



# Offshore Wind Energy in The Netherlands

## Wind in Spatial Planning

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18 juni 2018





# How much space is needed for renewable energy by 2050 in The Netherlands?

- 3500 PJ needed
- 1000 PJ by saving and preventing
- Target 2500 PJ
- Space needed?



**90.000**  
Wind turbines  
of 3 MW\*



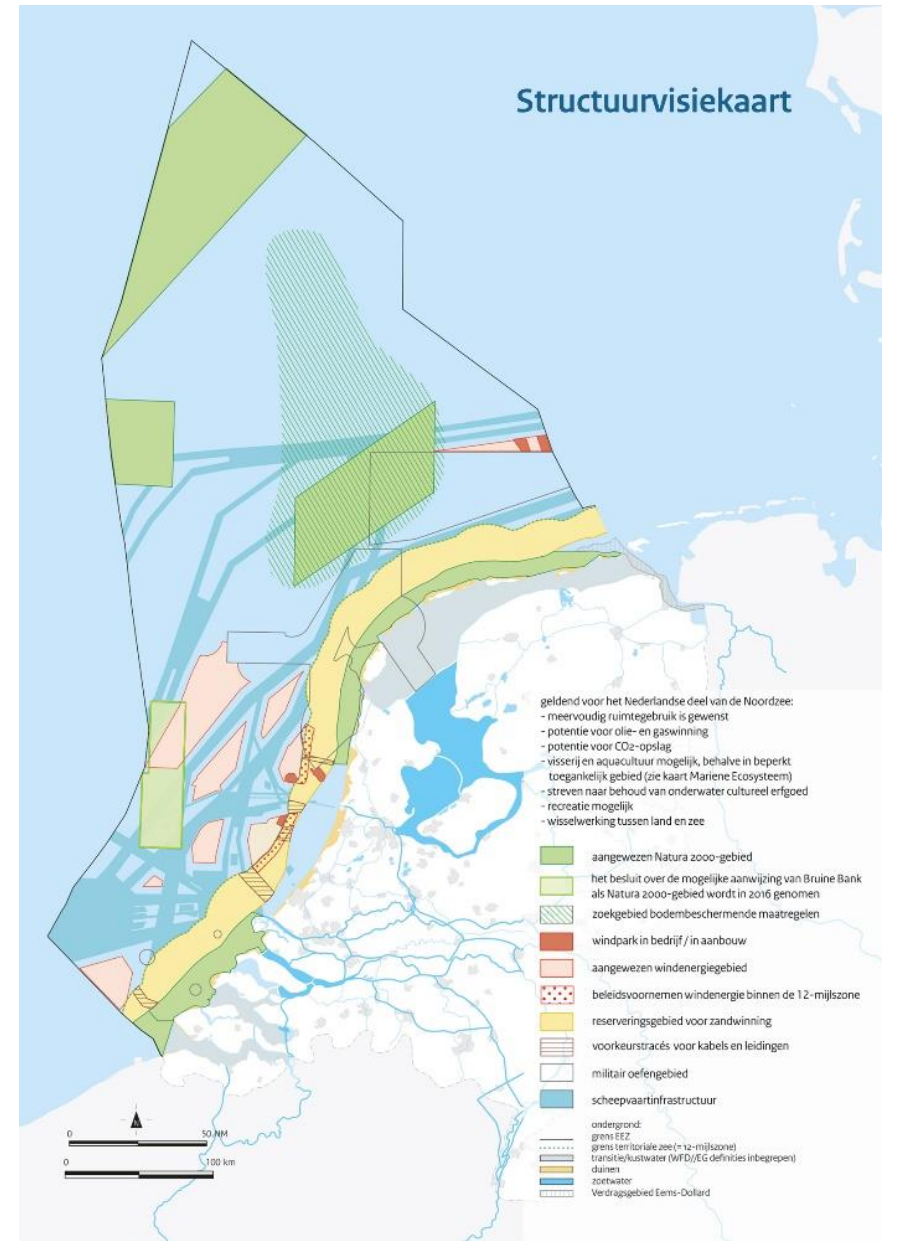
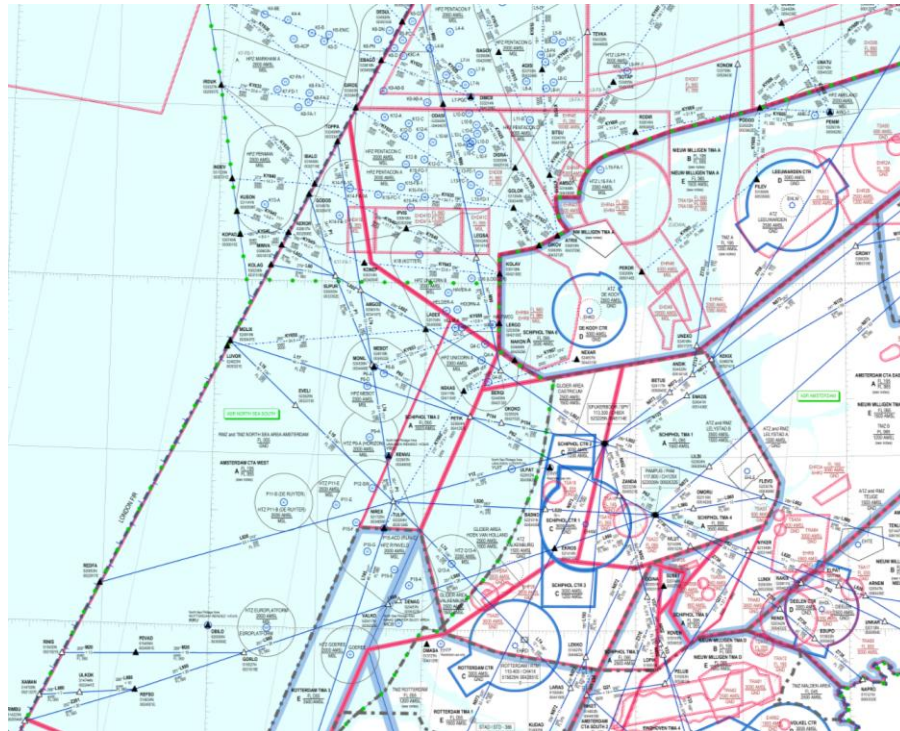
**600.000 ha**  
Solar farming



**240 million**  
Roofs with  
solar panels



# Current Situation



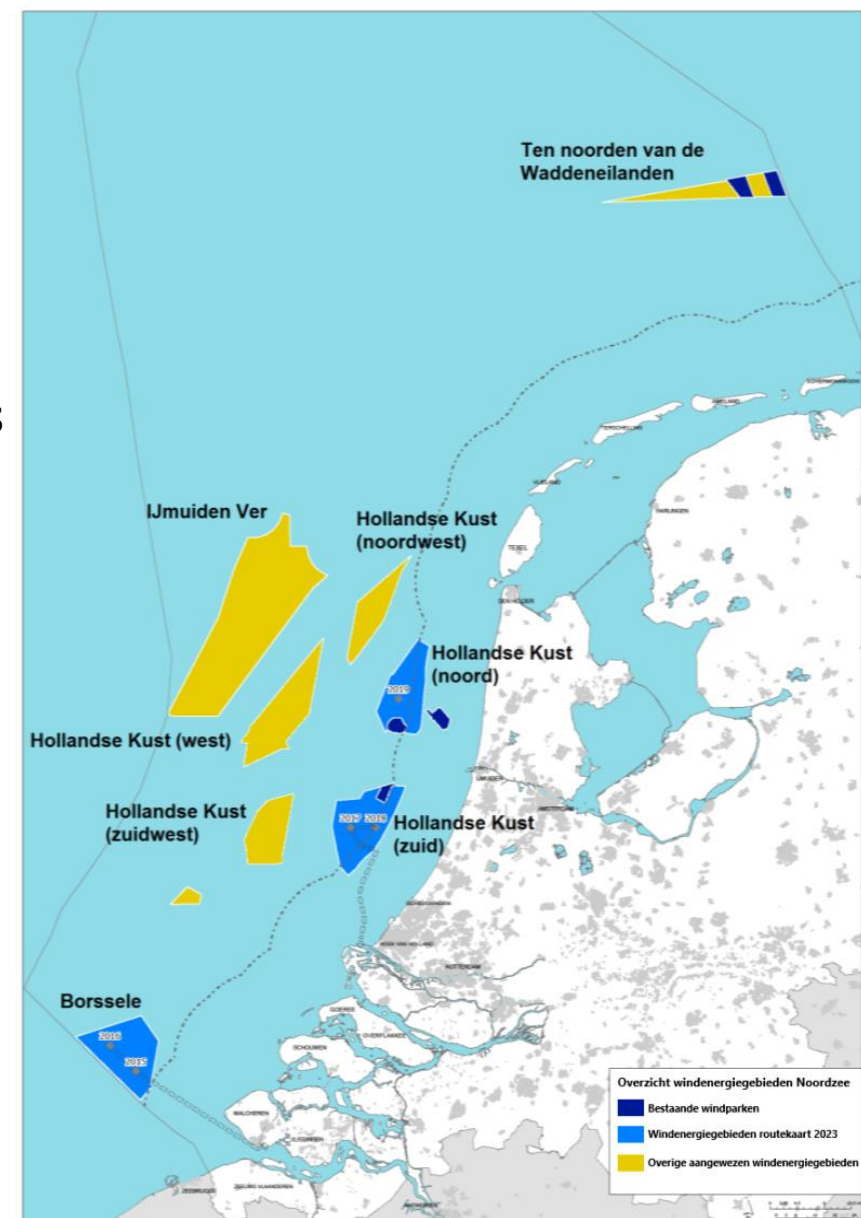






# Implementing Offshore Wind Energy

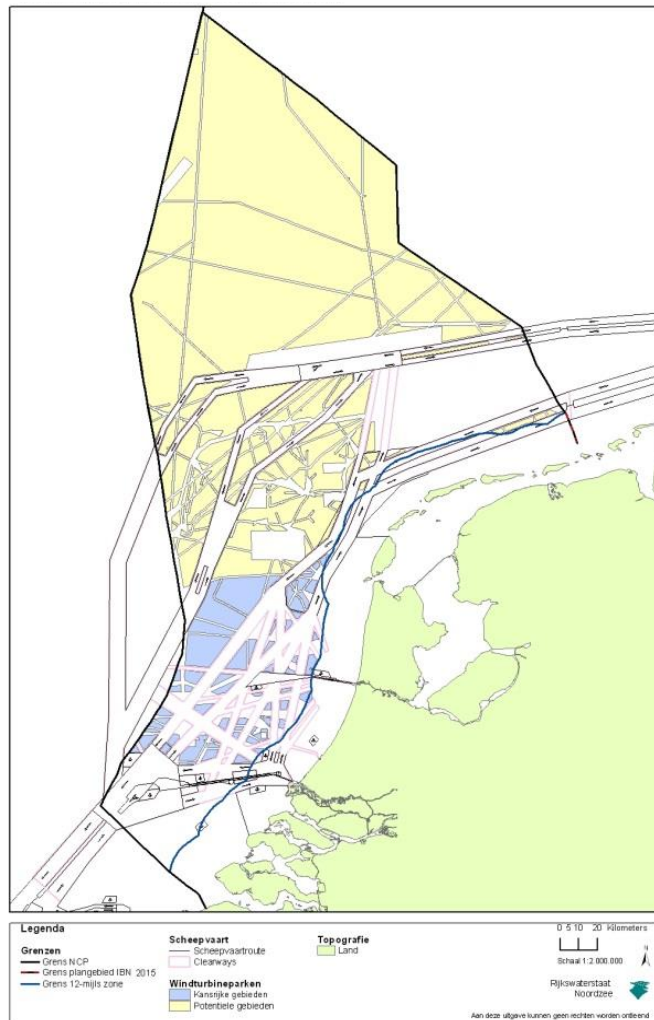
- › Dutch National Waterplan (the first in 2009)
- › Criteria to find space for offshore wind:
  - Cost effectiveness (e.g. 350 MW and 40% cable length)
  - Impact on other activities: e.g. sand extraction and cables
  - Preserve a free horizon as much as possible
  - Distance to shipping, oil/gas and aviation
  - Fisheries
  - Not in nature preservation areas
  - Not in military defense areas
  - Multiple use of space
- › Resulted in 8-10 GW space found



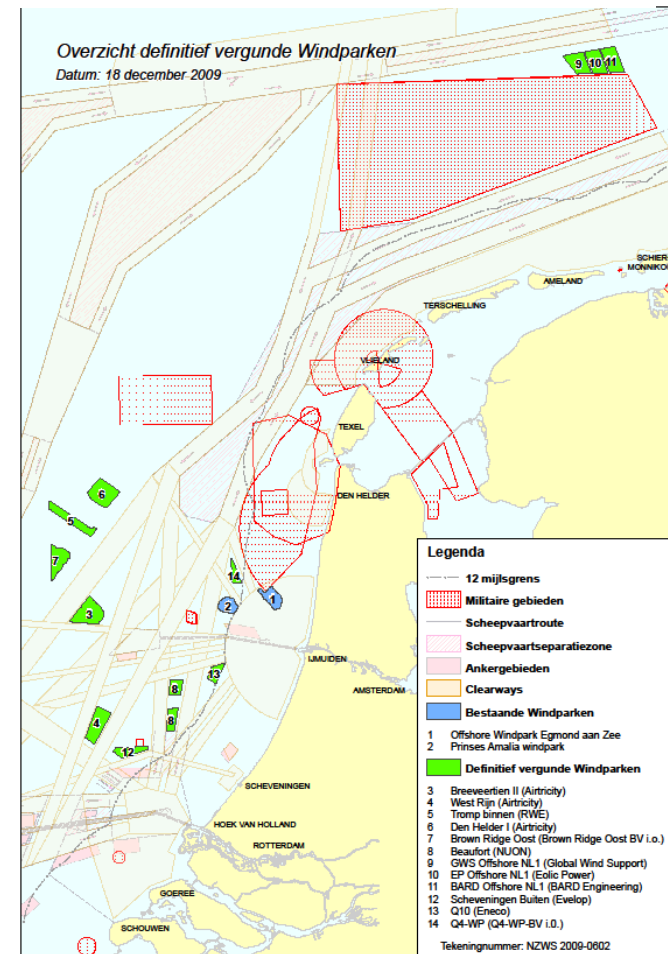


# 2nd Round Offshore Wind 2007 - 2014

## Possibilities



## Applications





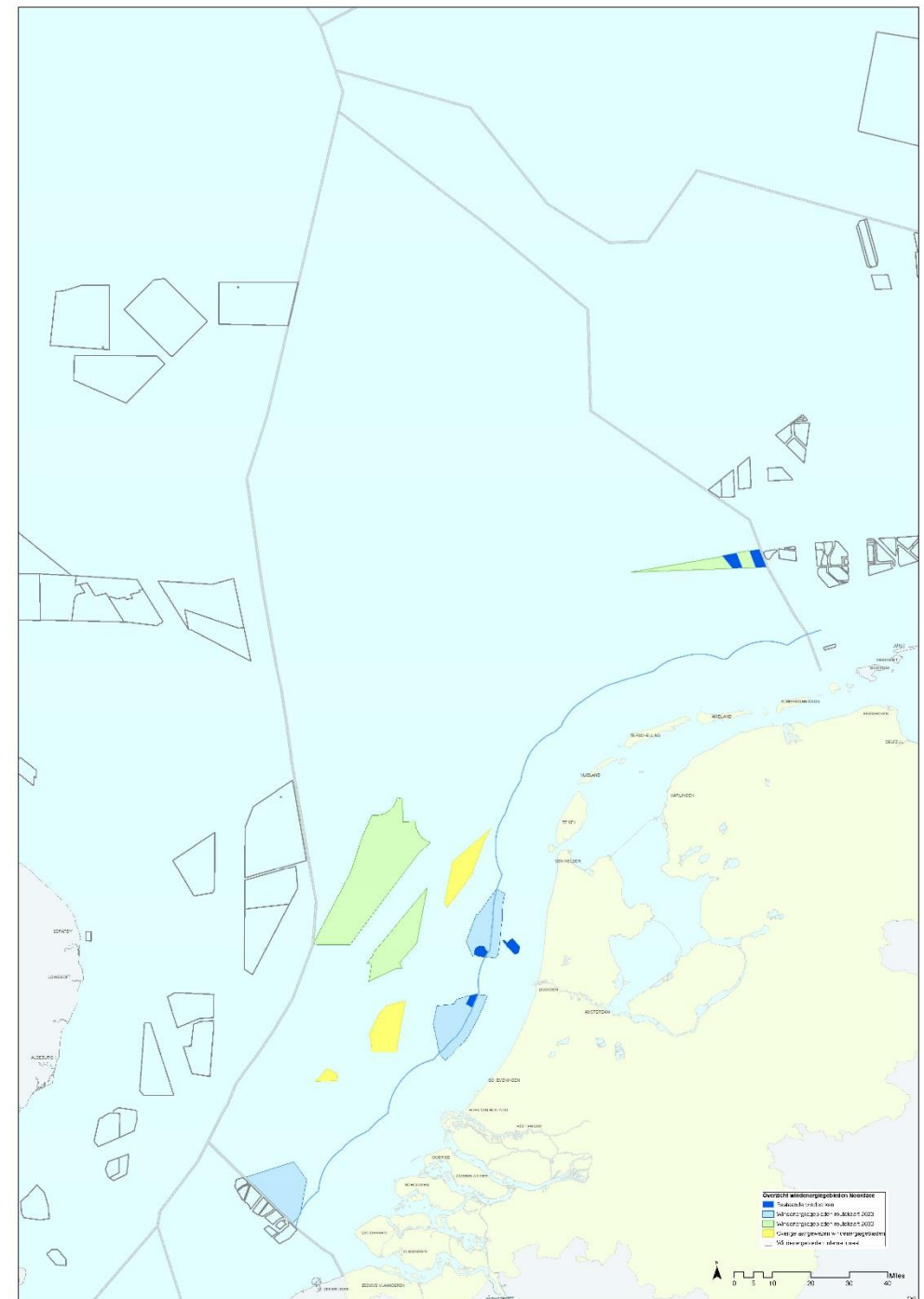
## Influence of Wind?

- > Until now:
  - Market wise: Flag on the moon and better BC
  - Government-wise: A management and especially an overall cost challenge
- > Predesignated offshore wind areas: 9-10 GW
- > Offshore dependency
- > Finding space ⇒ 2013: re-design North Sea
  
- > After 2030:
  - We probably need more offshore wind areas
  - Ambitions ranges between 35 - 80 GW in 2050
  - There is only so much wind?!



# Influence of Wind!

So, if we would only consider the wind?







## Influence of Wind – Rules of Thumb



NW-SE  
Orientation



The further  
north, the  
better



Rather equal  
spread of weather  
throughout the  
North Sea



Maximum wind  
seems to result in  
the most wind  
yield/harvest



Optimal  
MW/km<sup>2</sup>  
ratio (5 – 7  
MW/km<sup>2</sup>)



Wake between 5–  
20 KM: depending  
position, stability  
and wind speed



Size does  
matter!  
Rotor-wise



Wind makes waves



Possibility of low  
level jets seems  
interesting at first  
sight.



Thank you for your attention



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