

ENERGETIC ODYSSEY

RISKS AND OPPORTUNITIES



SYMPOSIUM OUTCOMES

Outcomes of a symposium on the ecological implications of large-scale offshore wind energy development on the North Sea, held during the IABR in Rotterdam on June 8th 2016.

The North Sea Foundation
Guido Schild

Symposium

Ecological Implications of Large-Scale Wind Energy Development on The North Sea

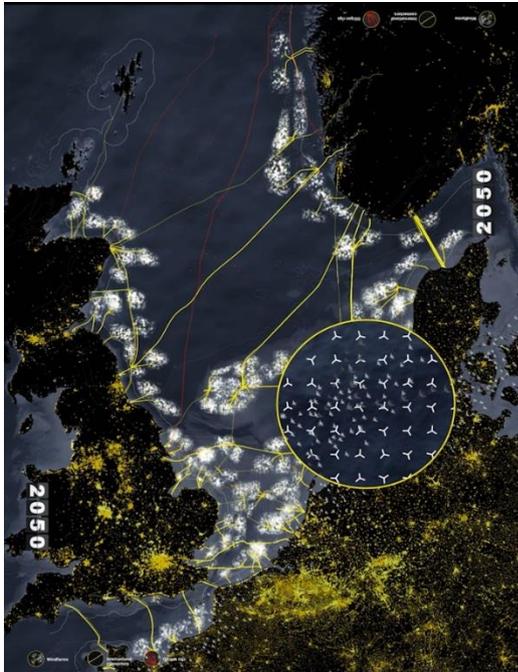
International Architecture Biennale Rotterdam, June 8th 2016

Introduction

On June 8th 2016, Dutch NGOs the North Sea Foundation and Natuur & Milieu organised a symposium on the ecological implications of large-scale wind energy development on the North Sea. The symposium was organised in connection with one of the projects on display at the IABR: “2050 – An Energetic Odyssey”¹. This project explores the possibilities of large-scale wind energy production on the North Sea. It envisions 25,000 offshore wind turbines of 10MW each to be installed in the North Sea by 2050, covering 57,000km² of the sea surface.

Participants in the symposium² were shown the Energetic Odyssey animation and asked for their view on the possible ecological implications of this large-scale development, based on their respective areas of expertise. The North Sea Foundation’s scientific advisory council gave input to the discussions during the symposium. At the end of the symposium, the participants formulated a set of conclusions and recommendations for wind farm developers and policy makers to move forward. These conclusions and recommendations are by no means exhaustive, but could form the basis for further research and discussions.

2050 – An Energetic Odyssey



“2050 – An Energetic Odyssey”: facts and claims

- 25,000 turbines of 10MW each will be installed
- Wind farms will cover 57,000 km² of the North Sea
- All planned wind farms are outside of the 12nm zone
- An artificial island (6km²) will be created on or near the Dogger Bank
- Energy will be stored onshore through hydrogen conversion
- Depleted gas fields will be used for carbon storage
- Bird migration routes are taken into account
- Artificial hard substrate offers new habitat
- Underwater noise is mitigated
- Fisheries management zones will be established in wind farms
- Carbon taxing is necessary

This still from “2050- An Energetic Odyssey” depicts the envisioned situation in 2050.

¹ Developed by H+N+S Landscape Architects, Ecofys and Tungsten Pro. Commissioned by IABR, the Ministry of Economic Affairs, Van Oord, Shell, TenneT, Zeeland Seaports, European Climate Foundation, Natuur & Milieu, RWE, Port of Rotterdam and Port of Amsterdam.

² For a list of participants and contributors see Annex I.

Main insights and recommendations

- **Climate change is a global problem with local implications.** The North Sea has been recognised as a hot spot for climate change. Effects of increased temperature change and potential ocean acidification variations can already be observed. **The North Sea should be part of the solution by providing space for harvesting renewable energy through wind.** It has to be accepted that the development of wind farms on the North Sea will have some ecological effects.
- The large-scale development of offshore wind farms on the North Sea further **accelerates the transition from a severely degraded seascape to a modified seascape.** The desirability of this modified seascape is largely a matter of ethics and societal choice.
- **The large-scale development of offshore wind farms will have wide ranging impacts on the ecology of the North Sea.** Current knowledge is insufficient to predict the effects of such a large scale transition. It is therefore recommended to take a **step-by-step approach.** This should be accompanied by a **dedicated monitoring scheme** that allows for **adaptive management.** The possibility to slow down, adapt, or even halt the large-scale roll-out of offshore wind farms if the ecological impact is deemed too significant should be present after each step.
- In light of the limited knowledge base regarding the cumulative effects of offshore windfarms, particularly on this scale, the **precautionary principle** should be applied during the roll-out of offshore wind farms. The precautionary principle should also be applied when deciding on the desirability of multiple-use wind farms, as methods for the assessment of cumulative impacts from multiple activities are currently still in their infancy.
- **It is paramount to consider whether the current legal framework related to nature conservation would allow for the large-scale development of wind farms at sea** as presented in the Energetic Odyssey, in view of the (potential) negative effects on protected species and habitats. The **applicable legal requirements have to be taken fully into account** in the planning and implementation large-scale wind farm development.
- To ensure that the negative ecological impacts of a future North Sea wind farm network are kept to a minimum, **international cooperation will have to be stepped up.** This international cooperation would have to be directed at **spatial planning** and at improving **research and monitoring** efforts. Together, North Sea countries can ensure that research budgets are optimally distributed and applied, that knowledge is shared and built upon and that wind farms are optimally located to deliver the right amount of energy to multiple markets, based on demand.
- Over time, many activities have placed spatial claims on the North Sea. In order to develop large-scale offshore wind farms in a sensible way, an **integrated approach to marine spatial planning** is recommended. This means not looking at which locations are left for wind energy development when all other uses have been taken into account, but coming up with a **new spatial plan for the North Sea** in which all activities are awarded space based on current ecological insight and need. When 're-designing' the North Sea, consideration should be

given to possible future developments, such as the decommissioning of oil and gas infrastructure and the opening of the polar shipping route to commercial shipping.

- **Wind farms should not be conflated with Marine Protected Areas (MPAs).** While wind farms could under certain circumstances be placed within MPAs, they should not themselves be considered to be MPAs. Designating and conserving MPAs as natural reference points will remain necessary in the future.

Ecological considerations

- The development of offshore wind farms will result in the **large-scale introduction of hard substrate in the North Sea's intertidal and subtidal zones.** While the artificial hard substrate in the subtidal zone might in some cases perform some of the functions of the natural hard substrate which historically covered a substantial part of the seabed, offshore hard substrate in the intertidal zone is wholly unnatural. The presence of hard substrate spread out over a large area may result in some **habitat connectivity**, thus creating opportunities for dependent species to spread. This may be positive or negative, as in the case of potential invasive alien species or the ecologically unbalanced expansion of existing species such as jelly fish.
- Wind farms will likely lead to a **local increase in biodiversity and biomass.** It is unknown whether or not these effects could be considered significant on a wider North Sea scale. Furthermore, increases in biodiversity and biomass as such should not be considered as adequate indicators of the functioning of the North Sea ecosystem.
- **Several bird species are likely to be severely impacted** by large-scale wind farm development, through direct collisions and habitat loss. The possibility of extinction events cannot be fully excluded in this scenario, particularly if wind farms are built in the shallower parts of the North Sea, where many birds forage. Areas with a water depth not exceeding 30m. are particularly important for birds. The construction of wind farms in those locations will reduce their habitat. In order to protect bird species, sensitive areas should be avoided, migration corridors should be maintained and source populations should be protected.
- The long-term, large-scale effects of offshore wind farms need to be assessed. **A North Sea wide Strategic Environmental Assessment is called for.** More attention needs to be given to the development of cumulative impact assessment methods. Ecological data generated by or in service of wind farm developers should be made public in order to enhance the common knowledge base and prevent double efforts. **Research budgets should be shared between countries and spent according to common need.** Monitoring carried out within existing wind farms should be focussed enough to produce results quickly and allow for adaptive management.
- In a scenario where bottom trawling is not permitted within wind farms, **the North Sea's natural benthic heterogeneity might partially return.** Species survival will increase if a network of no-trawl zones is established. Meanwhile the displacement of fisheries from wind farms to other areas will increase the pressure on those areas. **Wind farms provide an**

opportunity for a transition to more sustainable fisheries methods with little to no bottom impact.

- The large-scale development of offshore **wind farms reduces the space available for shipping**. Meanwhile, ship traffic is expected to increase. This poses potential navigational and therefore environmental risks. These should be fully taken into account when choosing wind farm locations. Furthermore, wind farms should allow for oil spill response actions to prevent any oil from reaching the coast after an incident.
- While **wind farms offer opportunities for multiple-use**, for example in combination with aquaculture, the environmental impacts of combined activities are harder to assess. It should be ensured that activities are not only technically compatible, but at the same time do not aggravate the ecological burden placed on their location. If the choice for multiple-use wind farms is made, the **design of the wind farm should take additional activities into account**.

Annex I: List of participants and composition of the North Sea Foundation's scientific advisory council

Symposium participants:

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Prof. dr. Han Lindeboom – Wageningen University
Dr. Jennifer Dannheim – Alfred Wegener Institute
Prof. dr. Steven Degraer – Ghent University / MUMM
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Ms. Malenthe Teunis MSc. – Bureau Waardenburg
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Mr. Floris van Hest – North Sea Foundation
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Mr. Peter de Jong – Natuur & Milieu

North Sea Foundation scientific advisory council

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