Overall Approach for the Assessment of Environmental Impacts of Offshore Wind Farms in Europe

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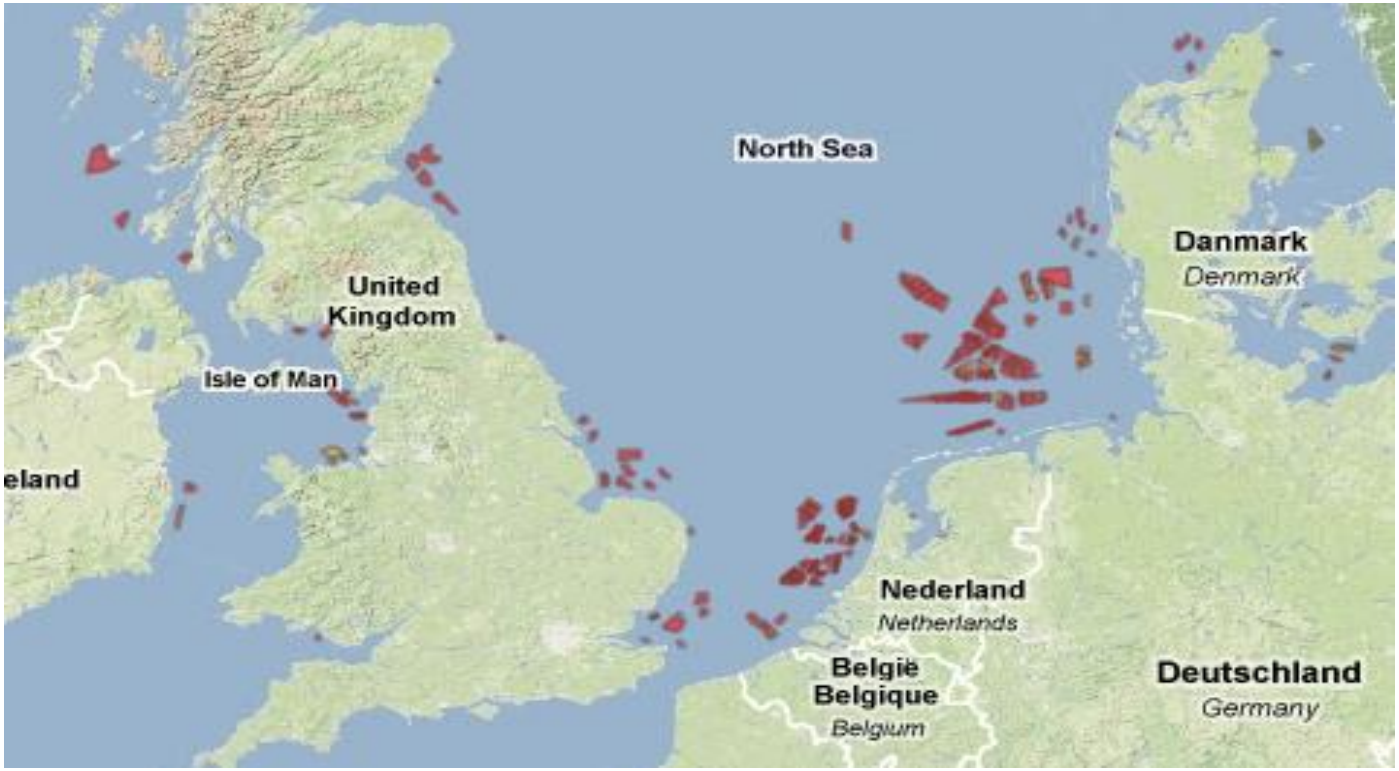
Offshore Windfarms in Europe

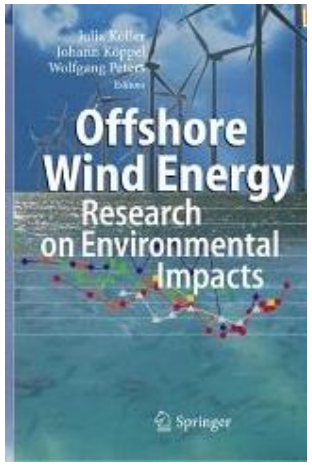


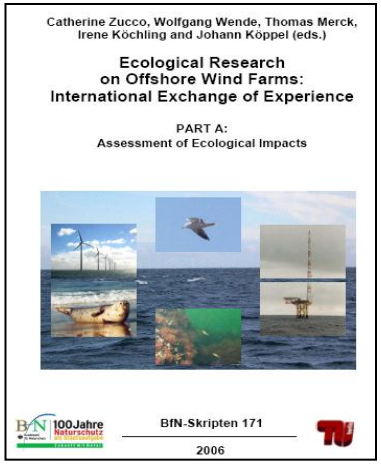
http://rave.iset.uni-kassel.de/rave/pages/map

Current Capacity Europe (2010)	3.000 MW
Goal Capacity 2020 (Europe)	40.000 MW
Goal Capacity 2030 (Europe)	150.000 MW

Ecological Research on Offshore Wind Farms

- More than 50 R&D Projects have been conducted on the research of Environmental Impacts of Offshore Wind Energy in Germany (with >20 million € funding)
- Very detailed „Standards for the Environmental Impacts Assessment“ have been designed (Federal Maritime and Hydrographic Agency)
- The research produced a lot of new knowledge and data, but so far failed to adress the *assessment* of Environmental Impacts sufficiently





„How to assess the Impacts of Offshore Wind on the marine environment“ (Peters et al 2008)

Study on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in Germany

Basic review of the ecological research in that field (literature review) and comprehensive analysis of environmental impact studies (EIS) and environmental impact assessments (EIA) in Germany

Development of a methodological tool for a decision-oriented assessment of impacts of offshore wind farms

Approaches for the Assessment of the following issues have been developed:

- Habitat loss of sea- and resting birds
- Collision risk to migratory birds
- Permanent impact onmammals (esp. Harbour porpoises)

Additionally: Review of Danish and British EIS and EIAs to analyse whether comparable findings can be found on an international level

Findings: Approval decision of BSH by Ecological Risk Assessment is over simplified

magnitude of likely effects (habitat loss: % of local population size)

sensitivity of the populations potentially affected (status, % of national population size)

sensitivity

	very high	high	medium	low
very high	very high	very high	high	medium
high	very high	very high	medium	low
medium	very high	high	low	very low
low	medium	low	low	very low
very low	low	very low	very low	very low

significance of impact

Detailed data that were gathered in the EIS got lost in the over-simplified Ecological Risk Assessment

Conceptual model for habitat loss of seabirds displaced by offshore wind farms

Impact Factors	Cause-effect relation	Criteria/Indicator
Size of the wind farm		
Extent of the wind farm	The larger the wind farm area, the stronger the effect of displacement and habitat loss	km^2
Effect intensity		
Wind farm illumination	The more illumination, the stronger the effect of displacement (some species can be attracted by the lights)	Number of lights
Sensibility of the species		
Sensibility to construction and operation of wind turbines	The more sensitive the species, the stronger the effect of displacement	Seabird-Sensitivity-Index (Garthe & Hüppop 2004.)
Backup capacity		
Reachability of avoidance habitats	The worse the alternative, the stronger the effect of displacement and habitat loss	Number of seabirds which do not reach an alternative habitat

Conceptual model for habitat loss of seabirds displaced by offshore wind farms I

Main Parameters	Maximum	Minimum	Notes
A Size of the effective area of the wind farm	[Wind farm effective area (km²)] + [disturbance distance of the species x perimeter of the wind farm (km)]		
B Density of individual s in the intended wind farm area	Largest individual densitiy in the wind farm area (Individuals/km²)	Smallest individual densitiy in the wind farm area (Individuals / km²)	Differen-tiation of seasons and functions of the area (feeding / nesting)
C Number of potentially displaced individuals	A x B Wind farm effective size (km²) x individual density in the intended wind farm area (Individuals / km²)		

Conceptual model for habitat loss of seabirds displaced by offshore wind farms II

Main Parameters	Maximum	Minimum	Notes
D Displacement intensity of the wind farm	The wind farm effects above-average. • High service intensity • Special illumination • High noise development	The wind farm effects below average. • High distances between turbines • Low service Intensity • Special illumination • Low noise development	
E Displacement Sensivity of the Species	The species is very sensitive. All individuals in the effect area will be disturbed *Sensitivity factor = 1*	The species is non-sensitive. No individuals in the effect area will be disturbed *Sensitivity factor = 0*	Seabird sensitivity Index (SSI) (Garthe & Hüppop 2004)
F Number of displaced individuals	C x D x E Number of effected Individuals x displacement factor x sensitivity factor		

Conceptual model for habitat loss of seabirds displaced by offshore wind farms III

Main Parameters	Maximum	Minimum	Notes
G Importance of this habitat for the species / Backup capacity	The displaced individuals cannot relocate to other areas *Backup capacity factor = 1*	All displaced Individuals can move to other Areas *Backup capacity factor = 0*	
	Fiction: Backup capacity factor 1		
H Reduction of population size	F x G Number of displaced individuals x Backup capacity factor		

Conclusions

1. Still, baseline survey data are only partly useful for the subsequent decision-making process
2. A huge gap exists between the bulk of datas and the oversimplifying ecological risk assessments in Germany
3. The scope of EIA to be focused on the pivotal assesment factors finally being considered by the approval agency (esp. birds and mammals, where required: landscape scenery)
4. Semi-quantitative approaches for comparable assessments of Offshore Wind Farms in Europe recommended
5. Thus, the presented conceptual models might fuel further and more sophisticated approaches for a research-based, transparent and reproduceable assessment

To do: assesment of cumulative effects, convention building (thresholds), compensation measures

Ecological Research on Offshore Wind Farms

Research at Alpha Ventus (RAVE):

- > 50 million € spent by Ministry of Environment on research at first German Offshore Wind Farm (Alpha Ventus), > 5 million for ecological research
- First findings available, results will be presented in an international conference next year in Bremerhaven (May 8 – 10, 2012)

RAVE
RESEARCH AT ALPHA VENTUS
Eine Forschungsinitiative des Bundesumweltministeriums

Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit

- Agenda for Offshore Wind in Germany: 5 billion € as credits for offshore projects