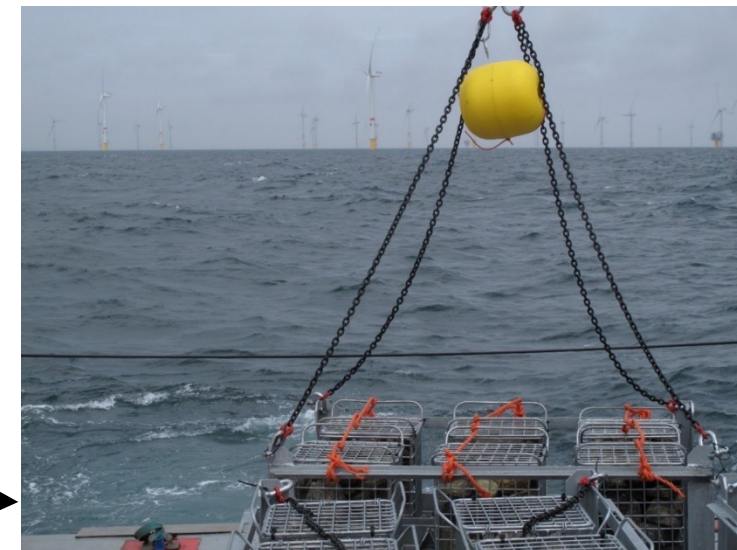
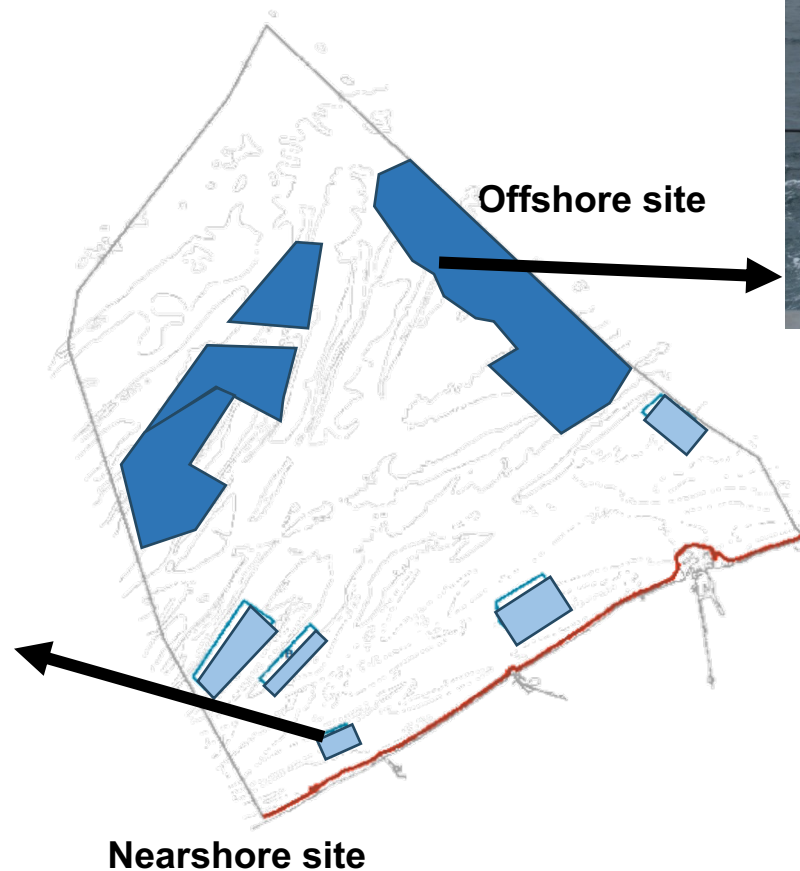
- Evaluation of windfarms as location for flat oyster reef restoration in combination with aquaculture of flat oyster for human consumption
 - Systems for wild spat collection of flat oysters and for oyster grow-out
 - Scour material as hard substrate to initiate formation of oyster reefs
 - Synergy between aquaculture of flat oyster and reef restoration (short term versus long term)
- Evaluation of windfarms as location for offshore seaweed production
 - Testing of seeding protocols
 - Testing substrate for grow-out
 - Effect genetic background on production
 - Offshore versus nearshore : impact on morphology and nutritional characteristics



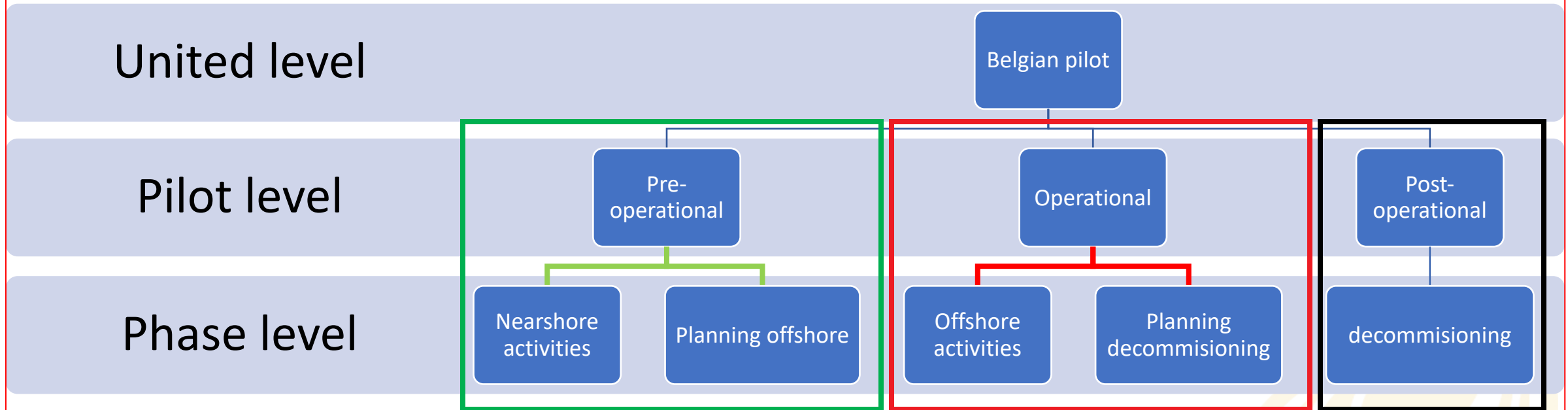
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Strategy

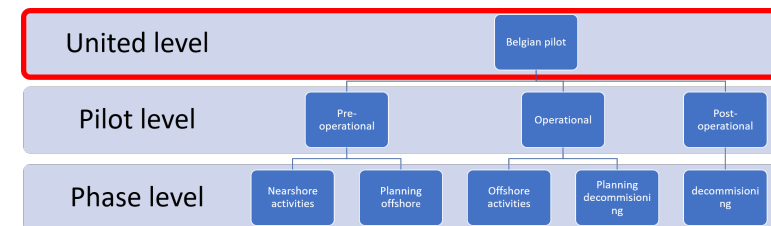
- First nearshore testing of systems before moving offshore with best suited materials and methods
- Focus on commercially viable solutions



Planning Belgian pilot

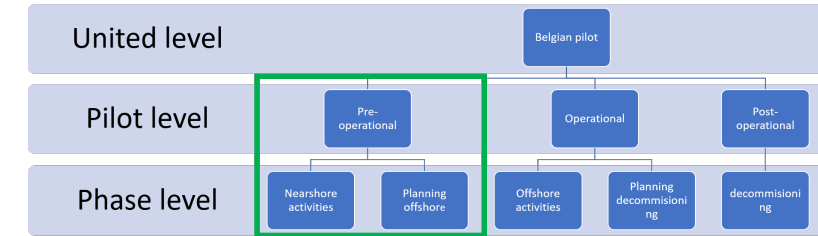


United level - Belgian pilot

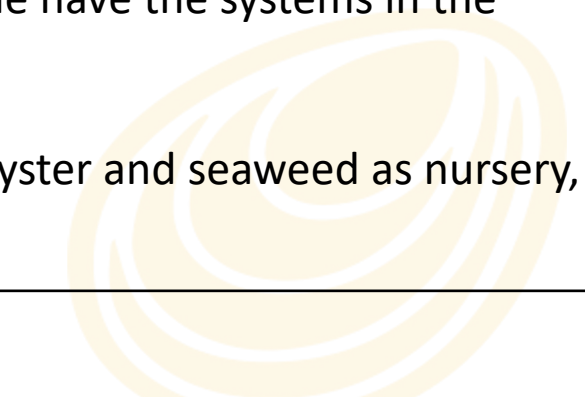


Regulatory measures	Planning challenges
<ul style="list-style-type: none"> - Sign grant agreement & consortium agreement - Research activity in compliance with MSP - Inform FOD Leefmilieu (federal agency for environment) <ul style="list-style-type: none"> o Written commitment to remove everything after the project - Inform BMM <ul style="list-style-type: none"> o Nature of research project o Nearshore activity in Nature 2000 area o Measures taken to “visualize” the project at sea (cardinal buoys, AIS Aton transmission, ..) o Reporting lost items 	<ul style="list-style-type: none"> - Meetings with Belgian partners <ul style="list-style-type: none"> o to work out the time line of the Belgian pilot, with milestones and deliverables o to go through the general budget and budget per partner o to explain the reporting to the coordinator of United and EU - Detailed planning of first 6 months

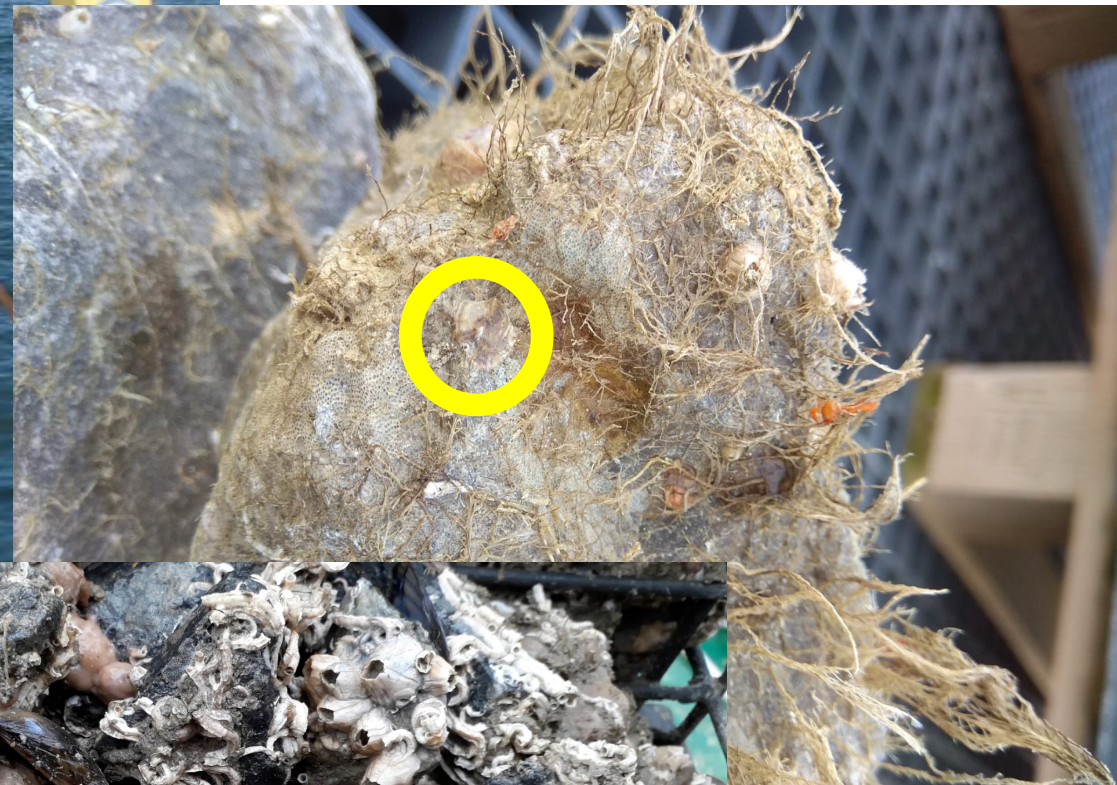
Pre-operational phase



Regulatory measures	Planning challenges
<ul style="list-style-type: none"> - Insurance third party liability and casco nearshore and offshore - Agreement of board of directors of windpark operator Parkwind and concession holder Belwind to effectively carry out the project and at proposed locations - Request FOD-leefmilieu (via BMM) about latest regulation import of <i>Bonamia</i>-free oysters - Seasurvival training and online training Parkwind for everybody on board 	<ul style="list-style-type: none"> - Contract insurance third party liability : who and for how much ? - Timing of insurance third party liability and casco offshore. technical description of the systems + results of risk analysis + public tender for insurance policy - Sea activity is determined by the biological cycles of the aquaculture species : pressure to have the systems in the water at specific time points - Availability of hatchery facility for oyster and seaweed as nursery, stocking and quarantine facility



Different systems are tested first nearshore : restoration



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Different systems are tested first nearshore : aquaculture



Seaweed nearshore 2021

Different net types

Nearshore net type

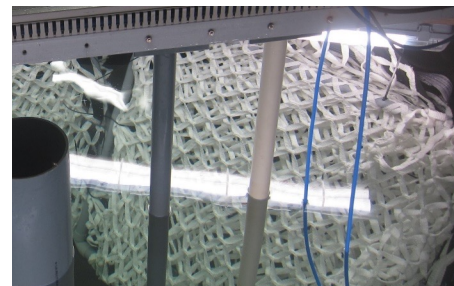


Offshore net type



Different seeding technics and strains

Nursery



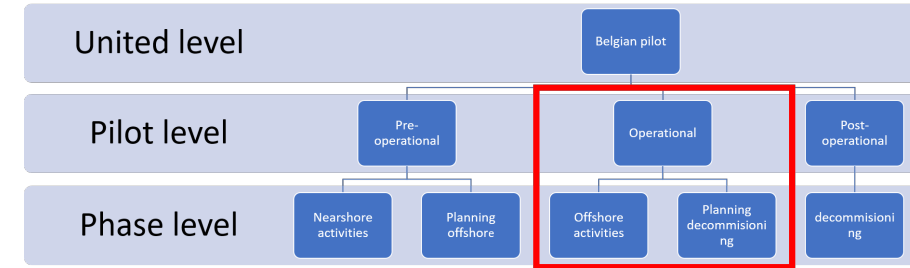
Direct seeding



Succesfull harvest in May 2021 and even better in May 2022



Operational phase



Regulatory measures	Planning challenges
<ul style="list-style-type: none"> - Regulation of the windfarm : <ul style="list-style-type: none"> - All project activities in the windfarm can only be executed with approved method statement. Changes during operation are difficult. - diving activity limited to scientific diving only - Vessels need to fulfill pre-set standards (vessel vetting ; certified crew ; ..) - Approval harbour to mount and prepare longlines in the harbour - Import regulations live animals (FAVV + Traces) 	<ul style="list-style-type: none"> - Because of innovative character of project, MS is long and iterative process - Finding appropriate vessels that are interested in executing the non-standard installation of longlines (screw anchors, seaweed nets, ...) - Availability of bonamia-free oyster seed of a certain size

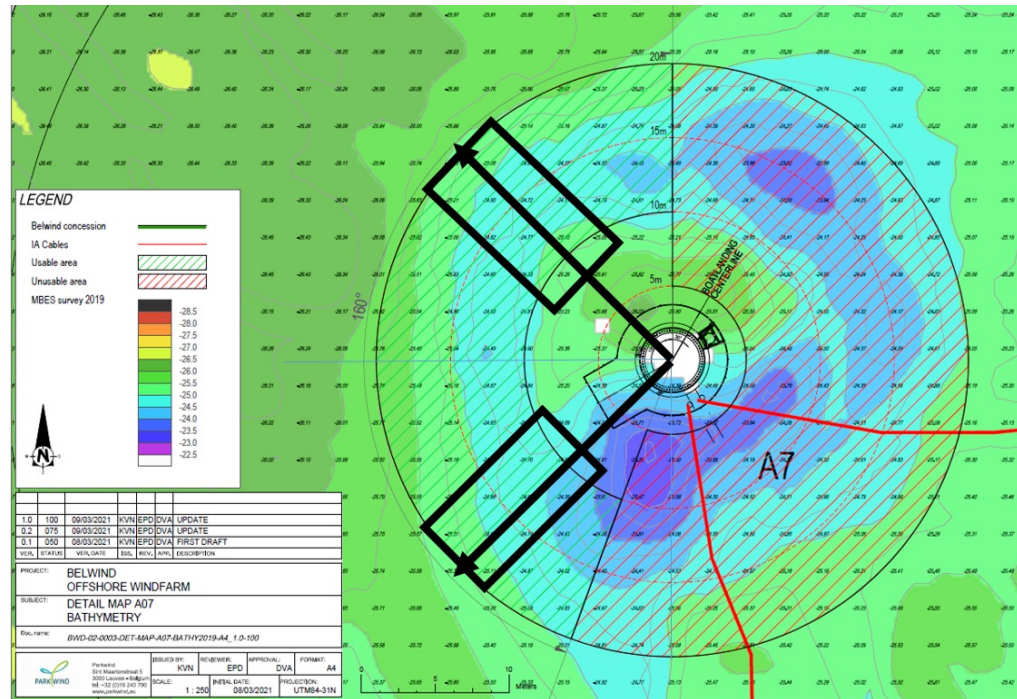
Oyster restoration offshore 2021

Installation of modified tables June 2021

A7

Black rectangle:
area to place
tables

Basalt bag:
in SW area
(wake
of turbine)



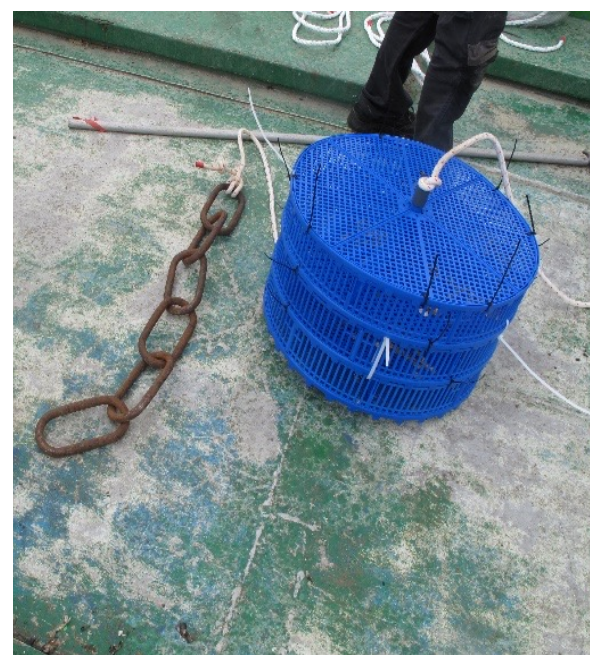
Improved oyster production systems for offshore



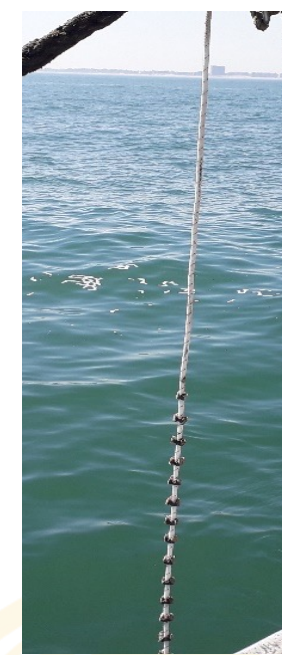
Ladder system with baskets



Cage for direct seeding

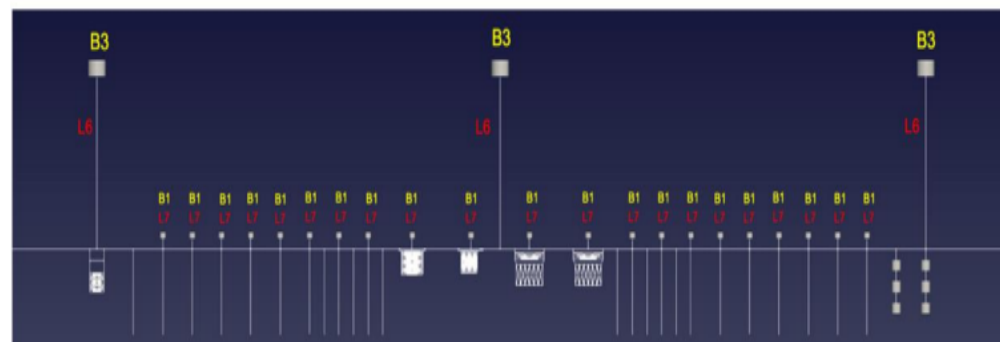
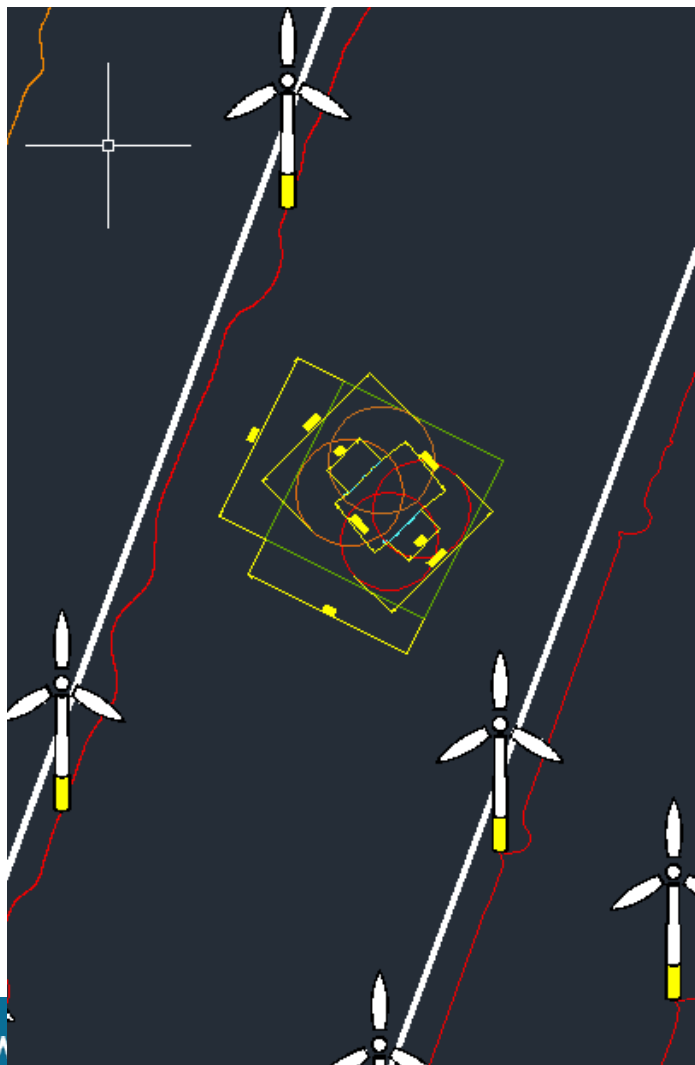


Lantern basket



Ropes with cemented oysters

Installation of 2 longlines offshore in Belwind (August 2022)



<https://www.youtube.com/watch?v=4sD2geIhTlc>).

- Calculation risk zones and forces on longlines with Moordyn – Ugent programma
- Design « submerged » longline for oyster production
- Design longline for seaweed
- Screw anchors

Aquaculture offshore installation Belgian pilot

Screw anchor installation with Leask Marine Auger Submersible Drilling Rig



Ready to go offshore in November 2022



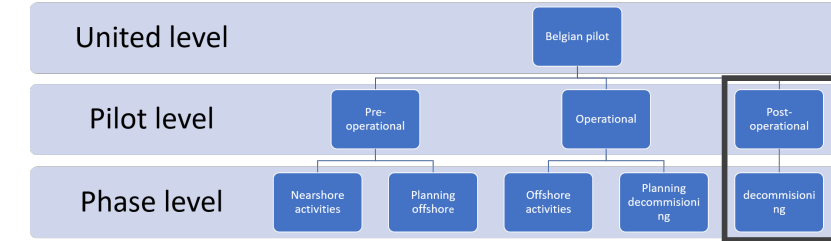
Figure 8-9: Offshore seaweed net type



Figure 8-10: Rope seaweed net type



Decommissioning phase



Regulatory measures	Planning challenges
<ul style="list-style-type: none"> - Everything has to be removed at the end of the project <ul style="list-style-type: none"> ○ Exemption needs to be asked for prolonged use in Ultfarm (FOD Leefmilieu/BMM) 	<ul style="list-style-type: none"> - Finding appropriate vessel that is interested in executing the non-standard decommissioning of the longlines and restoration tables <ul style="list-style-type: none"> ○ Option: use of research vessels



Improvement of regulation for roll-out

- Research project has special status and is relatively easy to implement (foreseen in MSP)
- Belgian pilot has no experience with requirements for commercial roll-out offshore
- Commercial activity in windparks is possible according to MSP, BUT
 - Insurance fee is very high : limited number of insurances are interested
 - Clarity about *Bonamia*-status of the Belgian part of the North Sea
 - Certification of health status Belgian offshore water (A-quality shellfish water, so no processing necessary ?)
 - Duration license aquaculture activity = lifetime windpark ?
- Restoration activity
 - Decommisioning at end of lifetime windpark ? Need for clarity



Recommendations

Bottlenecks	Suggestions
<ul style="list-style-type: none"> - High insurance fee - Unavailability of vessels, suited for aquaculture-related operations - Smart aquaculture systems for offshore - High transportation costs - Unpredictable weather conditions - Skilled technicians - Access to windfarms for other users 	<p>Creation of platform at sea for people to stay, for harvest to be temporarily stored, for recharging (electric) vessels and monitoring equipment (drones, RUV, ..)</p> <p>Creation of ‘innovation zone’ for young talent to test out prototypes, for which a legal and insurance framework is already in place</p> <p>Start-up accelerators : advice, guidance towards access to high-risk capital , technical guidance through data base of marine technical experts</p> <p>Specific training course for aquaculture at sea (retired fishermen ?)</p> <p>Licenses should include multi-use (since windfarms don’t use all the space)</p> <p>Co-creation of windparks to reduce risks and costs and to enhance inclusion of other activities</p>



The Team

Dát betekent dat die oesters wel goed gegroeid zijn de voorbije maanden.

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