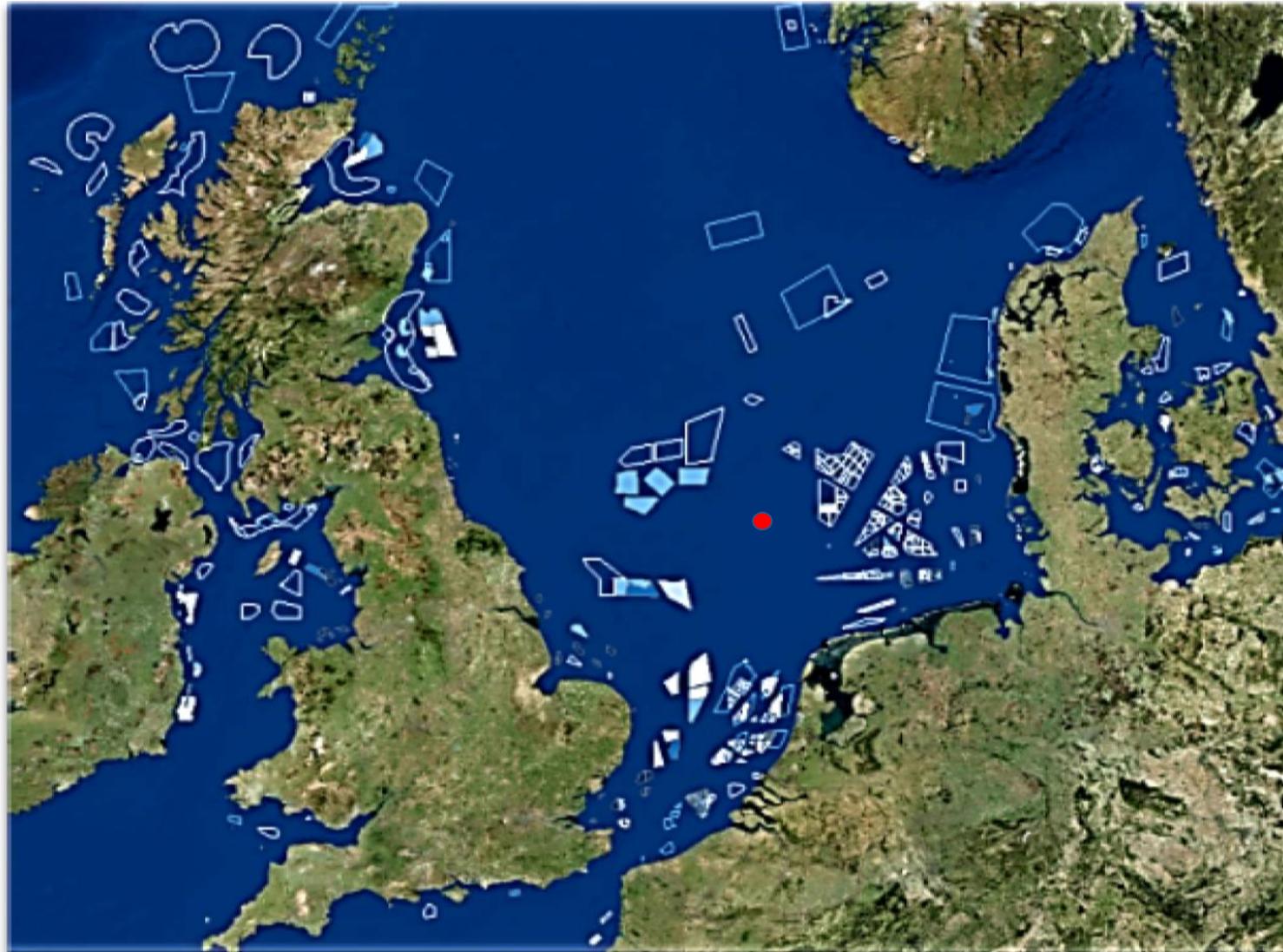


Conference on Multi-Functional Energy Islands

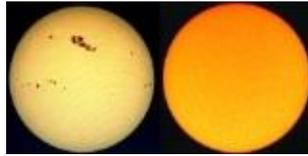
Session on Ecological Aspects

Chair: Em prof Han Lindeboom (HAME)

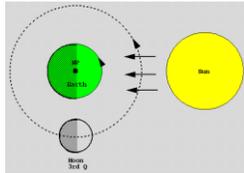


The Functioning of Marine Ecosystems

Four major Elements



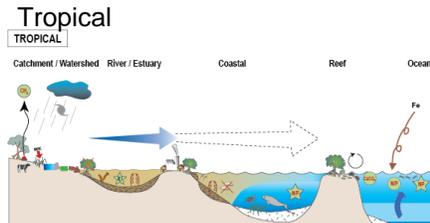
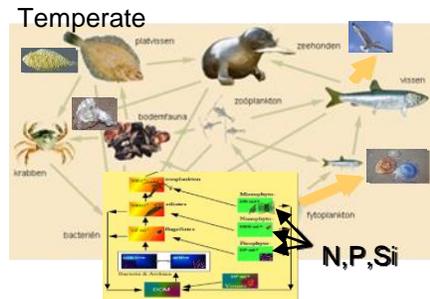
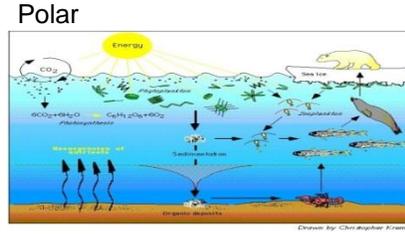
11-year cycle



18-year cycle

Energy

Natural driver of change



Anthropocene

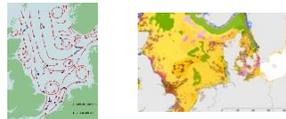


Man

Man-made drivers of change



Setting the stage



Habitat

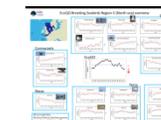
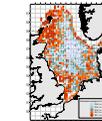
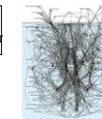
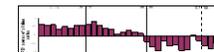
(Intrinsic properties non-living nature)



Determines reaction



Intrinsic properties living nature



The Functioning of Marine Ecosystems

Four major Determinants

Energy

- Light/heat/kinetic
- Climate*
- Temperature
- Wind
- Precipitation
- Tides/Currents
- Nutrient availability*
- Tectonics*
- Volcanism
- Earth quakes
- Tsunamis

Habitat

- (*Intrinsic properties non-living nature*)
- Depth
- Bottom type
- Currents
- Salinity
- Intertidal
- Waves (splash zone)
- Thermal vents
- Gas seeps
- Ice
- Biogenic structures
- Man-made structures

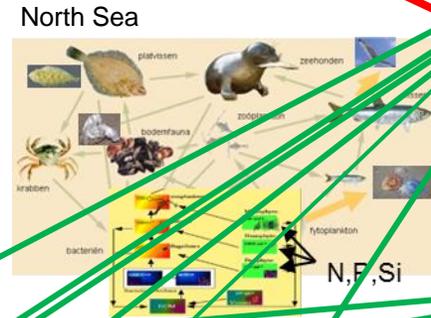
Man

- Fisheries
- Hunting
- Aquaculture
- Eutrophication
- Pollution
- Mining
- Noise
- River inputs
- Waterworks/Polders/Embankments
- Hard substrate
- Rotor blades
- Management*
- CO₂ emissions
- Invasive species

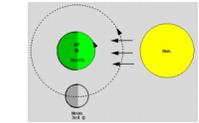
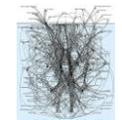
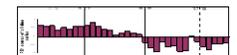
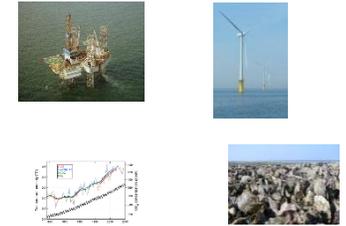
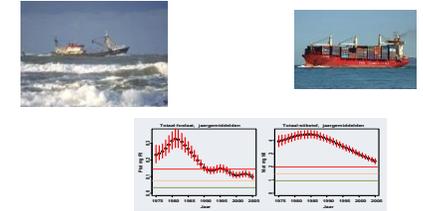
Intrinsic properties

living nature

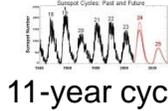
- Biodiversity
- Behaviour
- Production
- Recruitment
- Predation
- Diseases
- Reef building
- Evolution
- Regime shifts/sudden changes
- Resilience/sensitivity
- Feedbacks
- Match/mismatch
- Complexity/chaos



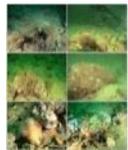
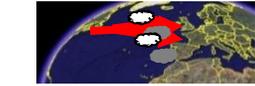
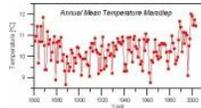
Anthropocene

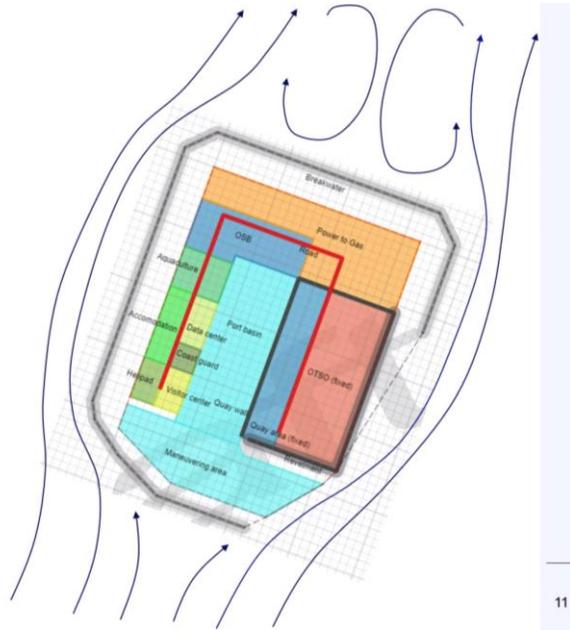


18-year cycle



11-year cycle





11

Changing:

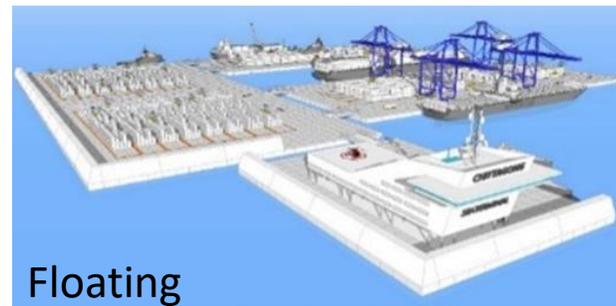
- Currents
- Waves
- Splash zones
- Depth
- Sediment transport
- Stratification
- Habitat type
-



Concrete



(partly) Sandy



Floating



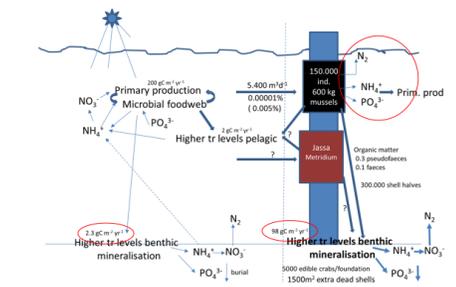
Platforms



Biodiversity /Production



Morphology



The Energy Transition

Foodweb



Session 5

Session 5	Ecological aspects	
Chair	Han Lindeboom	HAME
	Ib Krag Petersen	Aarhus University
	Mardik Leopold	Wageningen Marine Research
	Marjolein van Wijngaarden	Boskalis
	Heleen Vollers	North Sea Foundation
	Peter de Jong	Natuur en Milieu
	Emilie Reuchlin	WWF
	Discussion	

CONTENT OF THE SESSION

Threats and opportunities for nature; building with/ for nature

Energy island in the North Ssea and birds: pros and cons

Mardik Leopold & Ib Krag Petersen

Like it or not: **Any** offshore island **will attract** birds (and marine mammals)

Question is:

Do we like this or
dislike this?

Can we do something
about this?

Are some more
welcome than others?

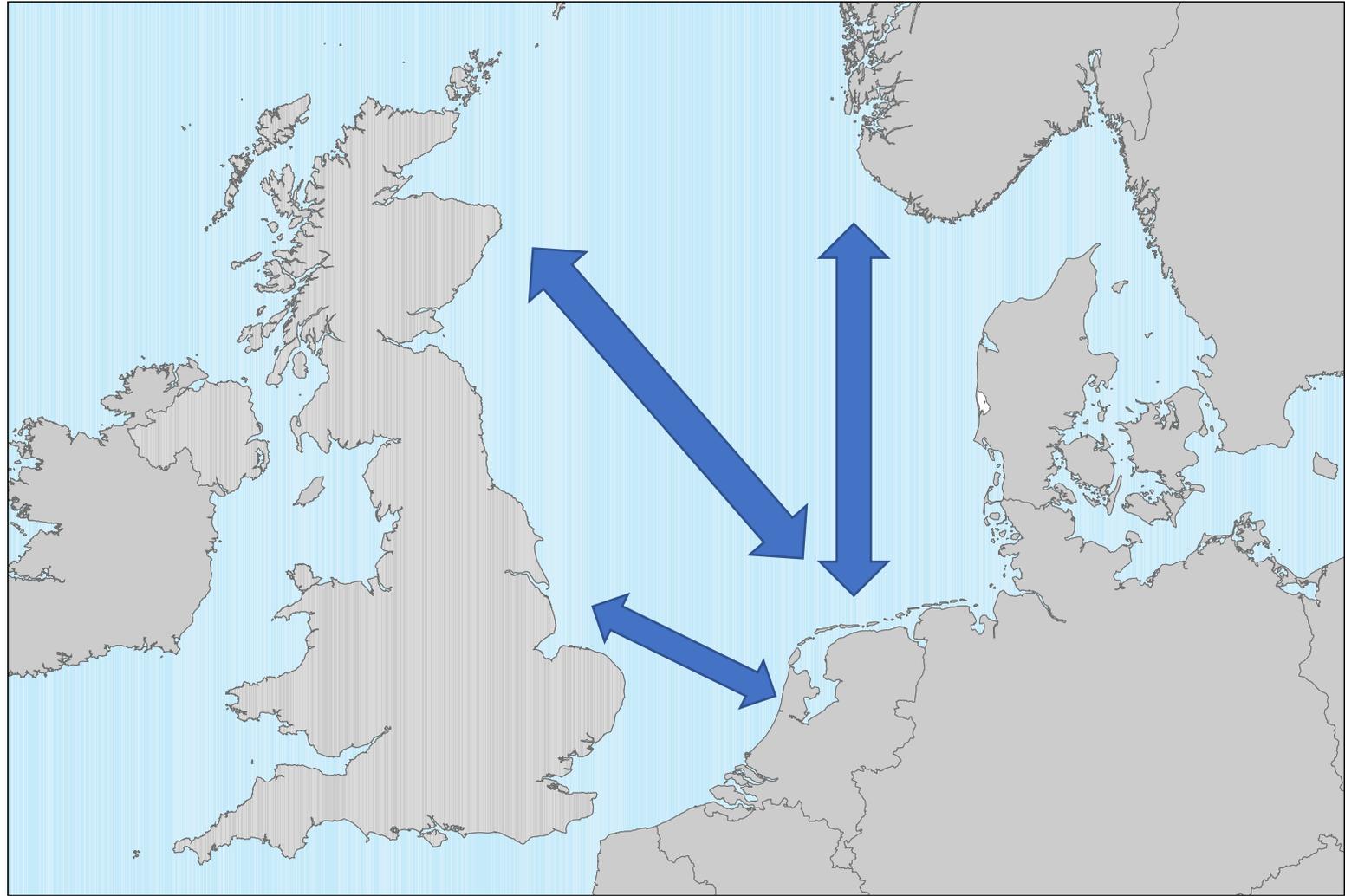


The setting: Seabirds versus landbirds

Many seabirds spend most of the year at sea, and avoid land.

But they need to breed on land, preferably on islands.

Land birds hate to cross the sea and seek land.



Seabirds

Resting (first) and breeding (in time)



Gannets,
Kittiwakes,
Razorbills,
Common
Guillemots,
Fulmar,
Gulls, Terns,
Cormorants



Seabirds: will find a place to nest (and nesting material)



Photo Guido Keijl-WUR

www.reisereporter.de



Management: where should the birds go?



Seabirds, Potential impact

Breeding will increase
population size

Collisions will decrease
bird numbers

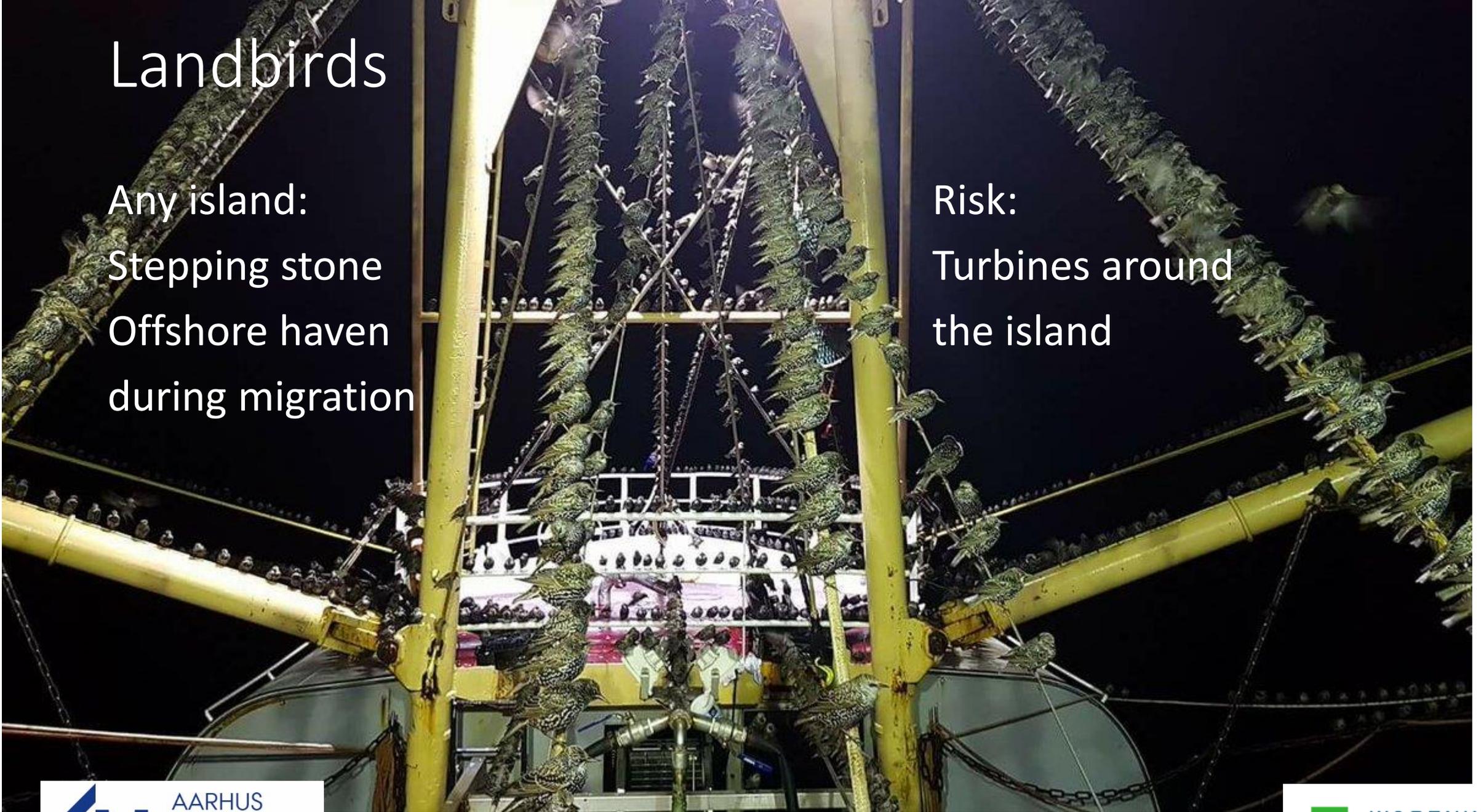
Question: can we attract
some birds over others?



Landbirds

Any island:
Stepping stone
Offshore haven
during migration

Risk:
Turbines around
the island



Invite or repel

So, should we invite the birds or repel them?

Low collision risk: **Invite**

Think: where?

High collision risk: **Repel**

Think: how?



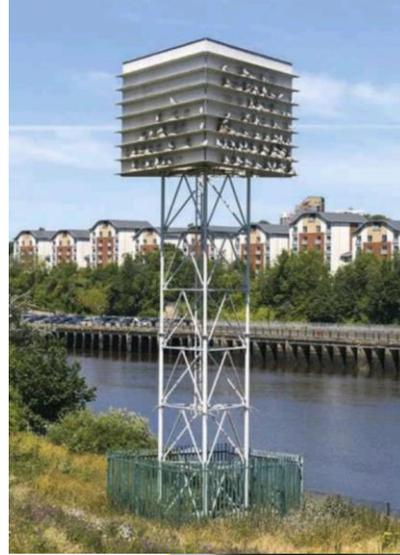
Foto: PR - TenneT

Design will be key

Design of the artificial island and the associated wind farms will be important.

Light regimes of both island and wind farms.

Access to breeding cliffs, freshwater, vegetation.



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Threats and opportunities for nature; building with/ for nature

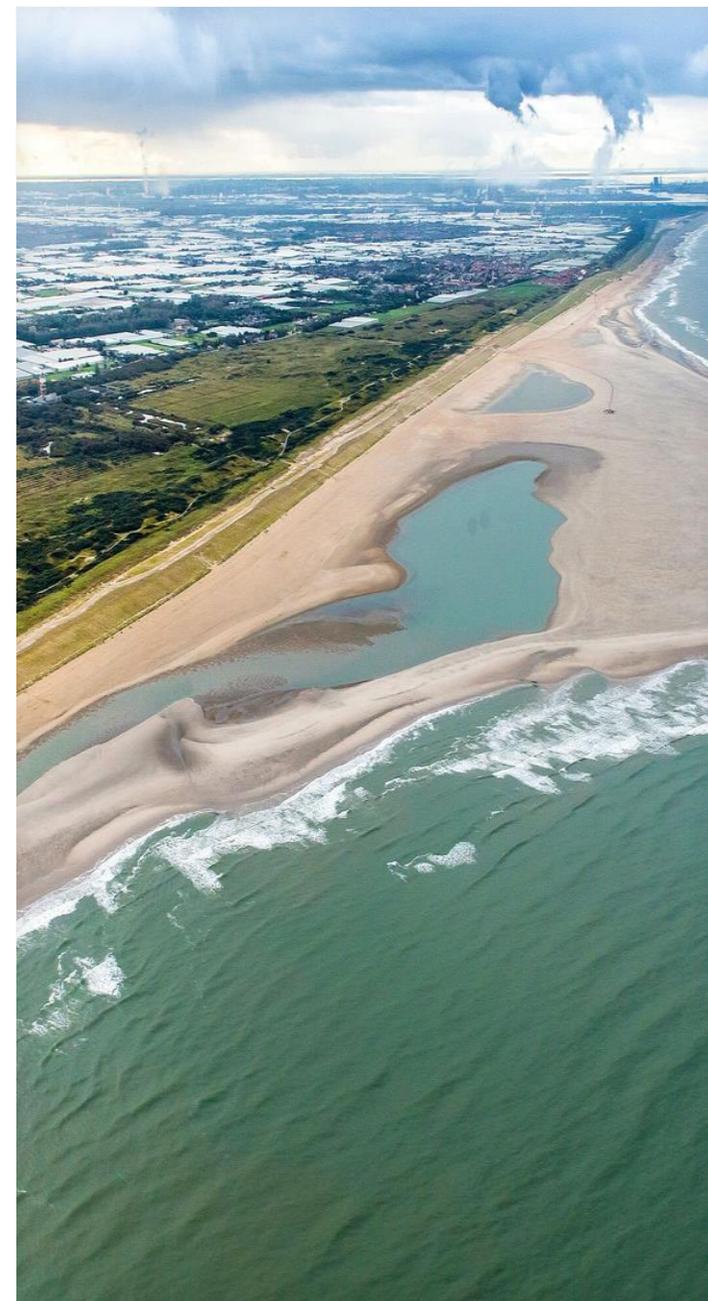
A perspective from the dredging industry

Marjolein van Wijngaarden

Boskalis Netherlands

Nature Based Solutions

- Are an opportunity to deliver sustainable and innovative solutions to society.
- Are a strong proposition for an Island at Sea to become an opportunity for both ecology AND economy
- Such islands are already technically feasible, but need to become cost effective and ecologically attractive solutions.
- We prefer “soft, green and sandy” solutions above the more traditional designs

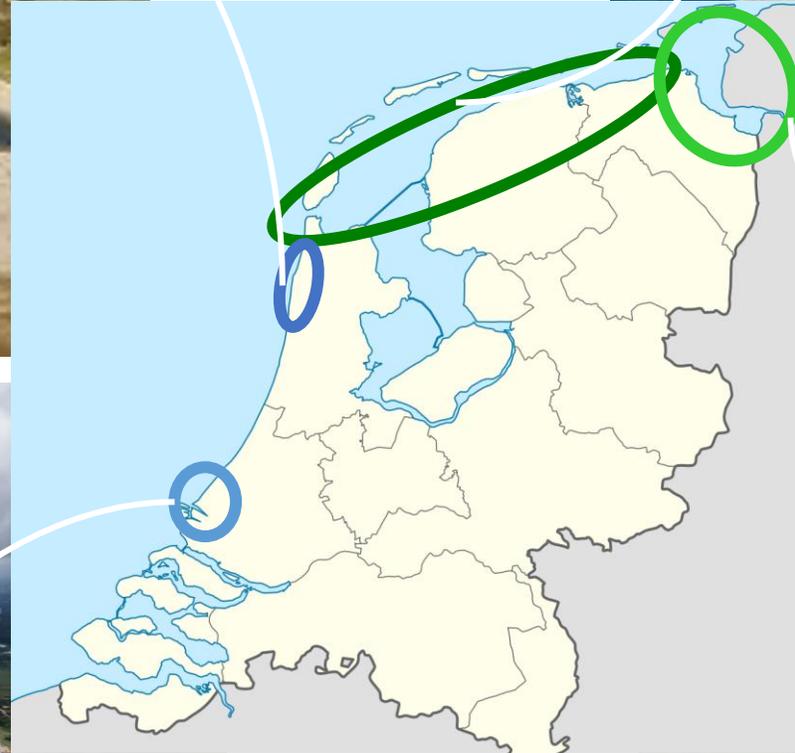


LARGE SCALE ATTRACTIVE PROJECT (-NETHERLANDS-)

Honsch Bossche Pettemer Dunes



Wadden Sea area



Sand Engine South Holland



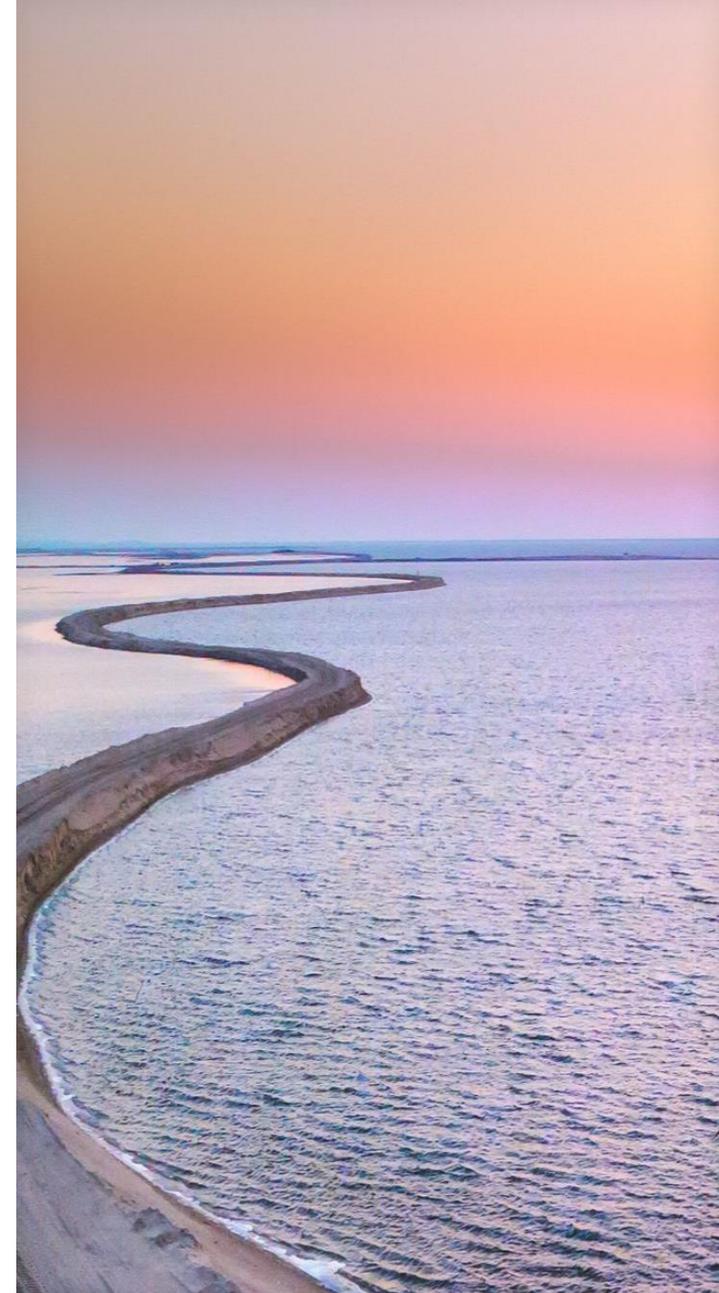
Eems - Dollard



Way forward?!



- Our sustainable future demands significant paradigm changes
- To make the change, we need to work together between knowledge institutes, companies, NGOs and government
- Connect on the base of a common interest (mutual gains approach) and respect individual drivers (serve the public goals, make money, protect environment, etc.)
- Work together and make it happen!



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CONTENT OF THE SESSION

Threats and opportunities for nature; building with/ for nature

Navigating in the mist; answers are needed

What are the (cumulative) effects on ecology?

Ecological risks:

- Habitat loss
- Invasive species
- Disruption during construction
- Disruption due to attracted economic activities
- Light pollution
- Toxic effects
- Effects on natural process including light transmittance, currents, and sedimentation

Much is unknown. Research and adaptive planning is needed



Proven necessity is key

Due to ecological uncertainties and risks, necessity of an energy island should be proven beyond doubt

Is the island beneficial to the following areas?



Economics

- Societal cost



Spatial impact

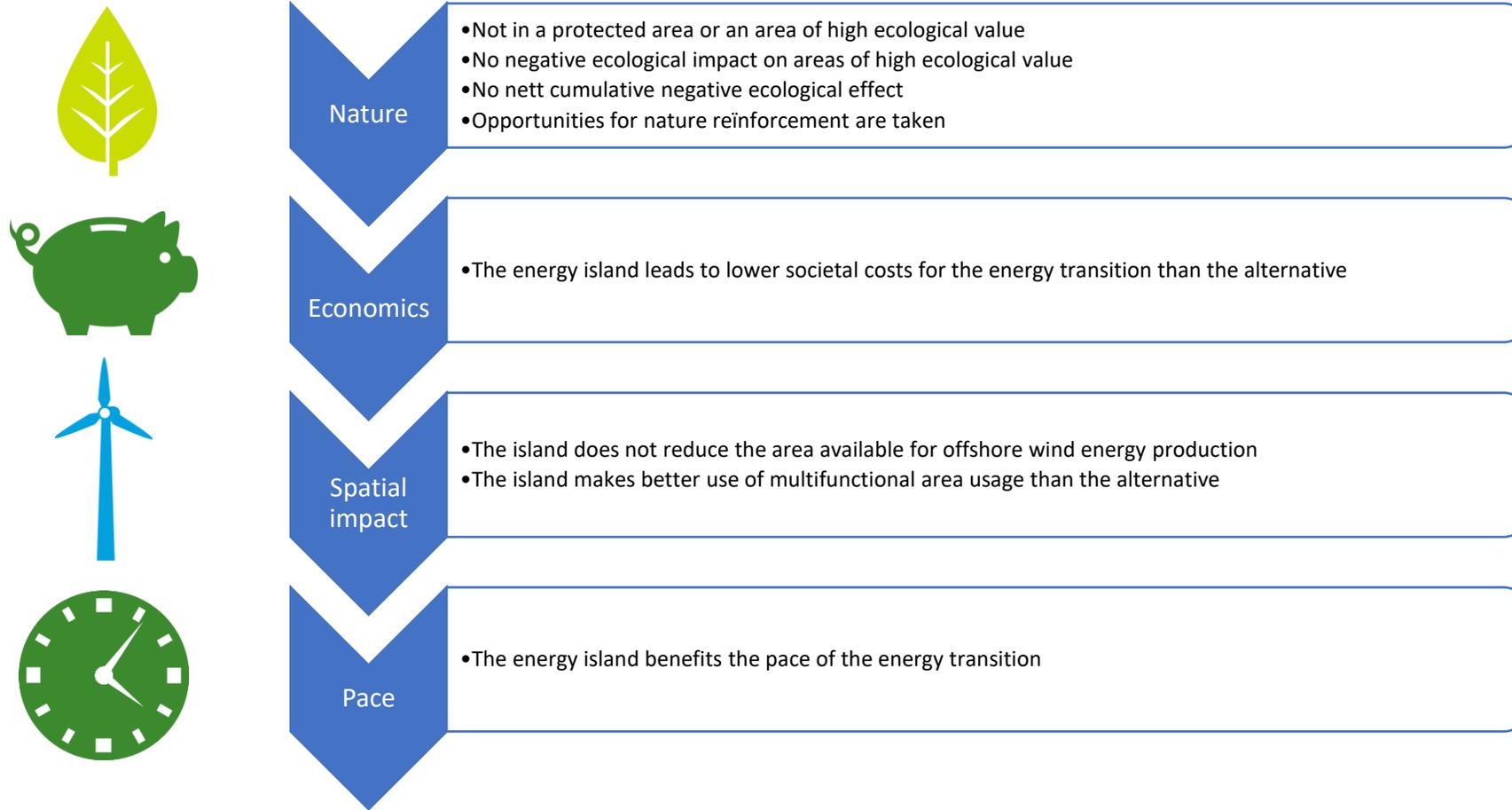
- Multifunctional use
- Area available for renewable energy generation



Pace

- Speed of the energy transition

Assessment framework



Fair comparison between the alternatives: sand island, caisson island, platforms, or no island



PROBLEMS WITH ENERGY ISLANDS IN THE NORTH SEA:

Energy islands are seemingly incompatible with restoration+ protection

Emilie Reuchlin, WWF Netherlands, International online seminar on multifunctional artificial islands, 8 April 2021

- North sea marine ecosystem and marine environment are in highly degraded state;
- There is no more 'ecological space' for further degradation;
- However, even with legislation in place, currently measures for protection, restoration, 'sustainable management' are largely absent, inadequate or not yet implemented;
- Solid cumulative impact assessments? We have yet to come across one;
- Mitigation and compensation mechanisms are not working;
- Focusing on islands as a solution will potentially cause blindness to easier and cheaper alternatives with a lower ecological and CO2 footprint.
- There are real and potential problems with energy islands, which include:
 - Habitat loss
 - Habitat damage
 - Interference with ecological, geological, geomorphological, hydrological processes
 - Death of marine species (direct and indirect)
 - Disturbance marine species
 - More underwater noise pollution
 - Materials for such islands creating problems elsewhere



PROBLEMS WITH ENERGY ISLANDS IN THE NORTH SEA: Energy islands are seemingly incompatible with restoration+ protection

Emilie Reuchlin, WWF Netherlands, International online seminar on multifunctional artificial islands, 8 April 2021

- Wind energy will help reach climate targets, but marine biodiversity and marine environment should not foot the climate bill.
- A healthy North Sea ecosystem provides space for sustainable energy and food harvesting, which is why we need a network of marine protected areas and place wind energy outside MPAs.
- WWF questions whether permanent energy islands in the North Sea are a good solution to solve energy-issues or that repurposed, temporary structures provide a better option with fewer ecological (cumulative) impacts.
- Impacts on environmental and ecological processes that underlie presence of species and habitats need assessment against the restoration potential instead of the degraded state of the North Sea ecosystem.

Session 5

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PROBLEMS WITH ENERGY ISLANDS IN THE NORTH SEA:

Energy islands are seemingly incompatible with restoration+ protection

Emilie Reuchlin, WWF Netherlands, International online seminar on multifunctional artificial islands, 8 April 2021

- North sea marine ecosystem and marine environment are in highly degraded state;
- There is no more 'ecological space' for further degradation; these boundaries have been surpassed long ago, which is why EU and national governments set out to protect areas and implement protective measures to restore nature. Unfortunately using shifted baselines of a degraded state as the target reference point;
- However, even with legislation in place, currently measures for protection, restoration, 'sustainable management' are largely absent, inadequate or not yet implemented;
- Solid cumulative impact assessments? We have yet to come across one;
- Mitigation and compensation mechanisms are not working;
- Focusing on islands as a solution will potentially cause blindness to easier and cheaper alternatives with a lower ecological and CO2 footprint. What exactly is the problem for which this energy island idea is arguably the only solution?
- There are real and potential problems with energy islands, which include:
 - ❑ Habitat loss
 - ❑ Habitat damage
 - ❑ Interference with ecological, geological, geomorphological, hydrological processes

- ❑ Death of marine species (direct and indirect)
- ❑ Disturbance marine species
- ❑ More underwater noise pollution
- ❑ Materials for such islands creating problems elsewhere

Greenwashing of large-scale infrastructure by calling it 'building with nature' and drawing attention to a few species that may benefit is a huge problem. We simply cannot speak of 'benefits to nature' when we do not understand the impact, when these are unknown or unprecedented.

Wind energy will help reach climate targets, but marine biodiversity and marine environment should not foot the climate bill. A healthy north sea ecosystem provides space for sustainable energy and food harvesting, which is why we need a network of marine protected areas and place wind energy outside MPAs. WWF questions whether permanent energy islands in the North Sea are a good solution to solve energy-issues or that repurposed, temporary structures provide a better option with fewer ecological (cumulative) impacts. Impacts on environmental and ecological processes that underlie presence of species and habitats need assessment against the restoration potential instead of the degraded state of the North Sea ecosystem.