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1

Navigation Risk Assessment for Large Offshore Wind Developments

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2

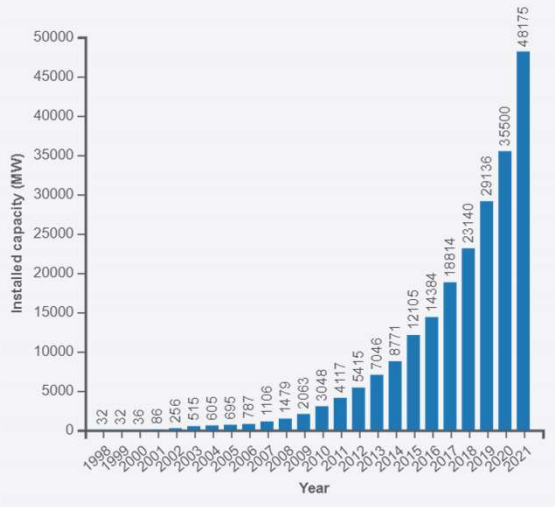
Overview

- Context of the development of very large OWF and integrated offshore wind energy areas
- Summary of industry guidelines and regulatory frameworks
- Summary of risks to navigation
- Overview of methods to assess navigation safety risk
- Risk reduction measures
- Lessons Learned

3

Offshore Wind Development

- Offshore wind is a rapidly developing renewable energy resource that has experienced rapid growth over the last 20-years
- As a result of increases in the number and scale of Offshore Wind Farms (OWF), there is increasing impact on marine traffic and navigation
- The latest developments, particularly in the USA, are on a scale that requires OWF, marine navigation and other marine resource utilisation (i.e. fishing) to co-exist

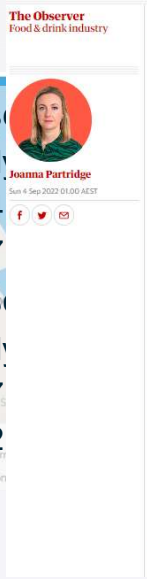


4

Transition in Scale of Development

Today

- Horns
  - Full
  - 174
  - 407
- Horns
  - Full
  - 167
  - 462



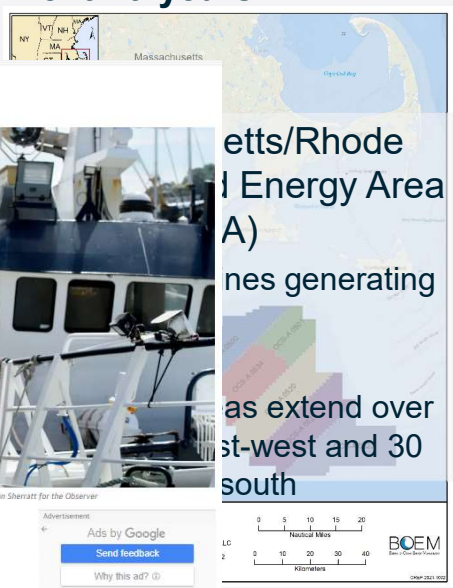
Offshore wind could blow us out of the water, say Cornish fishers

James 'Chunky' Chown says the industry can adapt, but only if it has room to. *All photographs by Adrian Sherratt for the Observer*

Newlyn trawler owners stress that they're not against renewables, but fear for their fishing grounds if the Celtic Sea is carved up and sold by the crown estate

As the fishing boat motors gently out of Newlyn's harbour, the sky is clear and the sea is millpond-flat. Below the surface, the clear waters are teeming with life; Newlyn, in south-west Cornwall, is home to one of Britain's largest trawler fleets, with more than 100 boats regularly landing catches. However, miles out to sea, a storm is brewing

Next 10-years



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south

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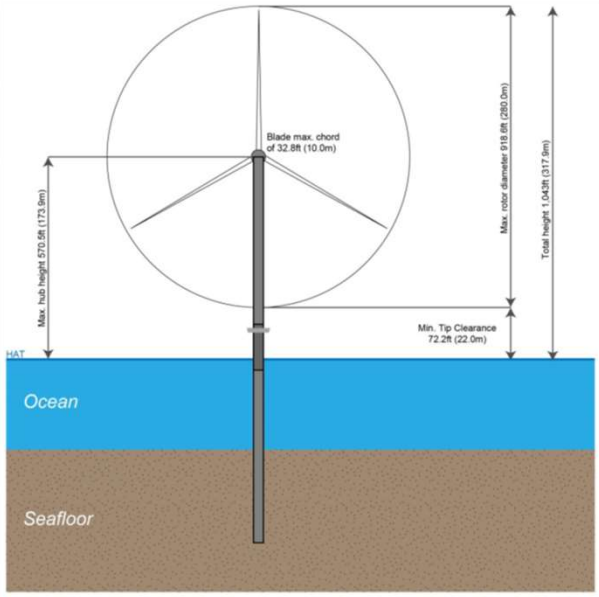
Industry Guidelines and Regulatory Requirements

- Industry and regulatory requirements are evolving
- Permitting and safety authorities are having to develop new requirements and criteria in parallel to approval and construction activities
- MarCom WG Report #161 (2018)
  - Focus on definition of safe minimum distance
  - Consideration of Electromagnetic Radiation and affect on Marine radar
  - Does not address mixed use of wind farm areas

6

Key Risks: Re-routing of Large Vessels

- Any OWF will require large vessels to avoid the wind energy area as this risk of allision is too high.
  - Maximum vessel length based on turbine spacing and minimum air draft margin



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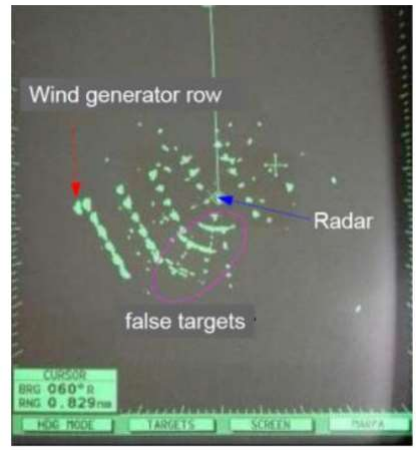
Key Risks: Impact on Radar and Communication

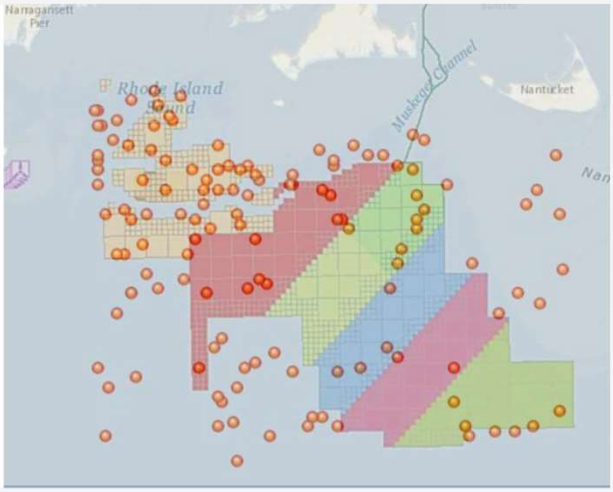
- MarCom WG Report #161 raised the potential impact on radar and communication
- On-going area of assessment on impact
  - Practical mitigation of impact can likely be achieved.



8

Key Risks: Marine Rescue

- SAR activities within OWF areas can been significantly impacted due to restriction in aircraft movements within the turbine array.
- This can be a key constraint to provide sufficient turbine spacing for aircrews to execute rescue missions in challenging conditions.



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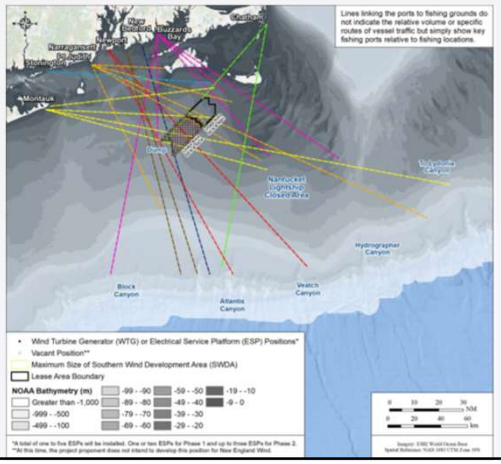
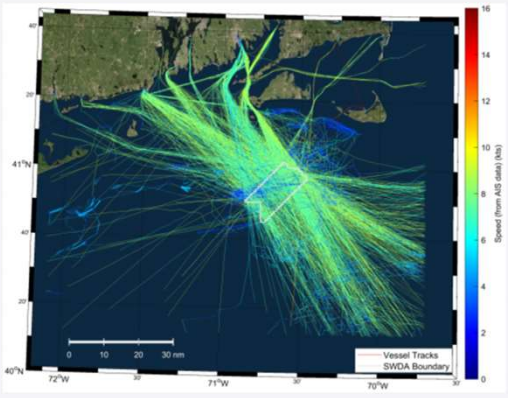
Key Risks: Mixed Use - Impact on Fishing Vessels

- Impact on fishing needs to consider transiting to fishing grounds as well as fishing within the turbine array



Fishing Vessel Tracks Through the OWF for All Transit Speeds



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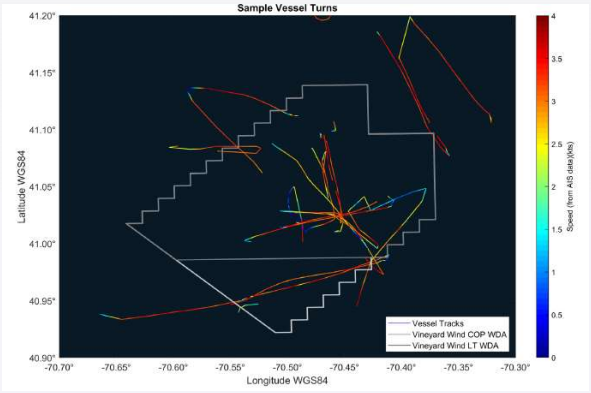
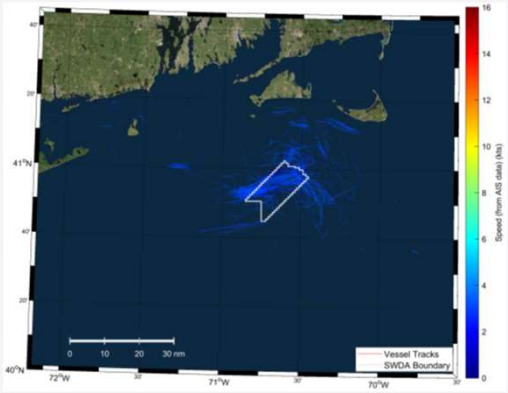


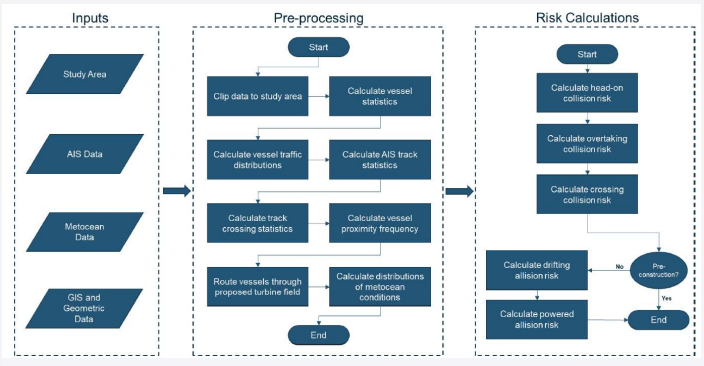
Fishing Vessel Tracks Through the SWDA Trawling or Fishing (<4 kts)

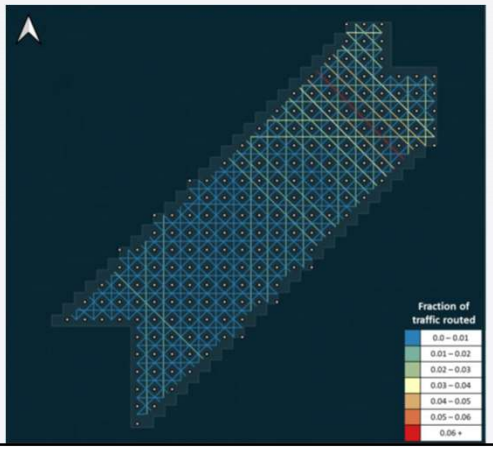


11

Assessing Impacts: Navigation Risk Modelling

- MarCom WG Report #161 proposed a framework to assess navigation risk
- A range of statistical and discrete event simulation models are being developed to assess impacts from navigation in or near turbine arrays





12

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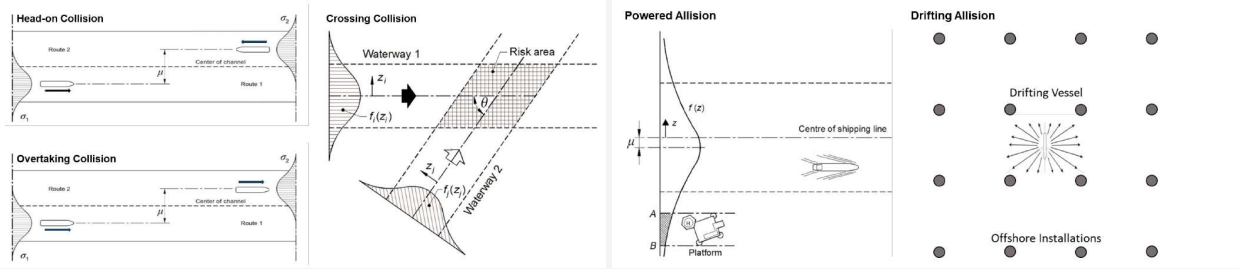
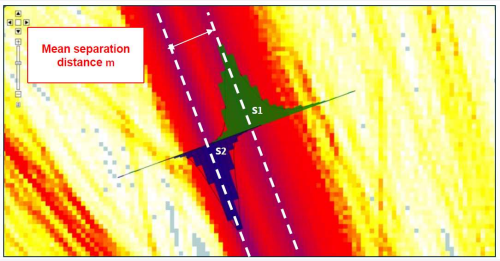
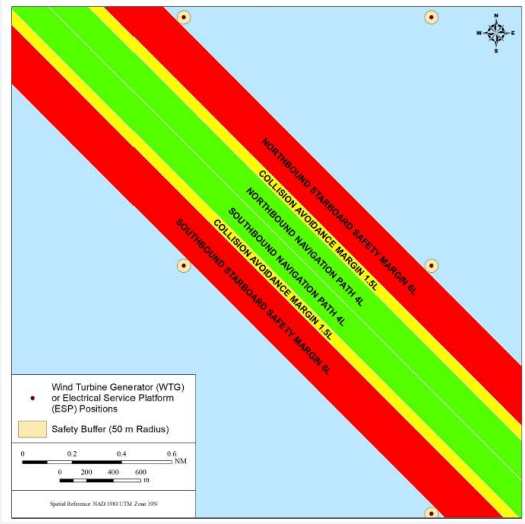




13

Key Risks: Maneuvering of smaller vessels in turbine array

- Following on from the work completed for a development within the MA/RI WEA and following extensive consultation with stakeholders the USCG has recently developed requirements for providing suitable navigation corridors within turbine arrays



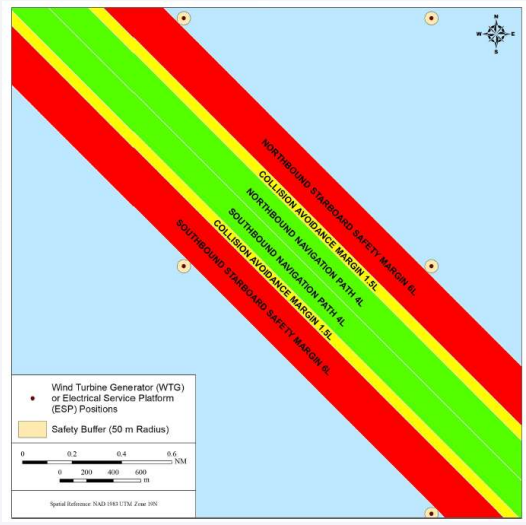
14

Key Risks: Maneuvering of smaller vessels in turbine array

- Navigational spacing of 8 ship lengths.
- A collision avoidance zone on either size of 1.5 vessel lengths.
- A safety margin of 6 ship lengths on either side of the corridor.
- A safety zone of 500m around each WTG.

Allowable Vessel Lengths

	No Safety Zone	50 m Safety Zone Per Side
1 NM Corridors	264 ft (80 m)	250 ft (76 m)
0.7 NM Corridors	185 ft (56 m)	171 ft (52 m)

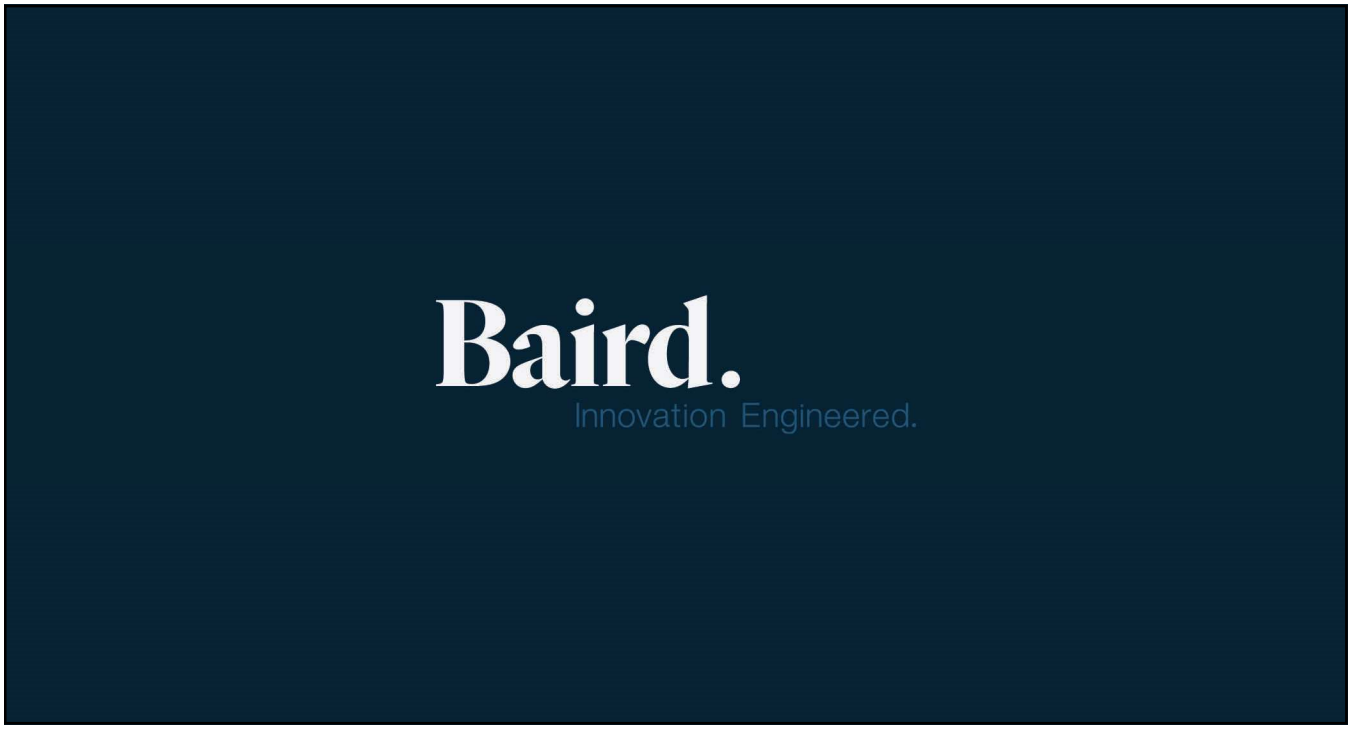


15

Conclusions

- Offshore wind will be a key energy resource for many countries in the coming years
- There is an urgent need to address gaps in knowledge of actual navigation impacts from OWF and development of regulations for very large OWF's
- International regulations and standards need to be considered
- Existing reliance on existing (small) operations, COLREG (IMO regulations) and MarCom WG Report #161 not suited to large projects that need to allow for mixed use of marine areas
- MarCom WG Report #161 should be reviewed as soon as possible to incorporate learnings from large OWF's proposed for the USA

16



17