



Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

Update Framework Ecology and Cumulation: a short introduction

Rijkswaterstaat, Ministry of
Infrastructure and Environment,

Commissioned by: Ministry of Economic
Affairs and Climate Policy, Ministry of
Agriculture, Nature and Food Quality





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NE&E



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And now the complete story.....



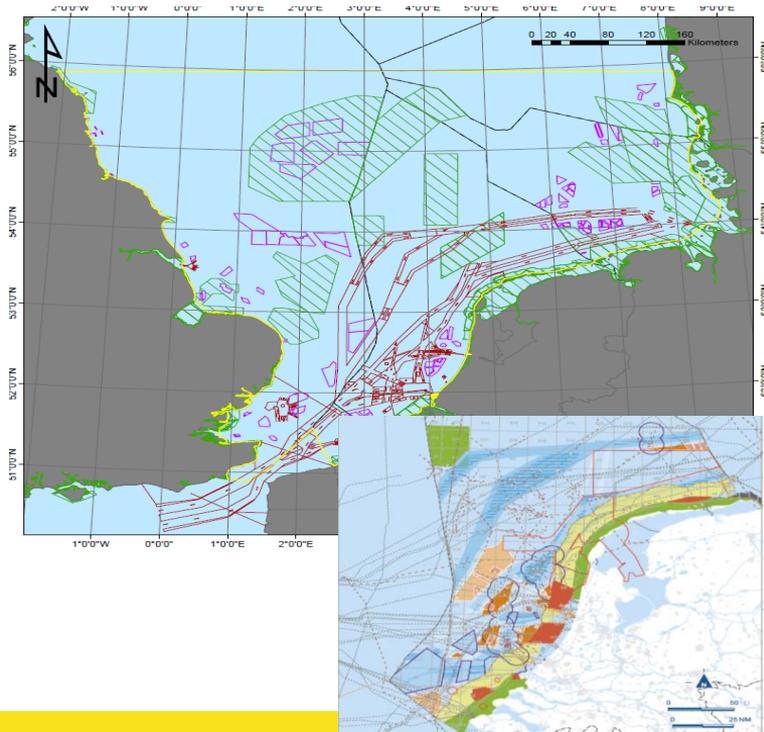


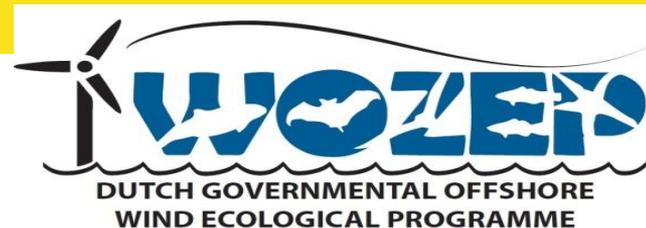
Why assessing cumulative effects of offshore wind farm development?

Plans for OWF in the entire Southern North Sea area

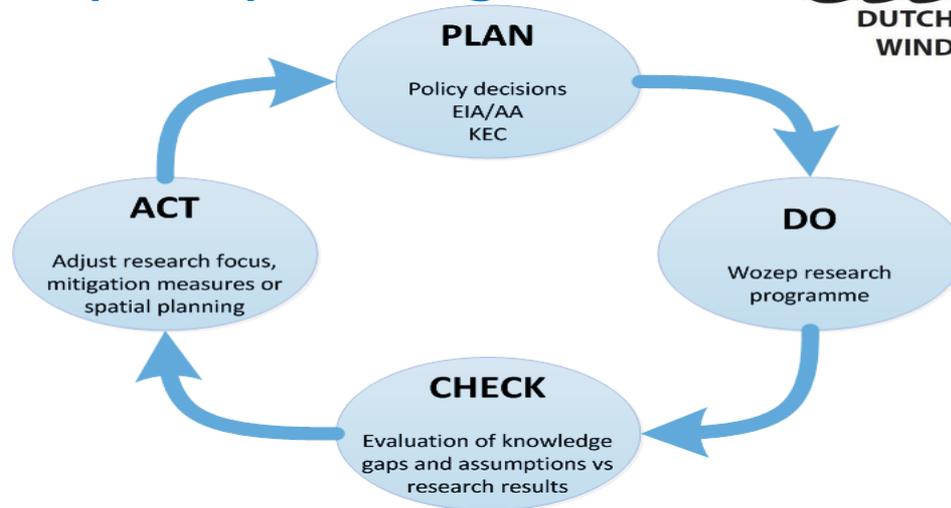
Need of clear framework for cumulation stressed by Netherlands Commission for Environmental Assessment

Not cumulation on a permit by permit base, but all windfarms together -> no unpleasant surprises,
-> no uncertainty





PDCA -> keep improving

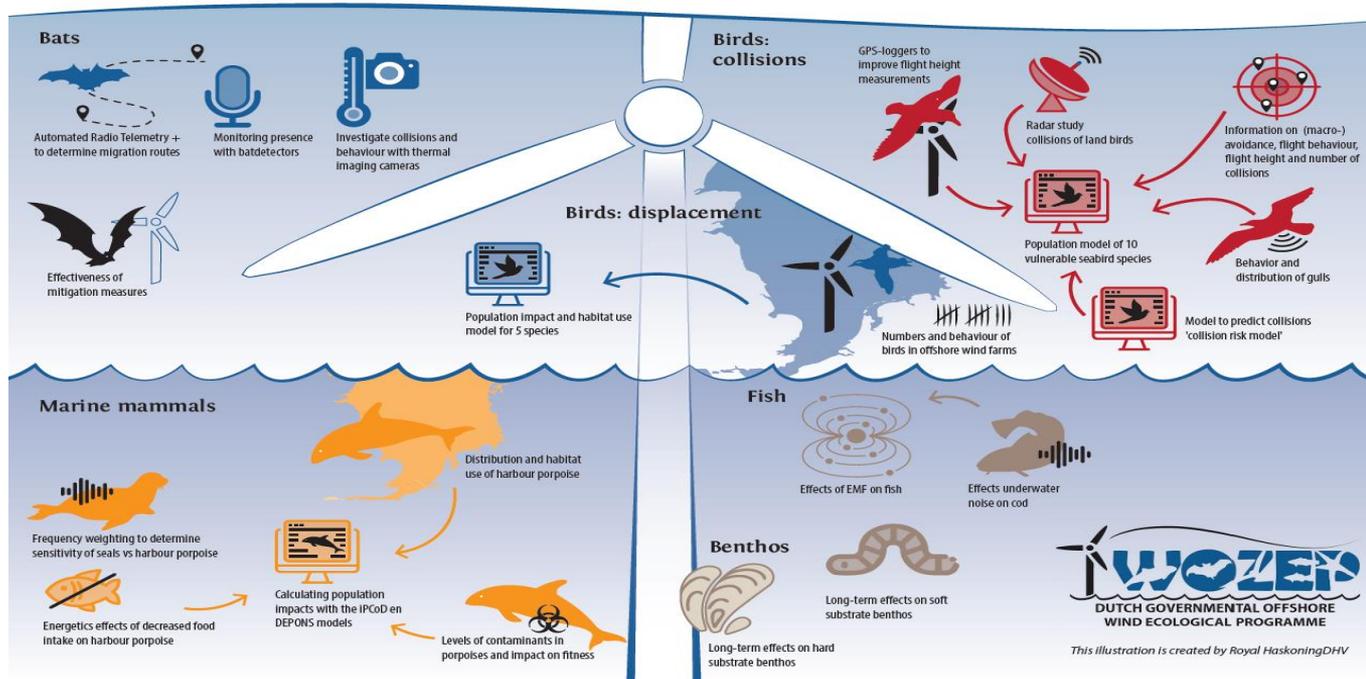


- KEC 1.1 (2015) --> KEC 2.0 (2016).->KEC 3.0 (2018) -> KEC 4.0 (??)
- Obligation to use new knowledge in EIA/AA



WOZEP: creating knowledge

Offshore Wind Ecological Programme (Wozep)





KEC: use of knowledge

Goals:

- Detailed methodology for determining cumulative effects of offshore wind farms
- Advice regarding regulations for Wind Farm Site Decisions (on ecology)
- Overview of knowledge gaps – basis for monitoring and research on offshore wind

Based on:

- Transparency
- Precautionary principle, but realistic worst case
- The use of expert judgement for filling knowledge gaps
- Only published information / models used

KEC 3.0 (2019) on www.Noordzeeloket.nl



Scope KEC

- Build and planned windfarms (till 2030) national and international;
- Only cumulation, not location specific;
- Use of new knowledge;
- Priority for biggest impacts, not all species;
- Only generic advice for mitigation measures;
- 10 MW;
- Birds: PBR;
- Harbour Porpoise: LNV-> Maintaining the population with a high degree of certainty (95%) at least 95% of the current size;



Rijkswaterstaat
Windenergie op zee





Birds



Pressures

- OWF: presence of OWF
 - habitat loss for certain seabirds;
 - barrier effects for coastal birds moving out to sea and back.
- OWF: rotation of rotor blades:
 - collision risks for seabirds and migrating 'land'birds.





Differences KEC 3.0 Data

- Data of densities 2014-2017 added;
- Densities of seabirds national scenario period 2000-2017 instead of 1991-2014;
- Population estimations seabirds from same density maps as the input for calculations -> PBR is PBR-ish, no real PBR for seabirds, "virtual population", numbers can not be used seperately!;
- Values for recovery capacity -> from last "conservation status" classification by the IUCN (IUCN 2018).



Birds: Differences KEC 3.0

Habitatloss

- No new knowledge.

Collisions

- Information flight behaviour of the lesser black-backed gull and herring gull Gyimesi et al. (2017a), WoZep;
- Data on flight behavior and migration routes of the Bewick's swan and brent goose Gyimesi et al. (2017b), Wozep;
- Fluxes of the shelduck, curlew and black tern updated (cf. BirdLife International 2004, 2015);
- Also looked at the ORJIP study (Skov et al. 2018).





Conclusions Birds

	Soort		Nationaal % PBR kec 2019	
Habitatverlies	duikers	<i>Gavia spec.</i>	0.4%	
	jan-van-gent	<i>Morus bassanus</i>	0.7%	
	grote stern	<i>Thalasseus sandvicensis</i>	0.9%	
	zeekoet	<i>Uria aalge</i>	4%	
	alk	<i>Alca torda</i>	23%	
Aanvaringen	Grote jager	<i>Stercorarius skua</i>	0,6%	
	Jan-van-gent	<i>Morus bassanus</i>	1%	
	Drieteenmeeuw	<i>Rissa tridactyla</i>	10%	
	Grote mantelmeeuw	<i>Larus marinus</i>	7%	
	Kleine mantelmeeuw	<i>Larus fuscus</i>	22%	
	Zilvermeeuw	<i>Larus argentatus</i>	48%	
			Internationaal scenario	
Aanvaringen	Kleine zwaan	<i>Cygnus bewickii</i>	8%	
	Rotgans	<i>Branta bernicla</i>	1%	
	Bergeend	<i>Tadorna tadorna</i>	10%	
	Wulp	<i>Numenius arquata</i>	64%	
	Zwarte stern	<i>Chlidonias niger</i>	98%	



Mitigation measures

- Birds:
 - Turbine type: 10 MW and preferably larger





Knowledge gaps and uncertainties birds

- Behaviour in windfarm;
- Density maps & monitoring;
- Population-estimations;
- Avoidance and collision risk (Orjip);
- Band model very sensitive to avoidance rates;
- More information migrating birds fluxes and flight heights and flight behaviour;
- PBR, population modelling.



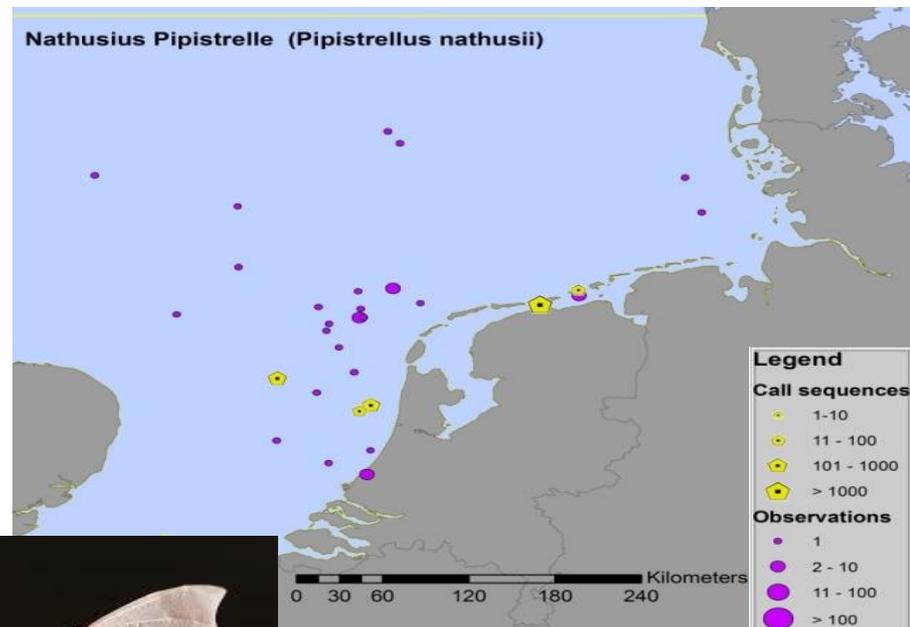


Bats



Possible effects on Bats

- Research from OWEZ, Wozep:
 - *Nathusius' pipistrelle*
 - Only spring and autumn
 - First: Mostly < 4 Bft
- Collision and disbalance, both lethal;
- Assumption 1 bat a year per turbine;
- Precautionary principle.





Re-evaluation Mitigation Measures

- Bats:
 - Also wind-direction;
 - Also temperature;
 - Date;
 - All night;
 - Cut-in speed.





Mitigation Measures

Now in the Wind Farm Site Decision:

Measures to prevent victims of collision amongst bats at rotor level:

- The cut-in wind speed of turbines will be 5.0 m/s at axis height during the period 15 August to 30 September, between one hour after sunset and two hours before sunrise.
- In case of a wind speed of less than 5.0 m/s at axis height during the period referred to in subparagraph a, the permit holder will reduce the number of rotations per minute per wind turbine to less than 2 (1 in HKN).

Advice:

- Date: 25 August - 10 October;
- Wind-direction: **NE & E**;
- Temp: 15° C – 20° C;
- All night;
- Calculation of loss of energy-production (↓) and batprotection (↑);
- Per turbine.

	N	NN O	NO O	O	ZOO	ZZO	Z	ZZ W	ZW W	W	NW W	NN W
<11	3	3	3	3	3	3	3	3	3	3	3	3
11- 15	3. 5	4.5	5.5	6	5.5	5.5	3.5	3.5	3.5	3	3	3
15- 17	3. 5	4.5	5.5	6	5.5	5.5	4.0	3.5	3.5	3	3	3
17- 19	3. 5	4.5	5.5	6	5.5	5.5	4.0	3.5	3.5	3	3	3
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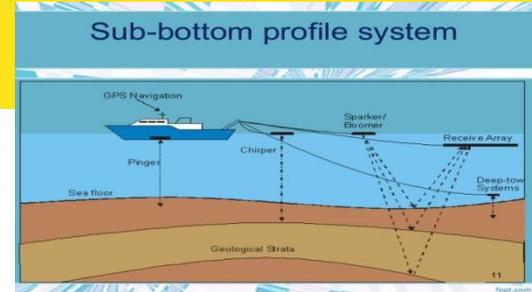


Underwater sound

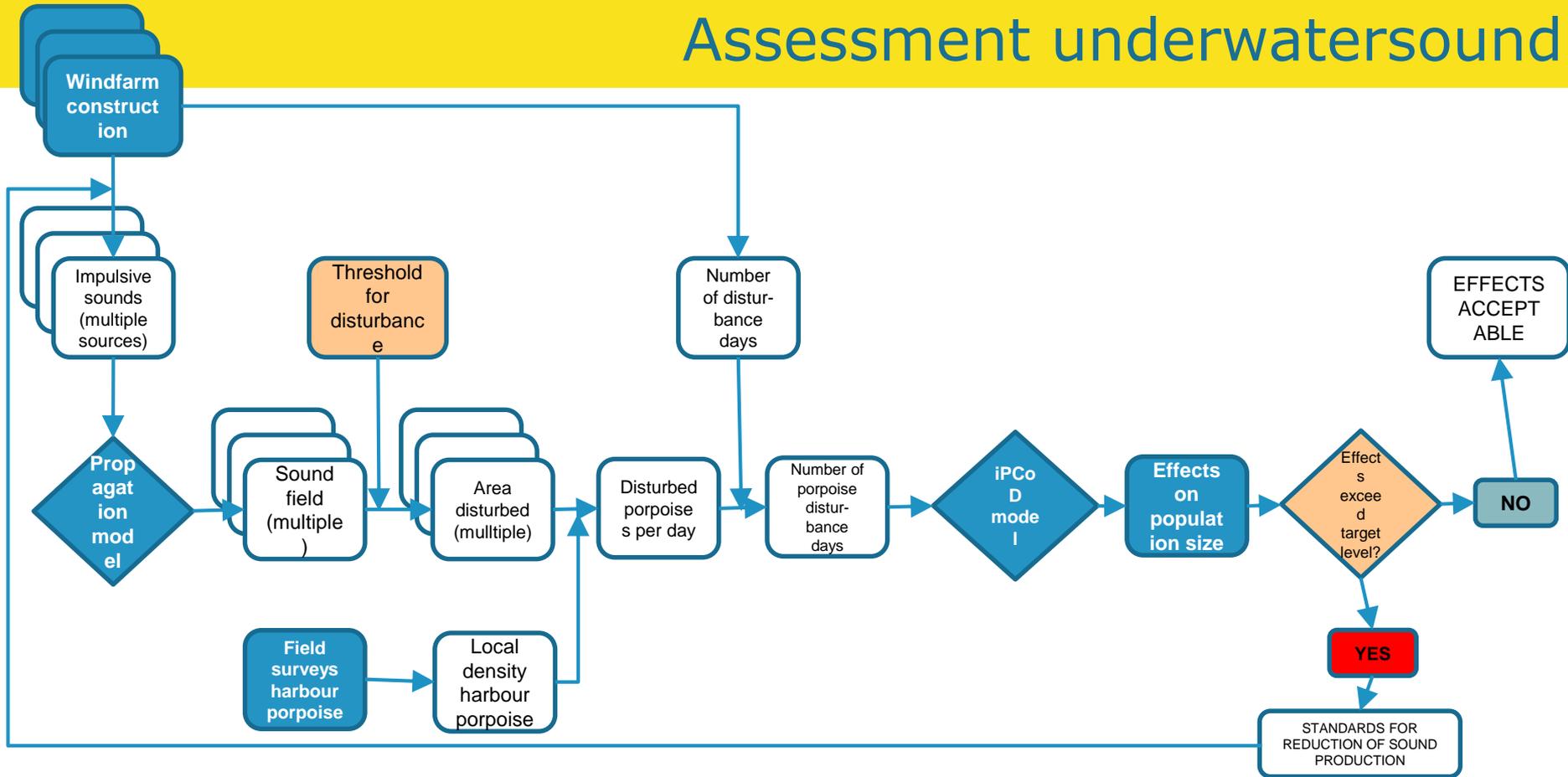


Scope Harbour porpoise

- Most sensitive: Harbour Porpoise;
- Impact assessment: propagation -> thresholds for disturbance (140 dB) -
> population size of harbour porpoises -> marine mammal disturbance days -
> population consequences (incl. iPCOD) -> mitigation;
- Wind Farm Zones 2017-2030, national and international;
- Realistic MW (planned or 10 MW);
- Geotechnical surveys included: cables, TenneT-platfoms, Wind Farm Zones;
- **Not** included: seismic surveys, sonar, shipping, etc.



Assessment underwater sound





Harbour porpoise: Differences KEC 3.0

- Improved sound propagation model (Aquarius 4.0);
- New monitoring data, improved densities;
- New *expert elicitation*: assumed disturbance period: 6 hours instead of 24-> iPCOD 5.0;
- New information energetics–vital rates (Kastelein, Gemini, Wozep) ;
-> energetics model (St.Andrews, UvA) ->iPCOD;
- New iPCOD version (iPCOD 5.0, summer 2018, KEC).

Same:

- 140 dB re 1 mPa²s disturbance-threshold.





Conclusions and mitigation measures

- 140 dB re 1 $\mu\text{Pa}^2\text{s}$;
- 95% certainty;
- In line with requirements Marine Framework Directive -> leaving room for other activities;
- Leaving room for more offshore wind;
- Realistic regulation;
- One universal noise-threshold of SELss (750 m) = **168** dB re 1 $\mu\text{Pa}^2\text{s}$ with 10 MW -> 95% certainty only ca. 1,7% decline of the population by windturbines (RK2030);
- Room for other activities and more windfarms.



Knowledge gaps and uncertainties

Among other things:

- Insufficiently specified seasonal density data;
- Unfamiliarity with effects geophysical surveys (lack of field measurements);
- Frequency weighting;
- Food availability Harbour porpoise.



Overall conclusions KEC

Birds:

- habitat loss: road map 2030 is possible;
 - collision risk: road map 2030 is possible, Lesser Black-backed Gull, European Herring Gull
- highest national PBR, international migrating birds: Eurasian Curlew, Black Tern at risk;
NB: this is only offshore wind, not other human activities

Bats:

- Advice for new regulation.

Underwater sound:

- road map 2030 is possible with mitigation 168 dB.

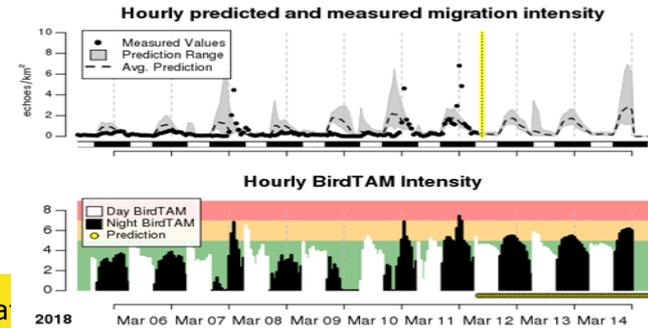
Overall:

- Still knowledge gaps, still uncertainties -> research needed;
- International collaboration, CEAF-project-> based on KEC methodology.



Elaborate Mitigation measures, with knowledge from Wozep

- Bats -> KEC;
- Migrating birds: Start/Stop procedure during massive migration and specific weather (mostly little songbirds), not for birds from KEC;
- Nature-inclusive building.





Nature-inclusive building

Now in the Wind Farm Site Decision:

Measures to increase the suitable habitat for species native to the North Sea by means of hollows and cracks of various sizes and settlement substrate:

a) If stones, rocks or other materials are used to prevent scour around the foundations of the wind turbine piles, then the following measure must be enacted: 20% of the total area of the uppermost level of the scour protection provided for all foundations must consist of contiguous surfaces of materials that include at least two hollows or cracks per square metre of surface area that are at least 10-30 cm in diameter and at least 20-50 cm in depth;

b) Provided a surface of the same size is used, the obligation referred to under (a) can also be fulfilled using one of the following alternative methods:

- by embedding –in a radial formation –a minimum of two and a maximum of six concrete pipes per wind turbine into the scour protection structure. Each pipe must be at least 100 cm in length and have an inner diameter of at least 100 cm, one of the ends of each pipe must be accessible at all times and the top side of the pipes must be equipped with a sufficient number of holes (150-300 mm in size) to guarantee water exchange;
- or by embedding a minimum of two and a maximum of six spherical concrete structures per wind turbine pile into the scour protection around each wind turbine pile. These structures must have an inner diameter of 100-200 cm, each must have 7-15 holes varying between 15-60 cm in diameter and the structures must be installed in a manner that prevents them from sinking into the sea bed or discharging sediment;
- or by adding calcium-rich material as a settlement substrate, including a top layer of natural substrate (such as shells) mixed together with rock armour and packaged in wire mesh/gabions;
- or by actively introducing flat oysters in combination with the preceding measure.

c) If the permit holder uses stones, rocks or other materials to prevent scour around the foundations of the wind turbine piles and wishes to employ a method that is not cited under (a) or (b) to increase the volume of suitable habitat for species native to the North Sea by means of hollows and cracks of various sizes and settlement substrate, then the permit holder must formulate a plan of action to this end, including a sufficient and location-specific monitoring programme.

- Mostly scour-protection, oysters, gabions, etc;
- First more monitoring and more experience with this kind of NiB



Questions?

