

# Night-time obstruction lighting of offshore wind farms and birds

- A multi-party project to define the requirements of different interest groups in Germany -

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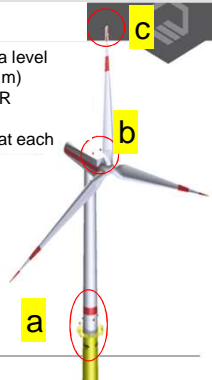


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## Offshore wind mill with potential markings / lightings

Ship safety: yellow shaft (15 m above sea level)  
3 x ID markings (letter size 1 m)  
illumination of ID markings OR illuminated ID  
5 nm lights (yellow, blinking) at each peripheral wind mill

Air safety: 2 x red blinking on nacelle  
4 x obstruction lights (red, permanent) on the mast  
3 x blade tip red lights, illuminated 60° before to 60° after the top height



SSC Montage SSC Windenergy Service

Fig. 1: Obstruction lighting on a model offshore windmill > 150 m in German waters; for smaller wind mills the "4 x obstruction lights" and "blade tip red lights" are not mandatory.

## Introduction

International and national regulations regarding ship and air safety require wind mills to be marked with obstruction lights during night-time.

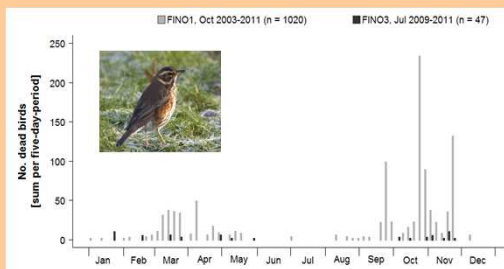
Migrating birds are known to cross large water bodies - e.g. the North Sea - during night-time; orientation relies on different mechanisms from magnetic compass over polarised light to night cues like sunset and stars. The disturbances of night-migrating birds by artificial lights range from des-orientation to exhaustion and/or collisions.

In this multi-party project each party (ship and air safety, energy providers, legal authorities) and nature conservation provided their needs regarding obstruction lighting.

## Do birds collide with offshore structures at night?



### They do!



Birds found dead on two North Sea platforms (FINO1/3); (n = 1067); FINO3 is further offshore than FINO1 and has fewer collisions. (R. HILL, AviTech Research, written comm.)

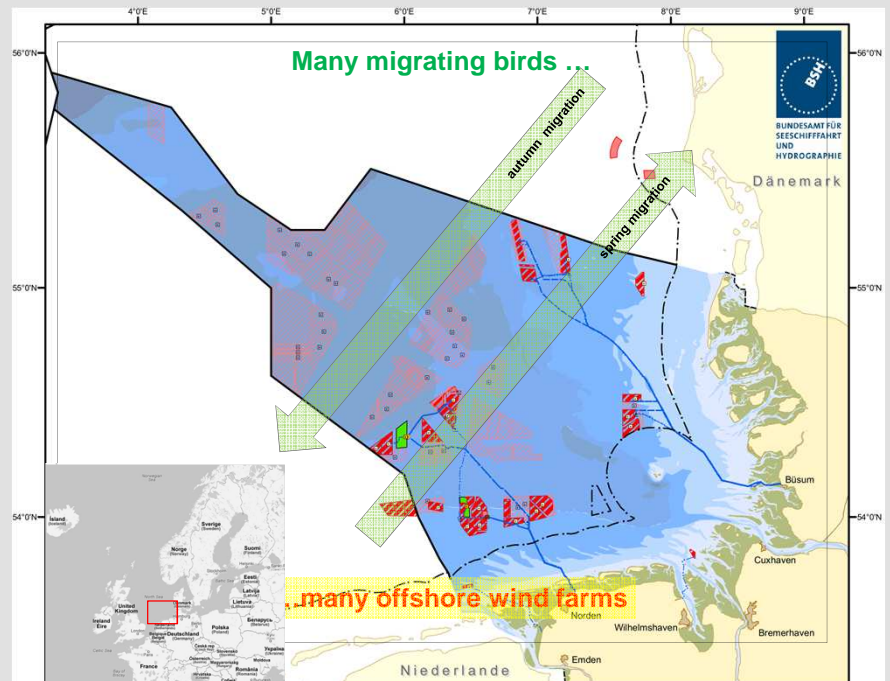


Fig 2: Offshore wind farm planning in German North Sea; green: windfarms existing or under construction; fully red shaded: windfarms consented; light red shaded: wind farms planned (BSH 2012).

## Facts:

- Lights attract birds. Worse: inclement weather / reduced visibility attracts birds at close distance, they may become "trapped".
- Permanent lights are worse than blinking / flashing lights.
- White / broad-spectrum lights are worse than green/blue / narrow-spectrum lights; however, the exact effects of light colour are not entirely clear.

## Conflict issues:

- Air safety demands red lights on each wind mill; if > 150 m, blade tip lights (Fig 1: a, b, c).
- Ship safety demands illuminated areas on mast / illuminated letters / signs (Fig 1: a).
- Ship and air safety demand obstruction lighting on many, if not all wind mills.
- Providers must fulfill legal obligations, also keep an eye on installation and maintenance costs.

## Conclusion from a nature conservation point of view:

**The less light, the better!**

## Solutions / suggestions:

- Replace illuminated areas with self-reflecting letters / numbers (only active, when illuminated by e.g. search lights (Fig. 1: a).
- Do not use blade tip lighting (Fig. 1: c).
- Only install lights for ship safety on corners and every second peripheral wind mill of a wind farm (Fig. 1: a).
- Only activate lighting in wind farm "on demand", i.e. when an airplane or a ship approaches (transponder or radar techniques) (Fig 1: a, b, c).

Talk to each other for compromises!