

EOLIEN OFFSHORE

Pourquoi?

Le vent

Les éoliennes

Les fondations

Les Transformateurs et les câbles

L'exécution

Le paysage

La biodiversité, la pêche et l'avifaune

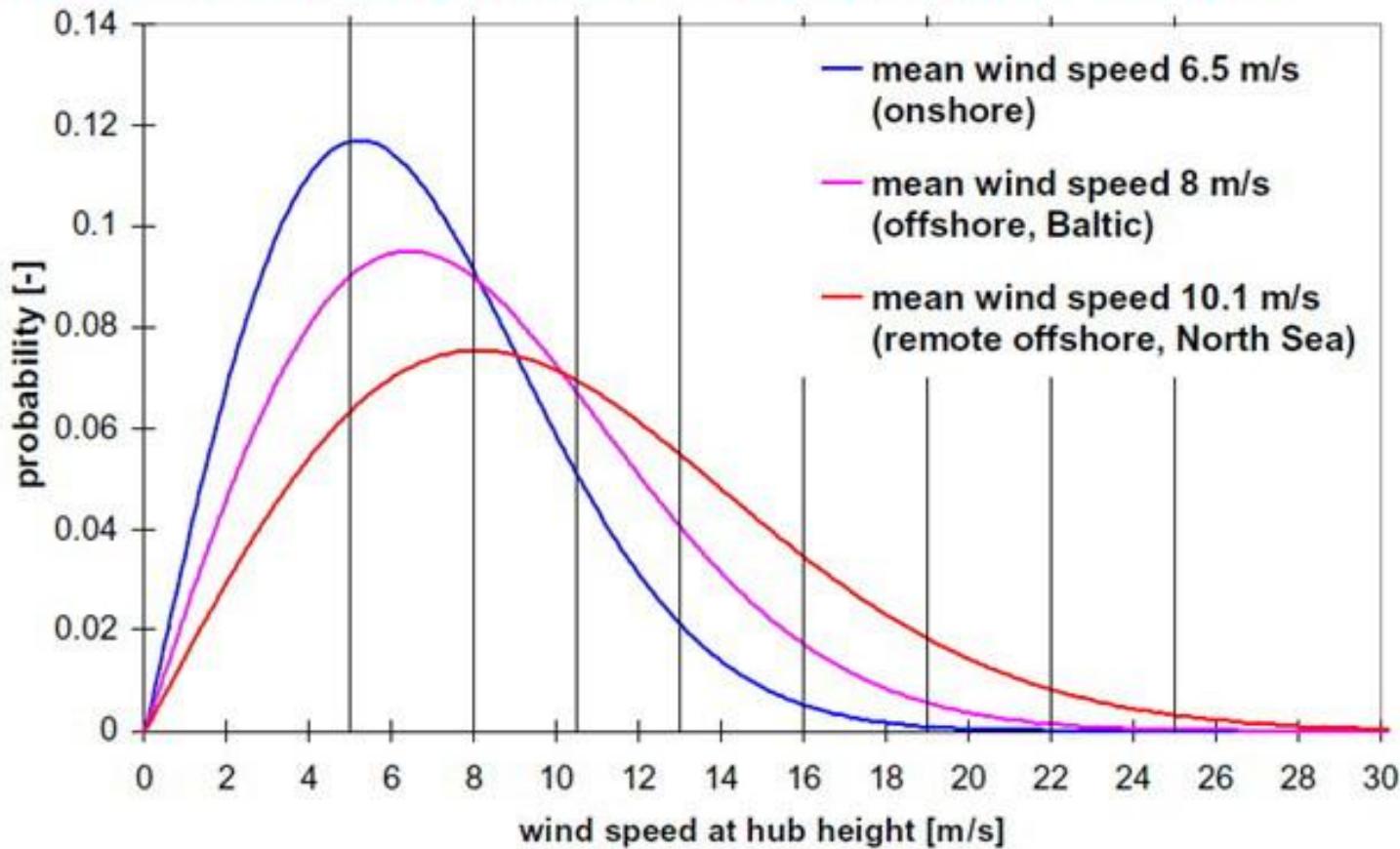
Les perspectives

POURQUOI

- Exploitation d'une ressource renouvelable
- Développement d'une industrie.
- Surface disponible importante.
- Un seul propriétaire.
- Proximité des lieux de consommation.
- Vitesse du vent plus élevée qu'à terre, plus fréquent et moins turbulent.
- Facilité d'accès pour de grandes machines
- Impact visuel réduit

Le vent

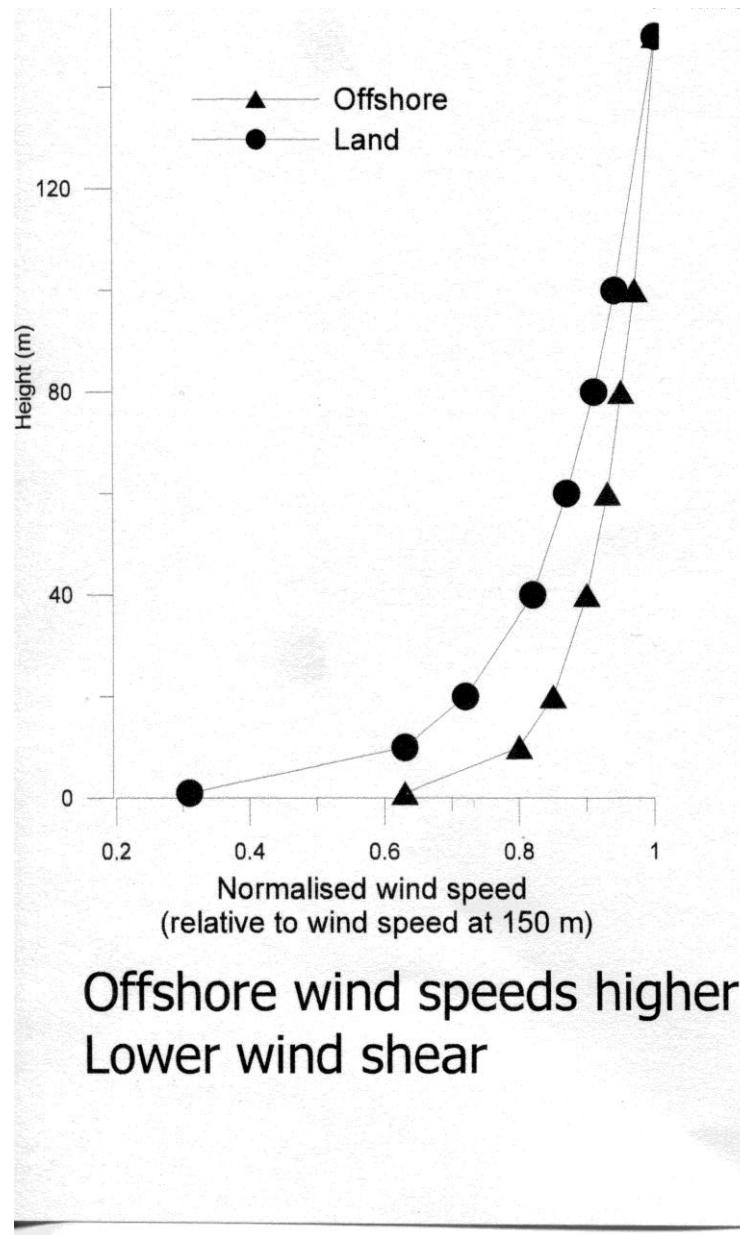
Offshore versus onshore: Weibull distribution



Turbulence et cisaillement

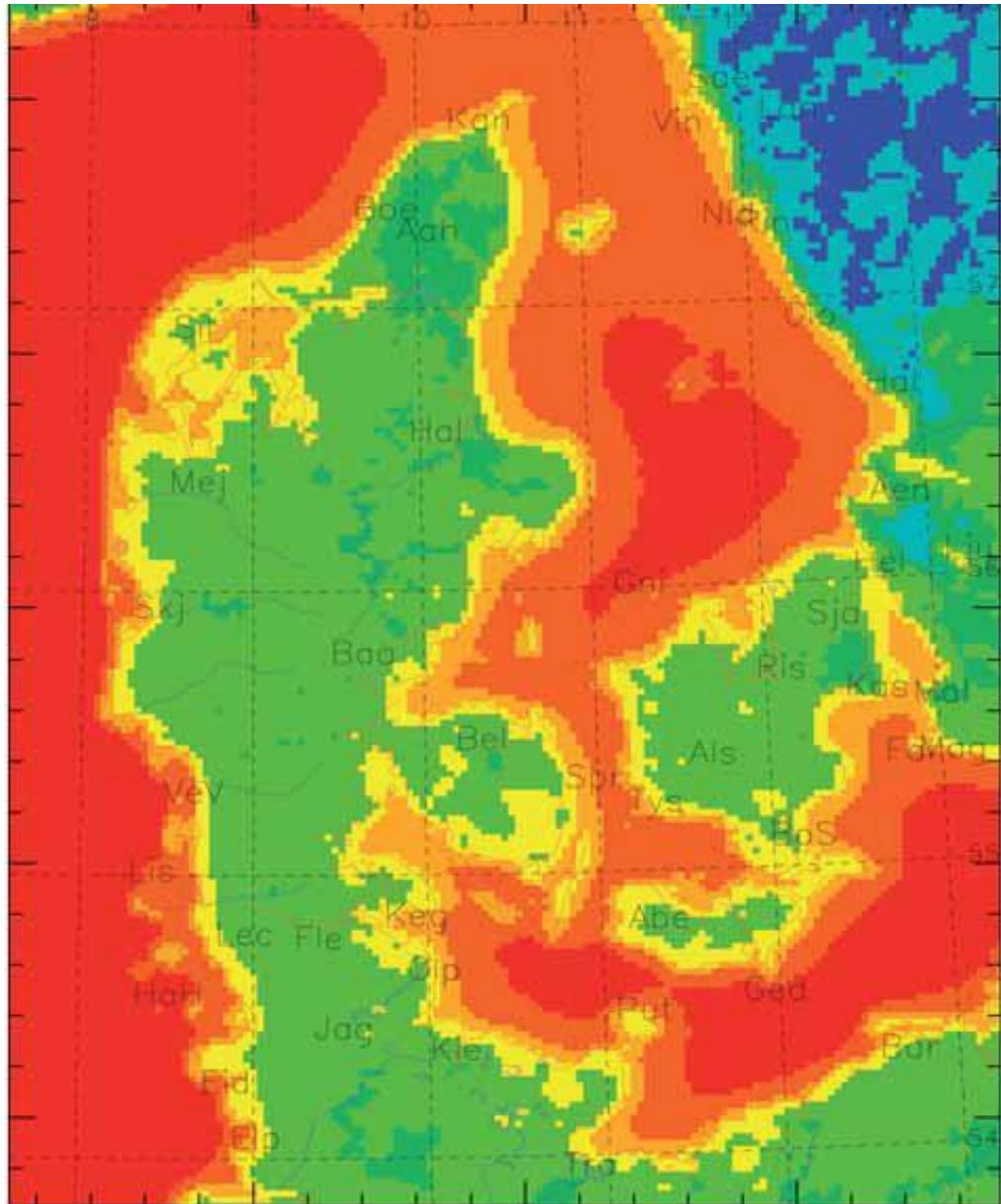
Turbulences: rugosité faible fonction de la hauteur des vagues, de la distance à la côte et de la durée de la houle

Cisaillement (shear): profil raide donc moindre différence de pression entre points haut et bas des pales



This map of Denmark shows wind speeds measured as an average in a normal wind year, both on land and offshore. The wind speeds are calculated at an altitude of 50 meters using WAsP software,

The red colours show wind speeds of 8-9 m/sec, yellow/orange 7-8 m/sec, green 6-7 m/sec the blue < 6 m/sec.
The map is drawn up by Risø.



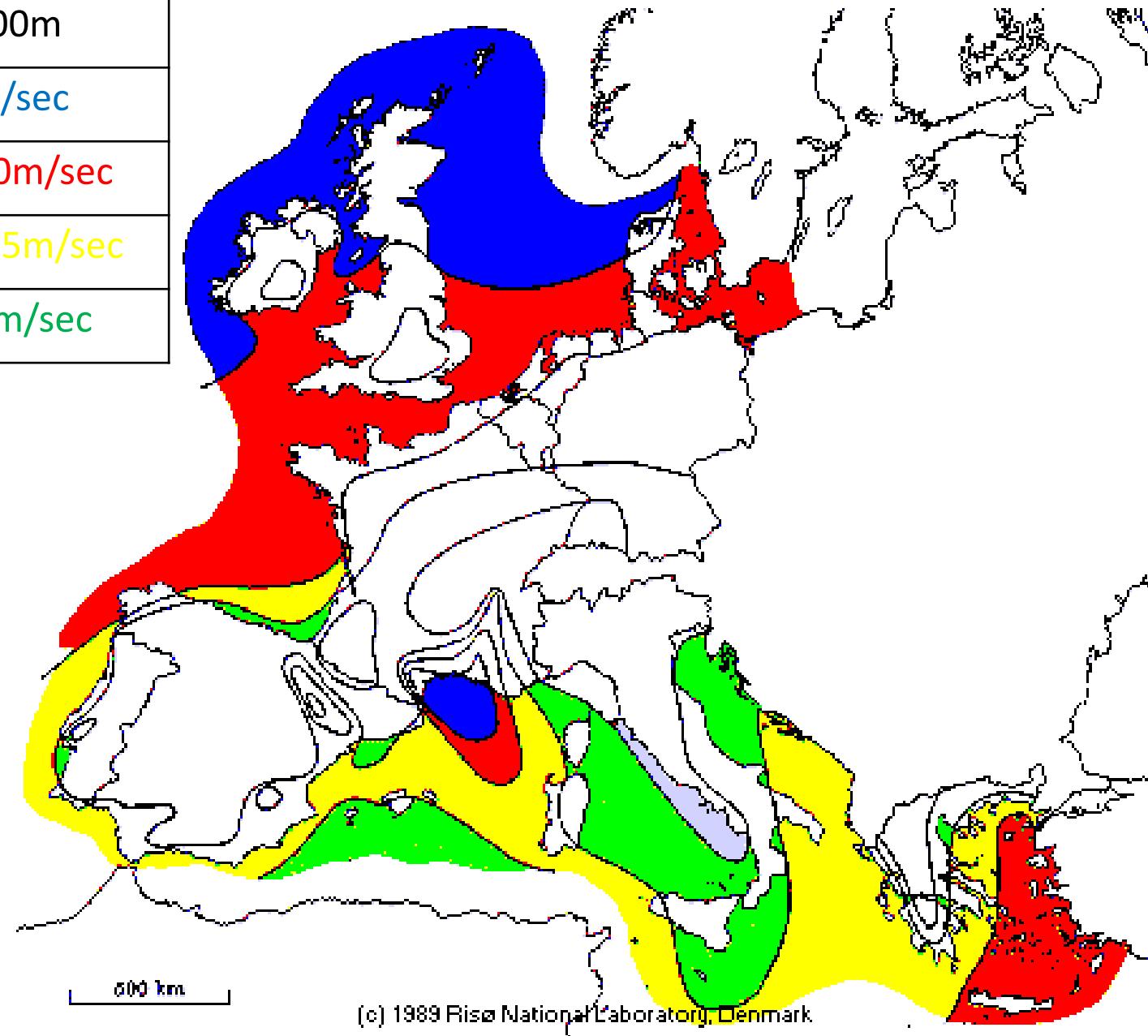
V à 100m

>10m/sec

8.5-10m/sec

7.5-8.5m/sec

6-7.5m/sec



600 km

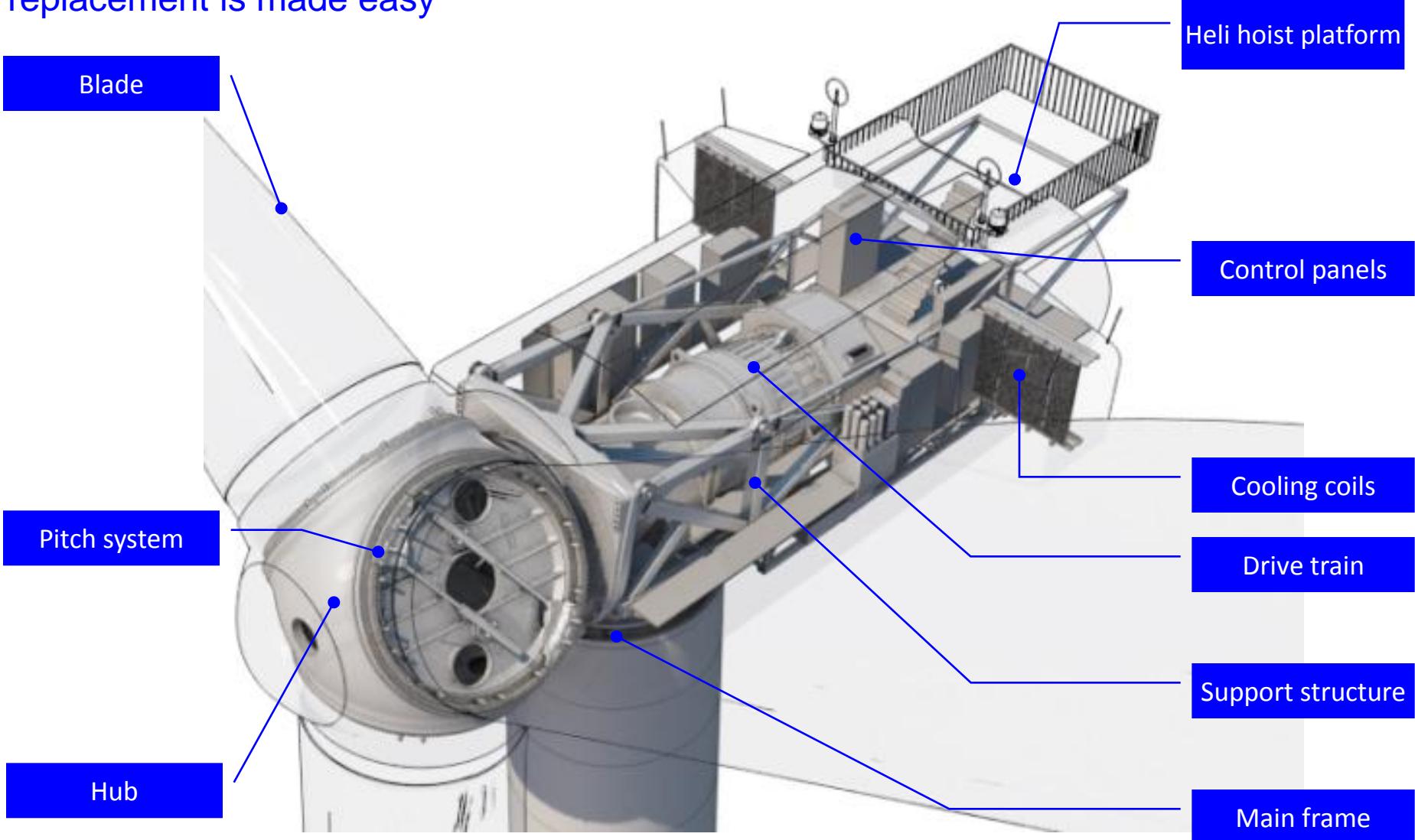
(c) 1989 Risø National Laboratory, Denmark

Les éoliennes

	Terrestre		Offshore	
	Puissance	Diam, rotor (IEC 1)	Puissance	Diam, rotor
Vestas	3,075MW	112m	8MW	164m
Siemens	3,6MW	107m	6MW	154m
Repower	3,4MW	104m	6,15MW	126m
Enercon	3,0MW	82m		
Alstom	3,0MW	100m	6MW	150m
AREVA			5MW	116m

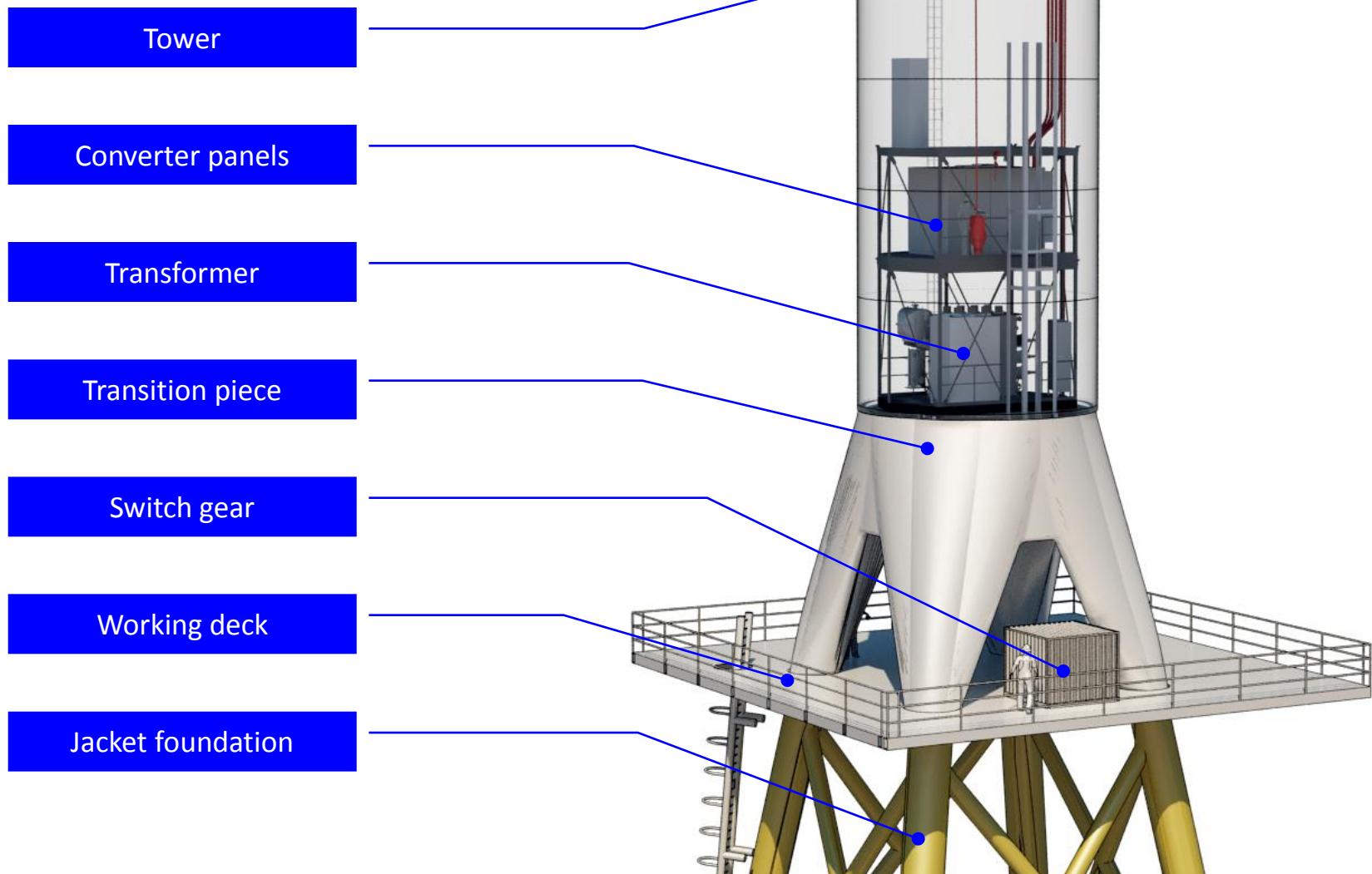
Nacelle

Moving key parts from the nacelle to the tower optimizes serviceability and replacement is made easy



Tower

Moving key parts from the nacelle to the tower saves weight in top head mass, optimizes serviceability and replacement is made easy.



V164-8.0 MW Main Specification

Main dimensions

Blade length: 80m

Max chord (preliminary) :5,42m

Nacelle (incl. hub and coolers)

Height: 7,5m

Length: 24m

Width: 12m

Weights ($\pm 10\%$)

Nacelle with hub: 390ton

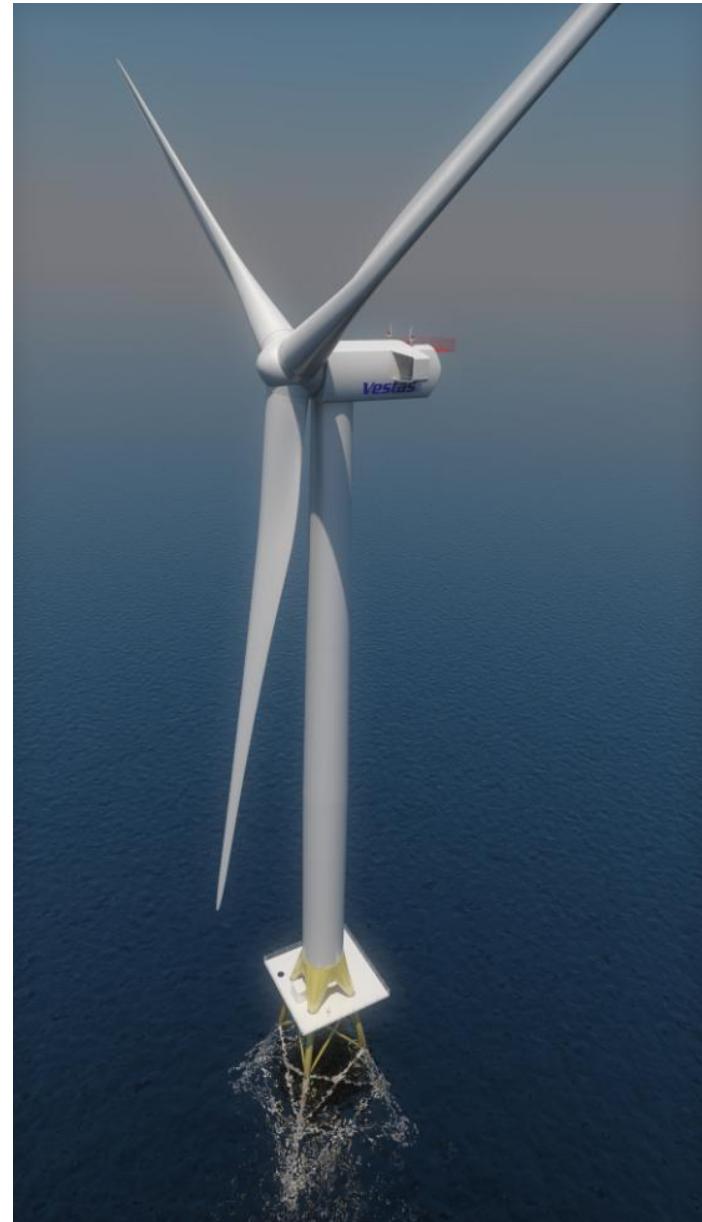
Blade (each): 35ton

Tower (HH 107m): site dependant

Rotor

Rotor diameter:164m

Swept area: 21 124m²



Le paysage

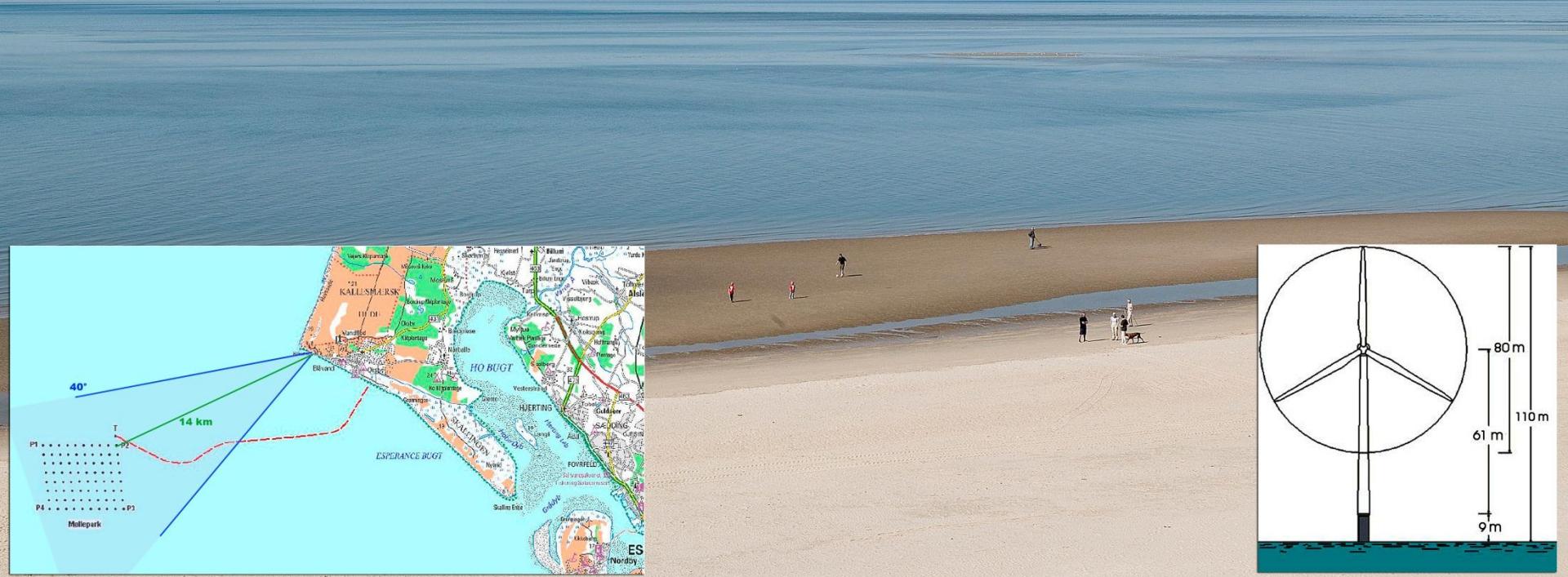


Blåvandshuk - real

The distance from the middle of the park to Blåvandshuk is 17 kilometers. Seen from the beach at this distance will 6 meters of the turbine have disappeared below the horizon due to the curvature of the Earth. If you are placed 20 meters over sea level the whole windturbine will be visible. Blåvandshuk is the place on the danish westcoast that is closest to the windfarm.

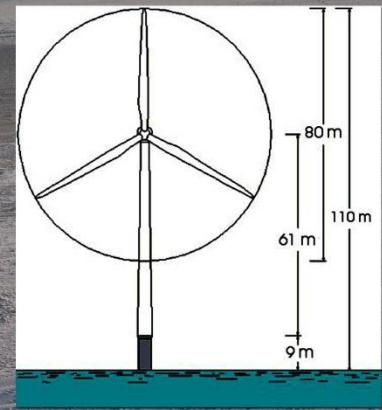
Horns Rev 1

Angel of the human eye = approx 40°



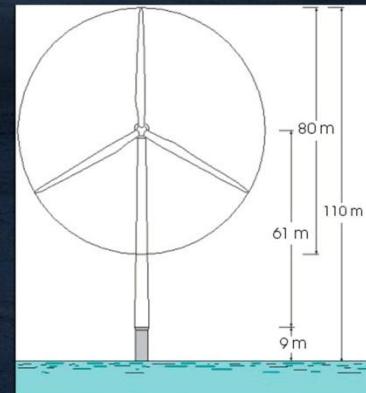
Horns Rev 1

Angel of the human eye = approx 40°



Horns Rev 1

Angel of the human eye = approx 40°



**7x50 binocular = 6,5°
HR1 distance 14 km**

