Offshore Wind Dogger Bank

Ecological Quickscan

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31 May 2016

Introduction

Long term vision on renewable wind energy after 2023:
more offshore wind is needed to reach the goals

Dogger Bank is an interesting location, because:

- It is a shallow area on a windy spot
- It may function as centre of offshore HV grid

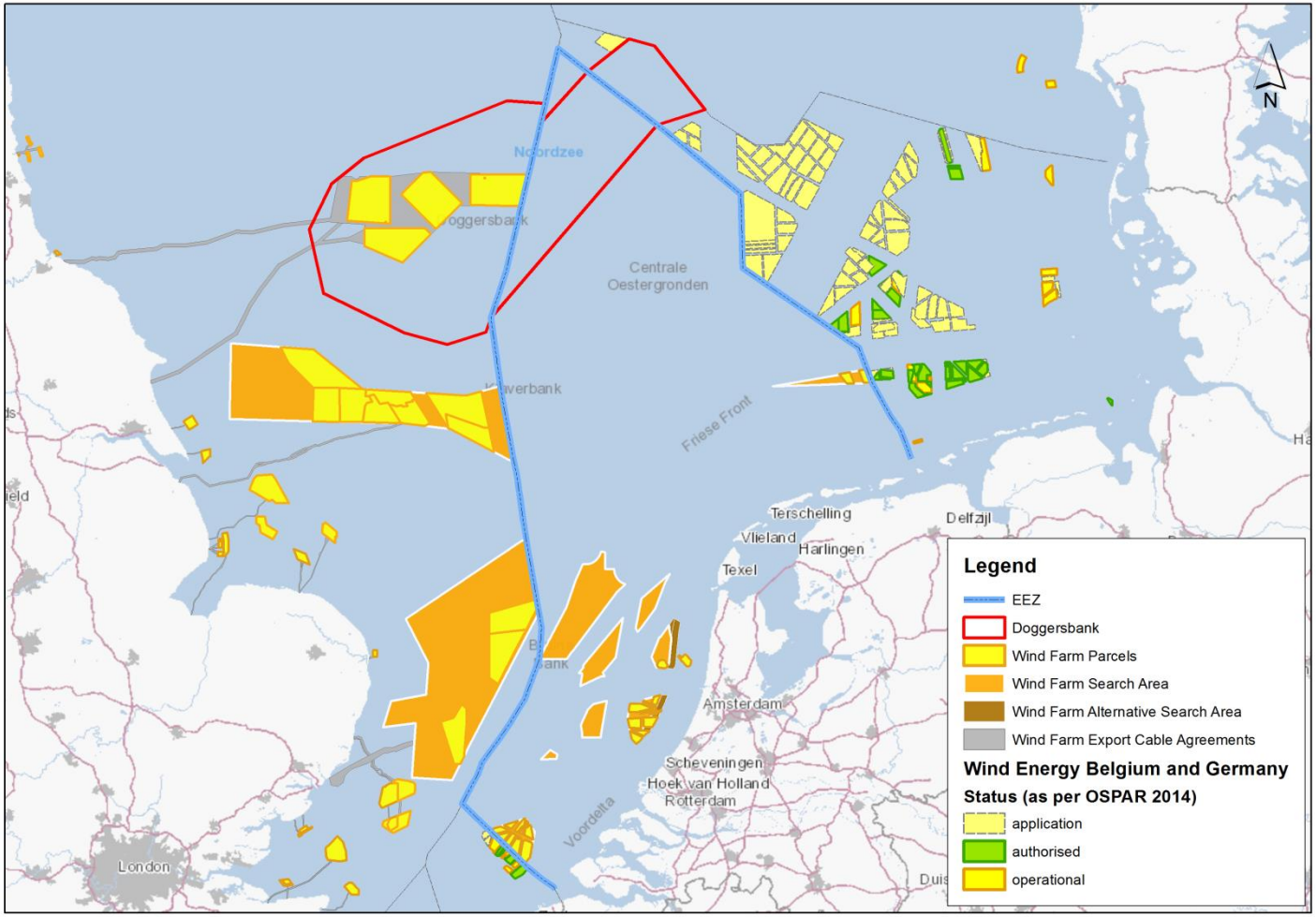
- Water depth is an important factor in the cost of Offshore Wind. Water depth on the Dogger Bank is between -20 and -40m
- Area – 30 m = 11.400 km2 ~ space for 80 GW

- Dogger Bank in NL is not designated as a wind energy area yet, in the UK part of the area is designated and for 4 offshore wind farms of 1200 MW permits are consented

Dogger Bank is also a Natura 2000-site, wich means:

- Nature values are protected
- No significant impact is allowed
- An Appropriate Assessment (AP) is needed (besides an EIA)

Offshore Wind Areas North Sea



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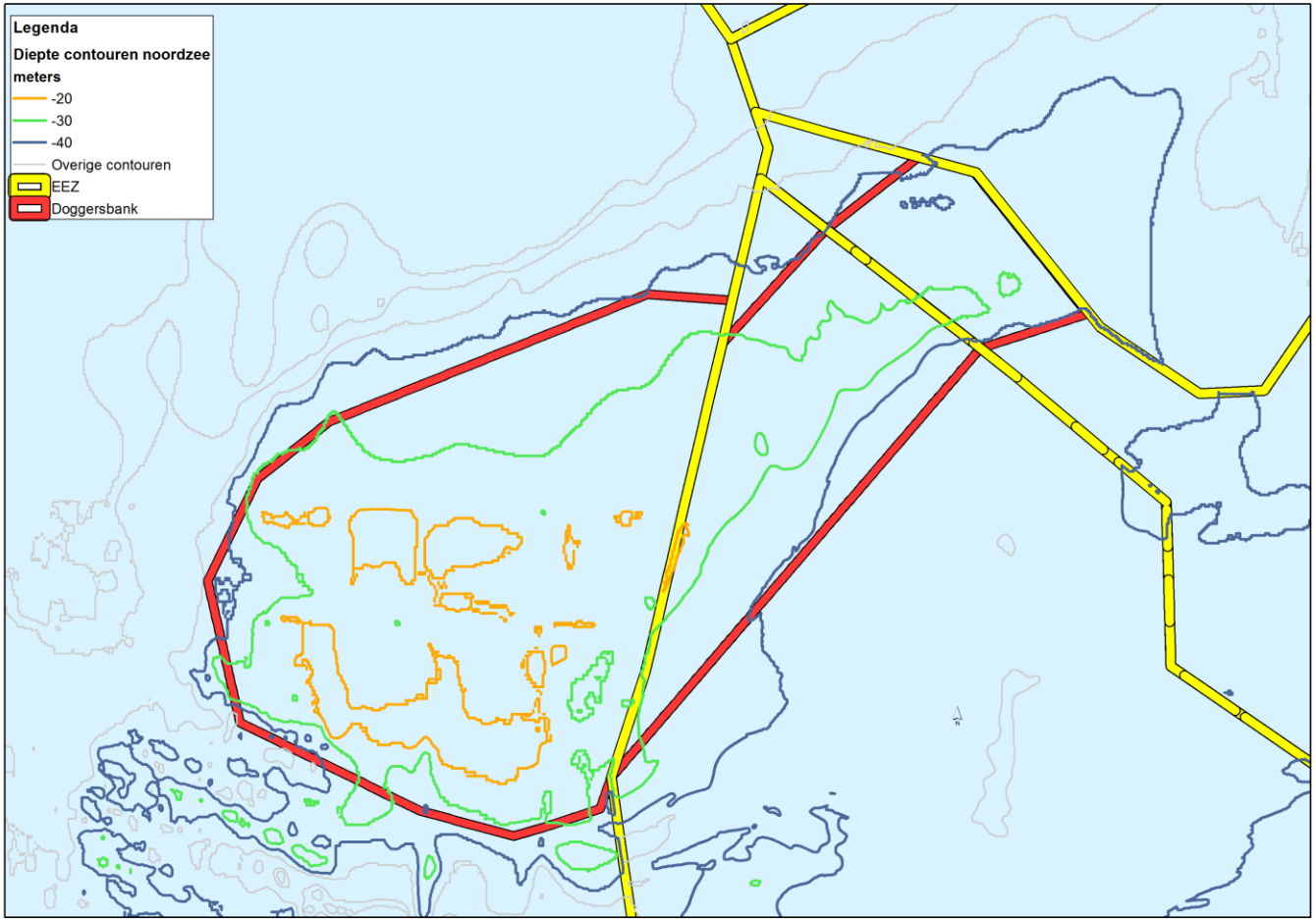
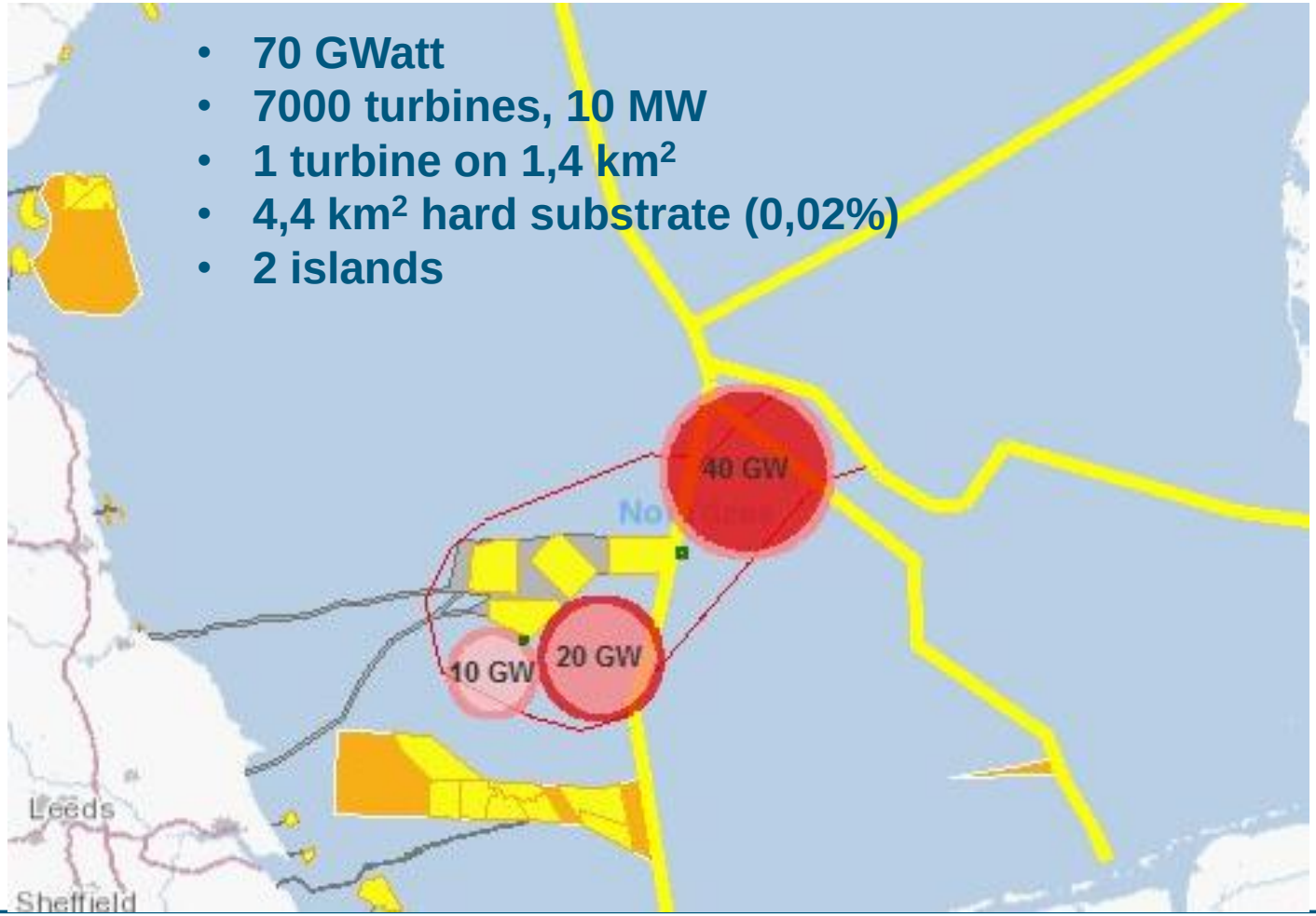
Dogger Bank: shallow water



Possible perspective Dogger Bank



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Ecological Quick scan

- An ecological quick scan is executed to have a first general overview of the impact of large scale offshore wind on the Dogger Bank
- This quick scan is based on EIA's & AP's for NL and UK offshore wind farms and wind energy areas executed by RHDHV and case study reports from Imares
- The Natura 2000 objectives of the Dogger Bank are:
  - Seabed H1110 subtype Dogger bank (NL, UK, G)
  - Harbour porpoise (NL, G)
  - Grey seal (NL)
  - Common seal (NL, G)
- Not only the impact on the Natura 2000 Dogger Bank species and habitats must be assessed, also the impact on other species that use the Dogger Bank area must be taken into account
- Sea mammals, birds, fish, habitat & biodiversity, rare species

Sea mammals Harbour porpoise, Grey seal, Common seal

- **Possible impact**:
  - Porpoises/seals avoid areas with underwater noise due to hammering at a distance of 24 – 45 km (latest information, research ongoing)
    - Construction 70 GW takes minimal 15 years: permanent hammering
    - Current level of knowledge and techniques: significant impact expected
    - Mitigation of underwater noise is necessary
    - Innovation of hammering techniques needed
  - Marine mammals may be attracted to windfarms (evidence from Offshore Wind farm Egmond aan Zee (OWEZ))
    - Due to decreased fishing and vessel activity and increased food availability within the wind farm
    - Other studies conclude operational wind farms have small but negligible impact
    - At this moment no barrier effect of offshore wind farms is expected

- **Conclusion:**
  - To prevent significant impact of the construction phase on sea mammals additional innovation of hammering techniques is needed, besides using pingers and soft start to scare mammals at the start. Also internationally coordinated phasing of the construction of wind farms could help mitigating the impact
  - At this moment no significant impact of the operational phase of offshore wind areas is expected. Research is needed to know more about the impact of large scale offshore wind

Birds I Gulls, auks, gannets

- **Possible impact:**
  - Birds will be disturbed by vessels used during the construction phase
    - Birds will avoid the construction area at a distance of 2 km
    - A small area will not be used, the impact depends on the way birds use the area
  - Several hundred million birds of many different species cross the North Sea from Europe and Scandinavia to Britain during spring and autumn migration. No exact migration routes are known, birds use the whole North Sea
    - Research in the OWEZ shows that the collision risk further offshore is lower compared to the region closer to the coast
    - Collision risk depends on the species and weather conditions
    - Collisions can be prevented by:
      - Choosing a location without important migration routes
      - Right configuration of the turbines, for example free lanes for migration
      - Shutting off the rotor blades during bad weather and migration periods
      - Using light that does not attract birds
    - Some species avoid wind farms (Northern gannet) and others make use of the wind farm (gulls, auks)

Birds II Gulls, auks, gannets

- In the EIA's for offshore wind areas in the Dutch part of the North Sea and for the Dogger Bank in the UK, the impact on birds is expected to be not negative for most species, negative for some species and significant for a few species

- **Conclusions:**
  - A significant impact of large scale Offshore Wind on several bird species cannot be ruled out at this moment
  - Due to collisions, barrier effect and a decline in foraging or resting area, mainly during the operational phase
  - The impact depends on the way birds use the area and migrate over the Dogger Bank, this is not clear for all species, which means that more research is needed (for example Northern gannet)
  - A bird monitoring programme that starts on time will give more insight
  - To prevent bird collisions, mitigation measures are must be executed (see former slide)

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Fish

- **Potential impact:**
  - Construction noise could have an impact on fish eggs and larvae when executed near a spawning ground
    - The Dogger Bank is a spawning area for herring, cod, plaice and whiting
    - In a worst case situation 5-10% decline of fish larvae is possible
    - This could have an impact on fish eating birds and mammals
    - Innovation of piling techniques needed for mammals will mitigate this impact
  - Disturbance, loss and change of seabed habitat
    - During construction sediment will be suspended temporarily
    - 4,4 km^2 hard substrate (0,02% of the total DB) will be introduced which will result in a higher biomass and more food for fish, especially cod will profit
  - Changes to fishing activity during operation
    - Exclusion of fishing activities will result in higher biomass and larger fish
    - Exclusion of a large area will cause an increase of fishing activity elsewhere
  - Electromagnetic fields (EMF) during operation
    - There is no evidence to date that offshore wind cause significant impacts – temporary behavioural reactions are more likely

- **Conclusion:** when impact of under water noise will be mitigated, the impact of offshore wind is mainly positive for fish if no fisheries are allowed in the wind farm

Habitat and biodiversity

- **Potential impact:**
  - Disturbance, loss and change of seabed habitat (H1110)
    - During construction sediment will be suspended, this is predicted to be negligible in scale and temporary
    - Changes to hydrodynamic processes are within the natural variation of tidal current velocity, no change to composition is expected
    - 4,4 km^2 of the sandy seabed will be lost due to placing turbines with scour protection (islands could cover 12 km^2)
    - This is 0,02 – 0,08% of the total Dogger Bank area, which is negligible in scale but no decline in area of a habitattype is accepted for NL permits at the moment
    - No impact on the subtidal sandbank communities is expected
    - Introducing hard substrate will result in a higher biodiversity and a higher biomass (300 times higher than on sandy seabed, according to Han Lindeboom)
  - Changes to fishing activity during operation
    - Exclusion of fishing activities will result in a less disturbed habitat and in higher biomass and larger fish
    - The habitat may become more suitable for sharks and rays

- **Conclusion**:
  - No significant impact on habitattype H1110 is expected, although the decline in habitat area could be a problem for permitting
  - Introduction of hard substrate is positive for biodiversity and biomass

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Rare species: sharks and rays

- **Potential impacts**
  - Construction noise
    - Sharks and rays are hearing generalists with generally low hearing sensitivity. Adults and juveniles are mobile and can therefore move away from disturbance
  - Sharks and rays are sensitive to Electromagnetic fields (EMF)
    - Effects depend on the technology used (i.e. AC or DC). There is no evidence to date that offshore wind cause significant impacts – temporary behavioural reactions are more likely
    - Cable burial or other means of protection dramatically reduce exposure to EMF
  - Changes to fishing activity during operation
    - Exclusion of fishing activities will result in a less disturbed habitat and less bycatch, which could be positive for sharks and rays

- **Conclusion:**
  - Significant impacts are not expected from offshore wind development, although more research is needed on EMF
  - Due to decreased fishing and vessel activity and increased food availability a large wind farm could be attractive to sharks and rays

Summary Quick scan

Ecological value	Conclusion
Sea mammals	• To prevent significant impact of the construction phase on sea mammals additional mitigation measures are needed • No significant impact of the operational phase of offshore wind areas is expected
Birds	• A significant impact of large scale Offshore Wind on several bird species cannot be ruled out at this moment, more research is needed for several bird species
Fish	• When impact of under water noise will be mitigated, the impact of offshore wind is mainly positive for fish
Habitat & Biodiversity	• No significant impact on habitattype H1110 is expected, but the decline in habitat area could be a problem for permitting • Introduction of hard substrate is positive for biodiversity and biomass
Rare species	• Significant impacts are not expected from offshore wind development • Due to decreased fishing and vessel activity and increased food availability a large wind farm could be attractive to sharks and rays

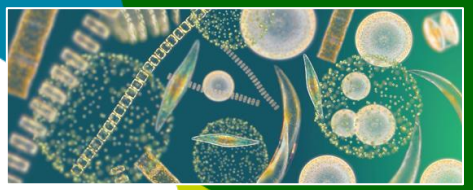
Building with/for Nature

- Offshore wind farms and opportunities for nature:
  - When special and extra hard substrate is used for scour protection this will have a positive effect on biomass. This will lead to more food for fish, sea mammals and birds
  - With the design of the islands a positive impact on nature can be created. For example: when an island is designed in the form of an atol or half moon, a large sheltered and sandy area will arise which can be attractive to fish and other species. For the outer ring hard substrate can be used, which will also stimulate biomass and biodiversity. This design will also be cost effective compared to a normal island
  - Resting areas can be created on the islands or turbines for birds with low collision risk

Sources used

- Passende beoordeling Rijksstructuurvisie Windenergie op Zee Hollandse Kust (Royal HaskoningDHV, 2014)
- Plan-MER Rijksstructuurvisie Windenergie op Zee Hollandse Kust (Royal HaskoningDHV, 2014)
- Passende beoordeling Rijksstructuurvisie Windenergie op Zee aanvulling Hollandse Kust (Royal HaskoningDHV, 2015)
- Plan-MER Rijksstructuurvisie Windenergie op Zee aanvulling Hollandse Kust (Royal HaskoningDHV, 2015)
- Reports Imares and Deltares used in above mentioned reports
- http://www.wageningenur.nl/nl/nieuws/Han-Lindeboom-bij-de-Universiteit-van-Nederland-over-de-Noordzee-1.htm
- Habitat Regulations Assessment report Dogger Bank A & B (Forewind and Royal HaskoningDHV, 2014)
- Foraging ranges of northern gannets *Morus bassanus* in relation to proposed offshore wind farms in the UK: 2010-2012. (Rowena H W Langston, Emma Teuten & Adam Butler, 2013)

Other aspects



- **Primary production**
  - Increase in suspended sediment concentration during wind farm construction is not higher than during a storm, generally temporary and localised to the near-field. No impact on productivity is expected, potential for indirect effects (on benthos, fish and birds) is therefore extremely limited

- **Water quality**
  - The fundament of turbines will need a cathodic protection te prevent erosion. Due to regulations this must be a system where no heavy metals are released to prevent pollution. This is already stated in the regulations for future wind farms