

ASCOBANS, 26<sup>th</sup> meeting of the Advisory Committee, 8-12 November 2021

# Status quo on ocean energy in the Agreement area

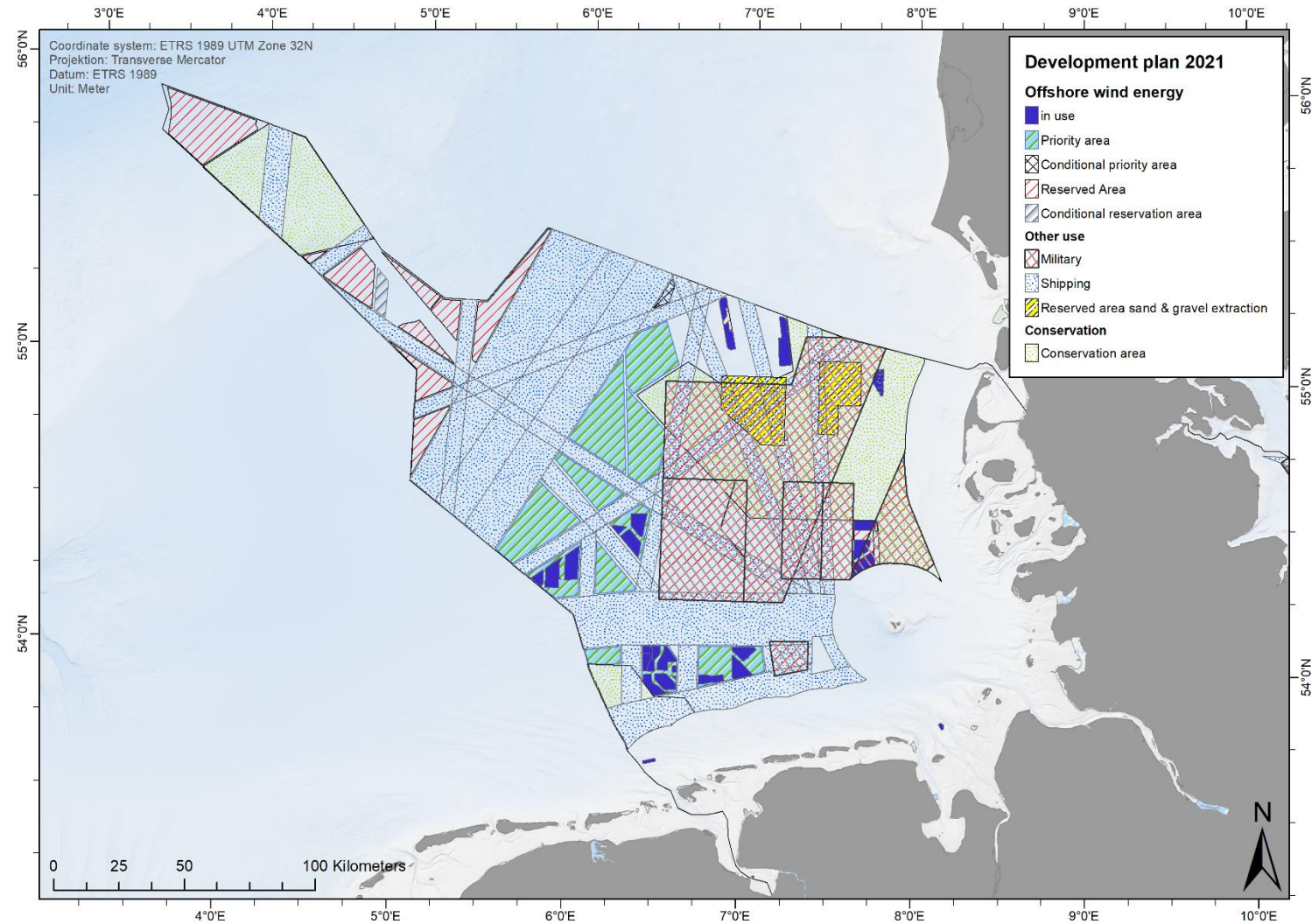
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Institute for Terrestrial and Aquatic Wildlife Research,  
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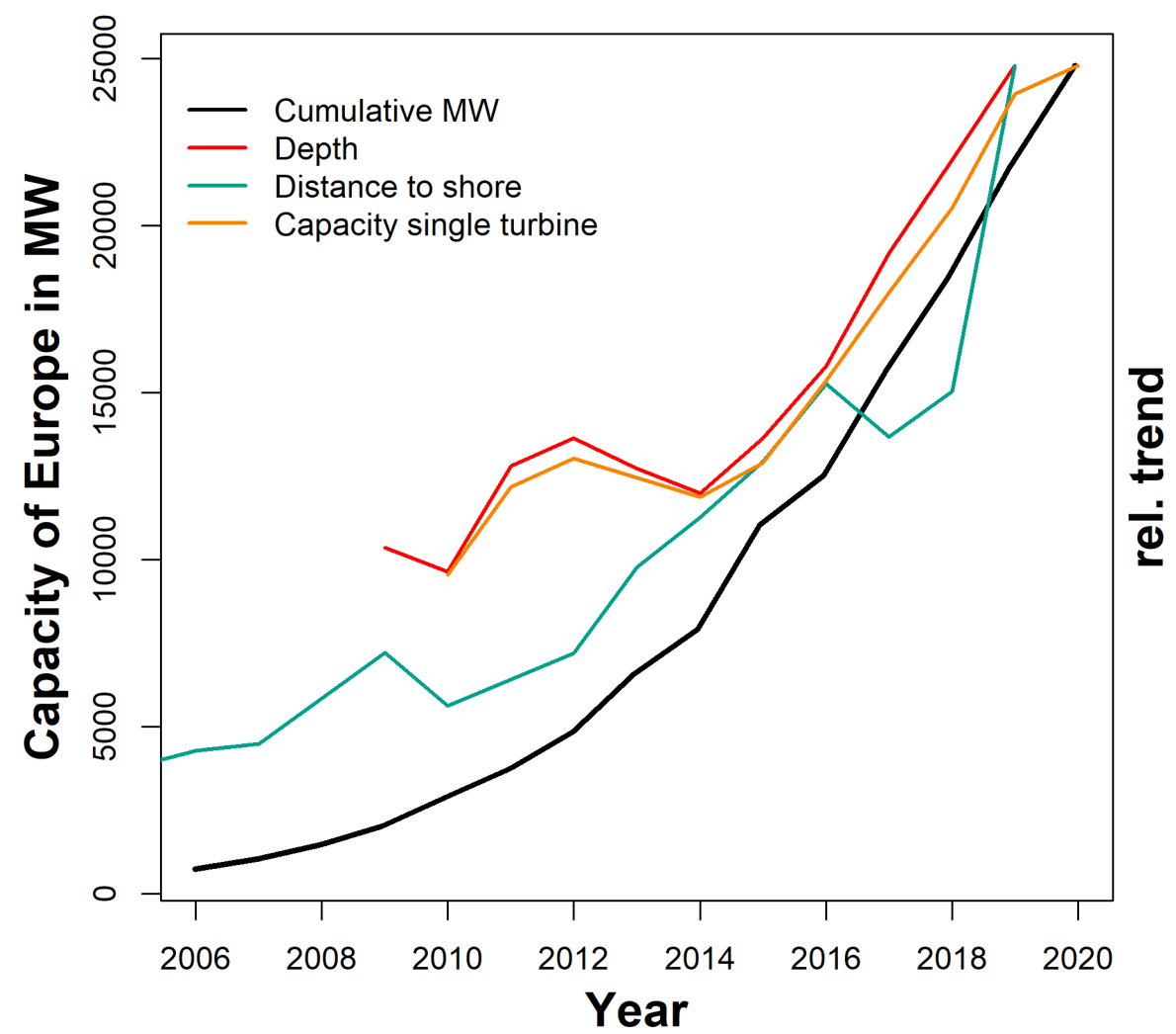


# Current status



Data from EMODnet, map by Abbo van Neer

# Current status

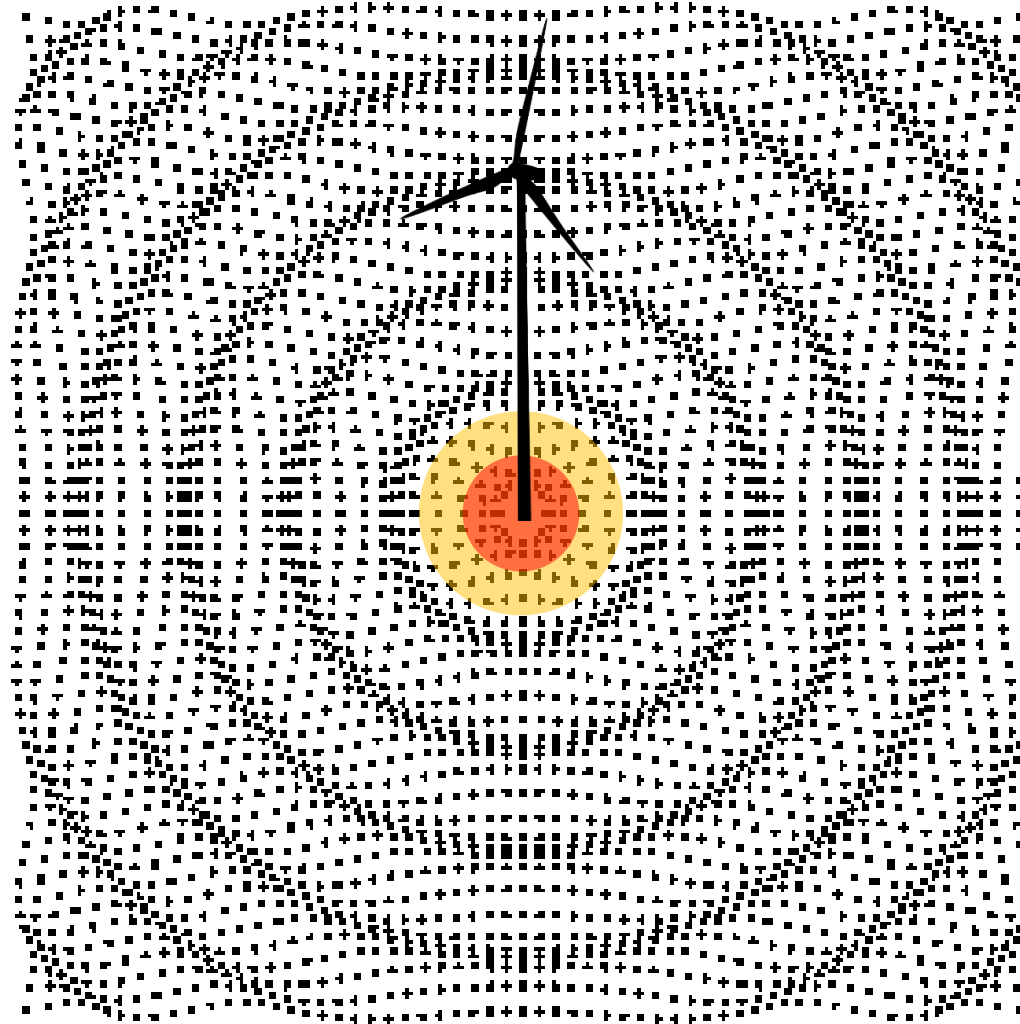


Data adopted from [www.windeurope.org](http://www.windeurope.org)

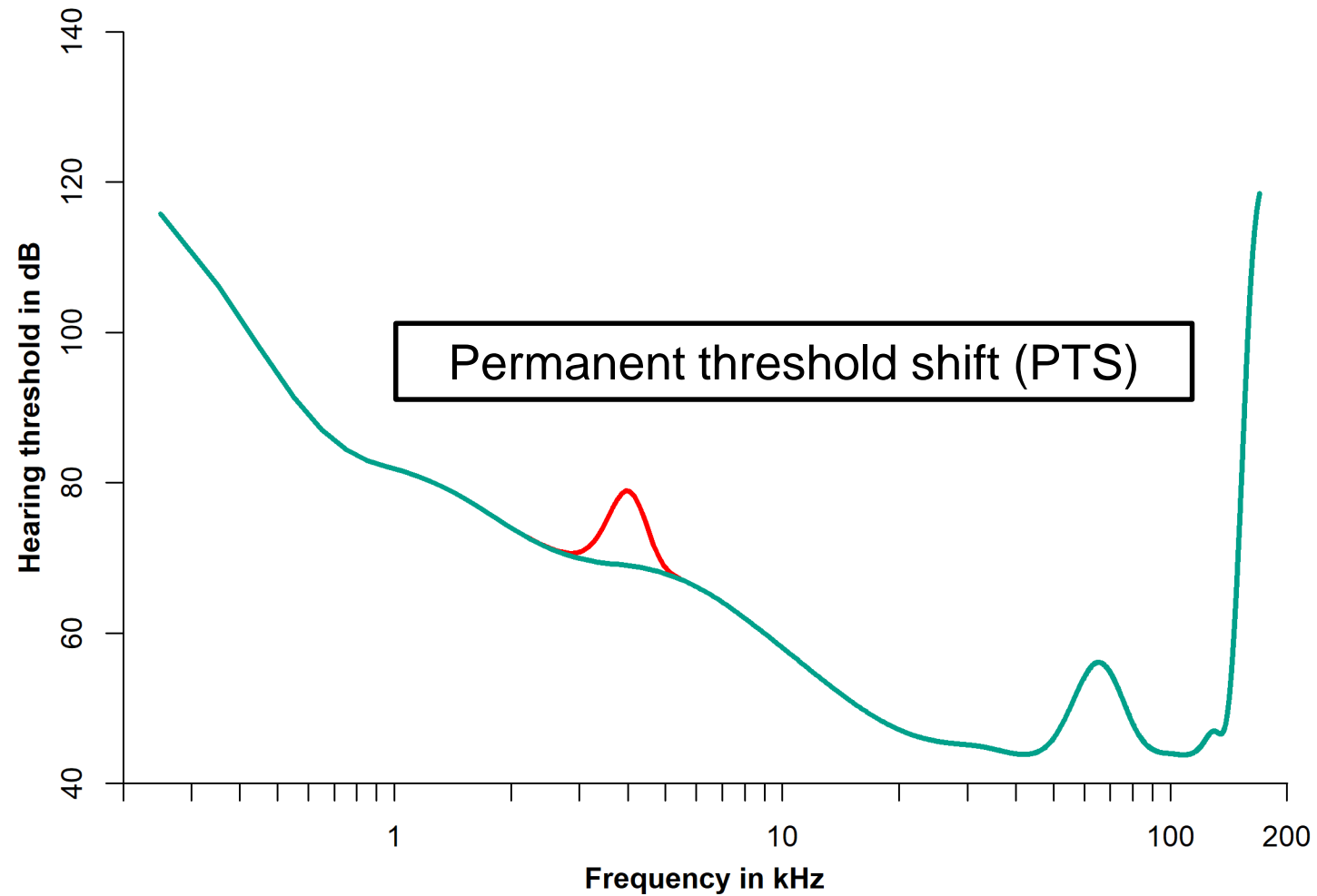
## Key issues of pile driving

Lethal injuries

Hearing impairment

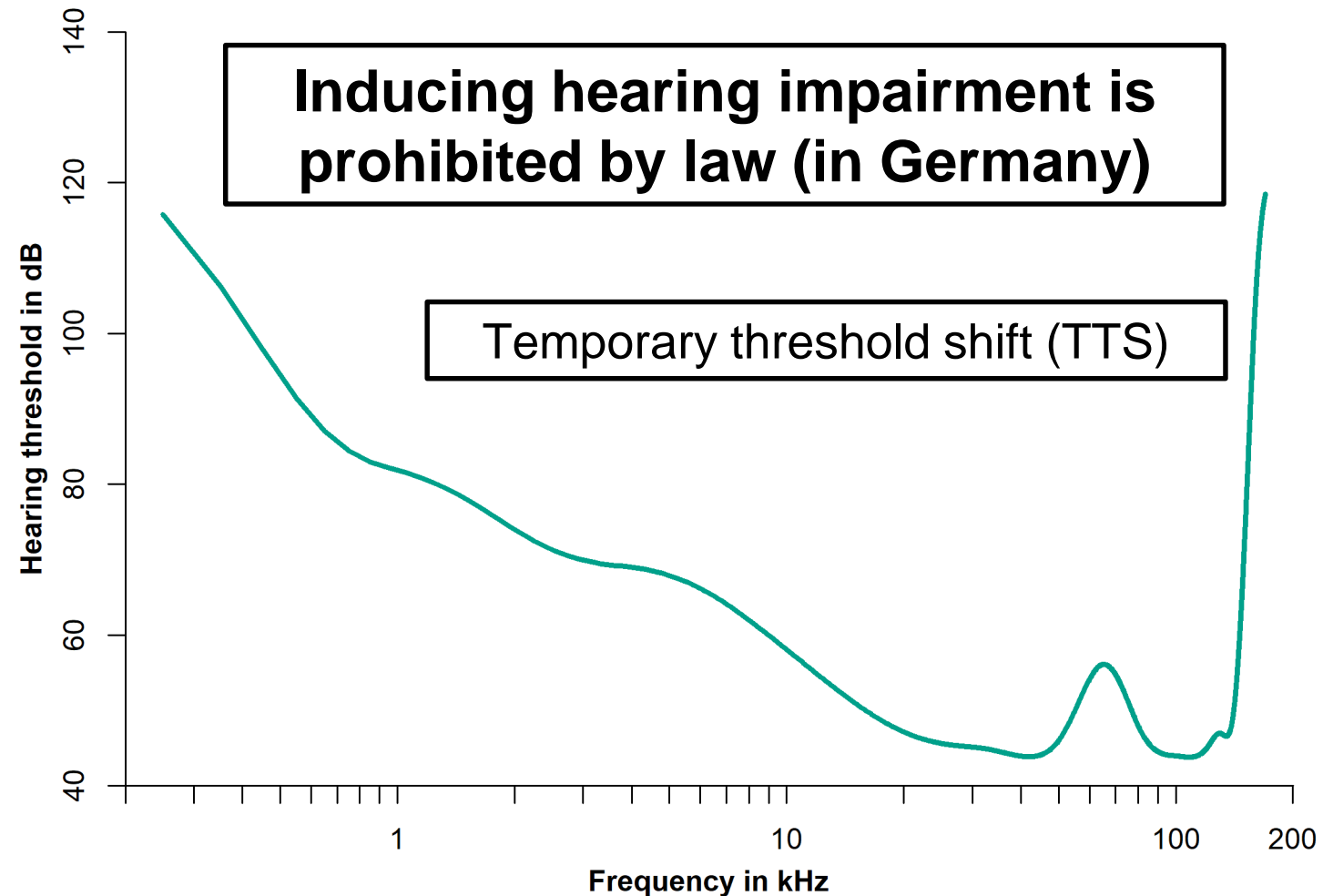


## Key issues of pile driving



Audiogram adopted from Kastelein et al. (2002)

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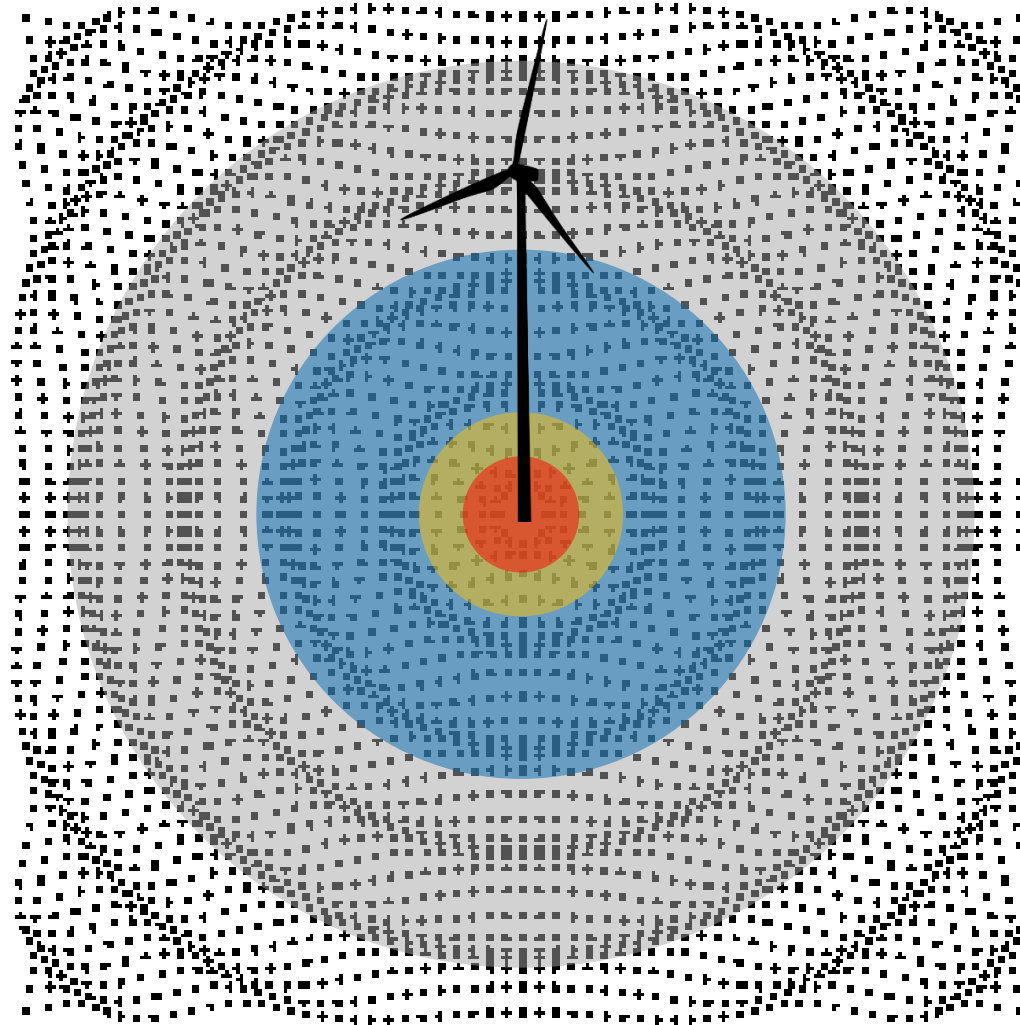
## Key issues of pile driving

Lethal injuries

Hearing impairment

Behavioural reactions

Masking



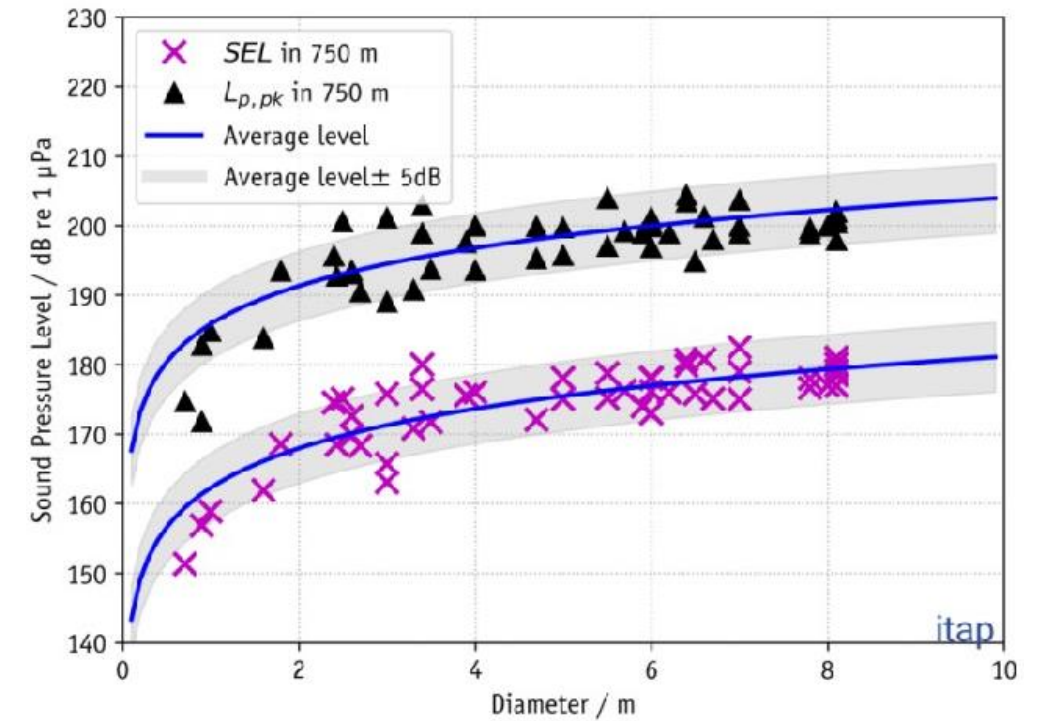


## Mitigation measures

### Big Bubble Curtain



Hydrotechnik Lübeck



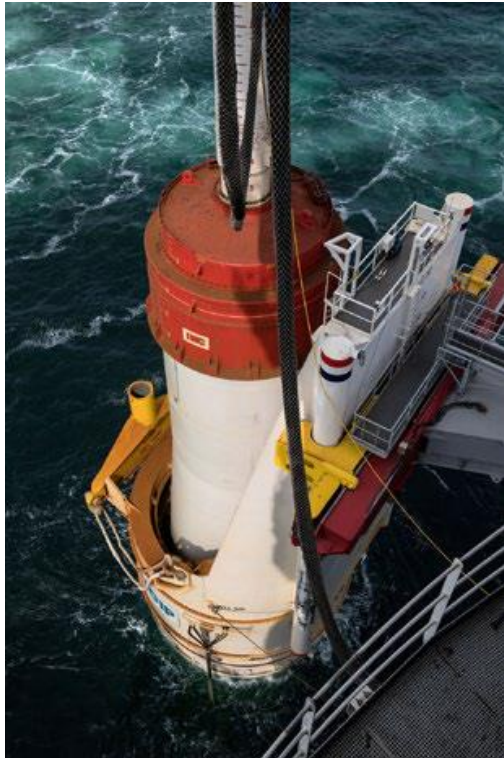
Bellmann et al. (2018)

**Not suitable for deeper waters**



## Mitigation measures

### Isolation casings



Ørsted

### Hydro sound damper



OffNoise-Solutions

### Vibrating pile drivers



<https://www.delta.tudelft.nl>

## Technological developments

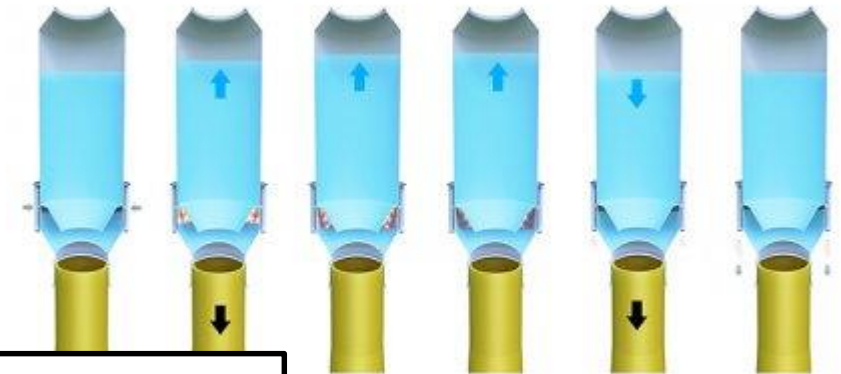
### Pulse prolongation by adaptation of hydraulic hammers



**Ecological effect of pulse  
prolongation unknown**

IQIP, YouTube

### BLUE piling



<https://www.windpowerengineering.com/>

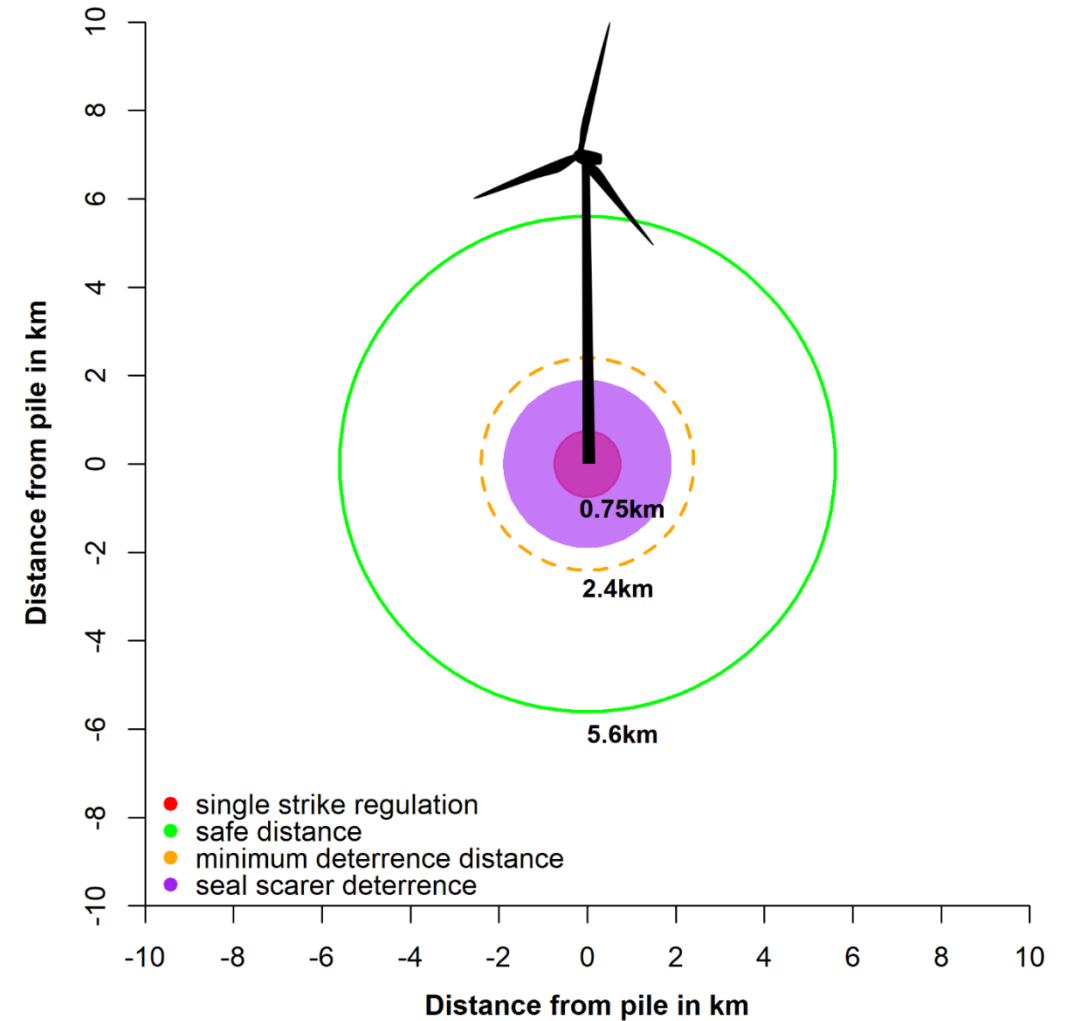
## Best practices and guidelines

Single strikes above 164 dB can induce a TTS  
(Lucke et al. 2009)

Multiple strikes of 145 dB can induce a TTS, if  
cumulative energy exceeds 175 dB  
(Kastelein et al. 2016)

Previous deterrence up to minimum  
deterrence distance  
(Schaffeld et al. 2020)

Previous deterrence already implemented in  
noise mitigation concept in Germany.  
(Schaffeld et al. 2019)



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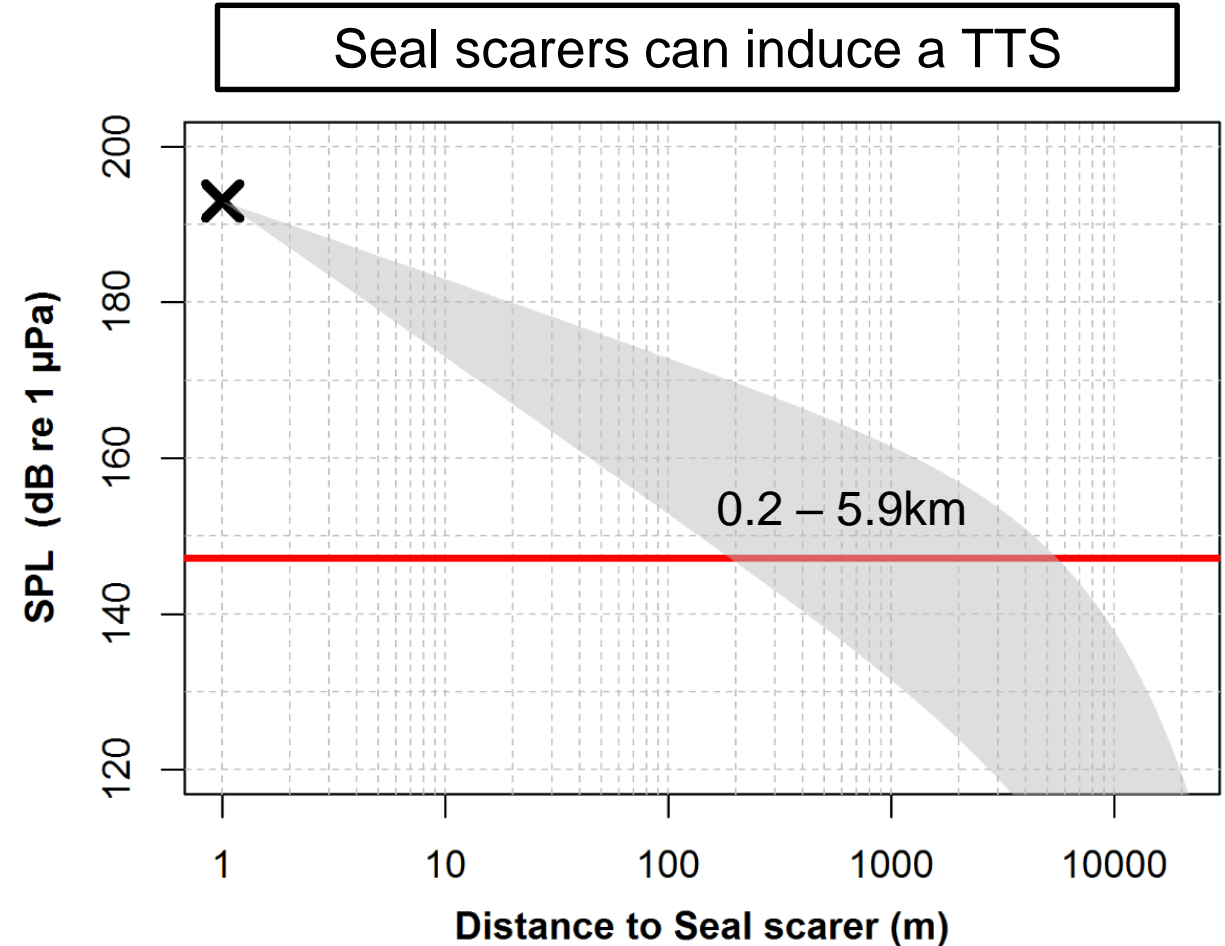
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Slowly increase seal scarer energy and give  
porpoises time to flee  
(Schaffeld et al. 2019)

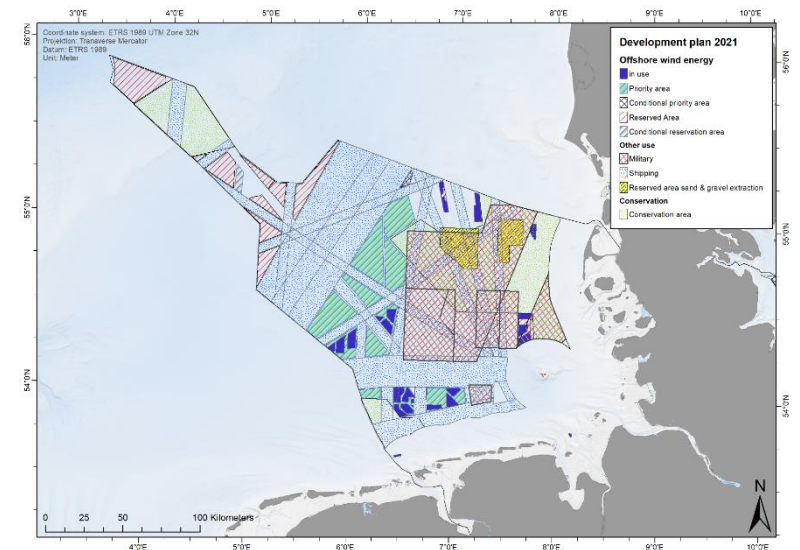




## Action points

Monitoring of population trends across countries

*“strong decline in the core area and main reproduction site in summer, the SAC Sylt Outer Reef (-3.79% per year).” (Nachtsheim et al. 2021)*

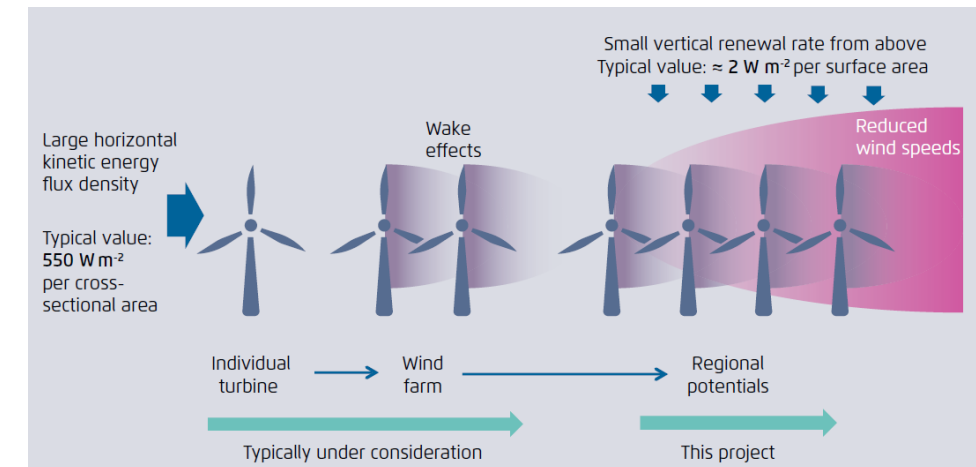


Effects of construction of multiple wind farms at the same time unknown

## Action points

Monitoring of population trends across countries

Consideration of kinetic energy from atmospheric flow



Agora Energiewende, Agora Verkehrswende, Technical University of Denmark and Max-Planck-Institute for Biogeochemistry (2020): Making the Most of Offshore Wind: Re-Evaluating the Potential of Offshore Wind in the German North Sea.

## Action points

Monitoring of population trends across countries

Consideration of kinetic energy from atmospheric flow

Regulation of actions after operation phase



Operation phase between 20-25 years.  
Dismantling suggested if action is justifiable for habitat



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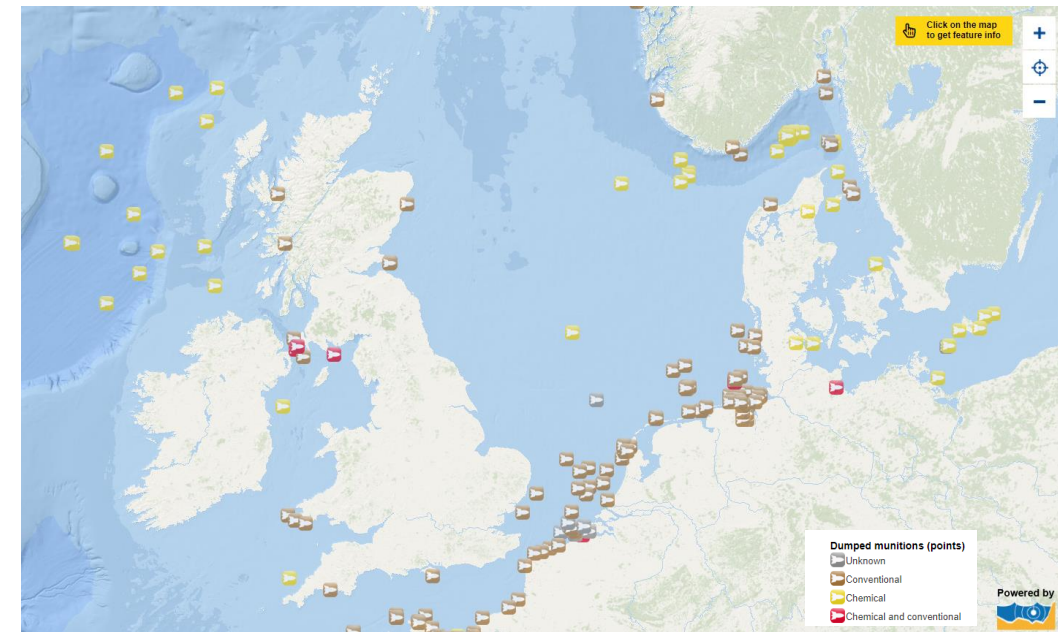
Monitoring of population trends across countries

Consideration of kinetic energy from atmospheric flow

Regulation of actions after operation phase

Regulation for clearance of unexploded ammunition of World War II

1,600,000 registered munition parts in German North Sea and 800,000 in German Baltic Sea



Blast injuries found in stranded harbor porpoises (*Siebert et al. under review*)

## Acknowledgements

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### Funding agencies:



### References:

Koschinski & Lüdemann (2020). Noise mitigation for the construction of increasingly large offshore wind turbines (Report).

Wind Europe (2019). Offshore Wind in Europe – Key Trends and statistics 2019 (Report).

Wind Europe (2020). Offshore Wind in Europe – Key Trends and statistics 2020 (Report).

Agora Energiewende, Agora Verkehrswende, Technical University of Denmark and Max-Planck-Institute for Biogeochemistry (2020): Making the Most of Offshore Wind: Re-Evaluating the Potential of Offshore Wind in the German North Sea.

# Thank you for your attention!