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FLOATING OFFSHORE WIND – NATURE-FRIENDLY RENEWABLES?

Could a shift to floating offshore wind reduce conflict between climate action and nature conservation at sea?

“We desperately need action on climate change, but a new approach is needed if we are to avoid damage to our precious wildlife and achieve a truly sustainable energy future in the UK.”

Martin Harper, Global Conservation Director, RSPB

Offshore wind

Offshore wind is already delivering large amounts of renewable electricity and is on track to double output several times over the next few decades. It is a rare, genuine, decarbonisation success story.

Yet the RSPB is worried.

This is because unless action is taken soon, this low carbon progress could come at a severe cost to our marine environment. In particular, potentially devastating long-term impacts on the UK's internationally important seabird populations are predicted from poorly located bottom-fixed offshore wind farms.

Floating offshore wind offers a viable alternative to bottom-fixed technology, whilst also offering an opportunity to reduce some environmental risks of a growing offshore wind sector. However, emerging floating wind technology will need support to realise its vast potential.

Floating offshore wind technology is now moving from the drawing board to deployment. Hywind began operating in 2017 and is the world's first floating wind farm located off Peterhead, Scotland. Kincardine is another demonstration project located due south, which connected its first phase in late 2018. A number of floating wind projects are progressing elsewhere in Europe and further afield, including in Japan and the United States.

In this short report we look at:

- why a shift to floating wind could help the UK deliver on multiple Sustainable Development Goals
- the wildlife implications of floating offshore wind
- issues that need resolving to aid deployment of floating wind at scale
- the challenges still to be faced
- our recommendations to achieve sustainable future UK offshore wind development.

Why floating wind turbines could be part of the climate change solution

Compared to traditional bottom-fixed technologies, floating offshore wind can exploit wind resource in deeper areas of sea in locations that are further from shore.

In general, the greater the distance projects are from shore the lower the risks are to seabirds, which breed and generally feed closer to the coastline. As a result, floating offshore wind holds advantages over bottom-fixed projects by providing opportunity to reduce environmental risks and increase the environmental sustainability of the sector.

Potential to lower wildlife impacts

The UK and its waters are internationally important for seabirds, hosting almost eight million birds of 25 species, 24 of which qualify for protection under national and international legislation. For some species the UK hosts globally important numbers of breeding seabirds, such as Manx shearwaters and gannets.

Deeper-water offshore sites

Floating wind can exploit areas distant from breeding seabird colonies and important shallow foraging areas.

Lower infrastructure impacts on the sea bed and less noisy construction time is also anticipated for deploying floating structures, which could reduce the associated impacts on marine wildlife, including birds and mammals.

Maximising wind energy generation

- 80% of UK offshore wind resource exists in water depths greater than 60m where bottom-fixed turbines may not be possible.
- Deep-water, far-offshore locations experience stronger and more persistent winds. Turbines could generate more energy, more of the time.
- Availability of shallow water sites with low wildlife sensitivity suitable for bottom-fixed wind is severely constrained. Notwithstanding these many advantages there are some specific challenges, such as loss of energy in transmission and innovative solutions to enable operation in very dynamic environments.

Will floating wind farms harm wildlife?

There is potential for some impacts from floating offshore wind to be significantly lower than those caused by bottom-fixed wind farms, which are causing serious concern for our already threatened seabirds.

Potential impacts on seabirds from all types of offshore wind turbines are well known[1,2,3] and include:

- collision with structures
- disturbance, causing altered behaviour
- changes in prey or predator abundance (positive or negative)
- barrier effects resulting in additional energy costs of avoiding structures and thus a reduction in individual fitness/survival
- habitat loss or change (positive or negative).

A switch to floating turbine technologies could significantly reduce underwater noise impacts, barrier effects and habitat loss or change.

Many deep-water, far offshore sea areas are likely to have lower ecological sensitivity to wind developments than near shore areas, particularly for seabirds. However, uncertainties due to a lack of marine data remain and some areas could prove to be of higher ecological value. For instance, upwellings at sea can create nutrient rich areas that support fish, which in turn attract seabirds and other species. Similarly there may be areas at sea where mobile marine species (eg seals, whales) may gather, or use in significant numbers during migration.

Floating wind technology could unlock previously inaccessible, and potentially less environmentally sensitive, areas for sustainable renewable generation development. However, the search for suitable sites must always be supported by a sound understanding of the environmental sensitivities. Technology type, design and, most importantly, appropriate siting is critical to limit the scale of impacts on wildlife.

[1] Drewitt, A. L., & Langston, R. H. (2006). Assessing the impacts of wind farms on birds. Ibis, 148(s1), 29–42

[2] Dierschke, V., Furness, R.W., Gray, C.E., Petersen, I.K., Schmutz, J., Zydelis, R & Daunt, F. (2017). Possible Behavioural, Energetic and Demographic Effects of Displacement of Red-throated Divers. JNCC report No:605.

[3] Dierschke, V., Furness, R. W., & Garthe, S. (2016). Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation, 202, 59–68.

Kittiwakes on nest, Orkney, 2013. Adult in middle was tagged to collect data on when and where at sea it went to find food to raise its chick.

Improving our understanding

Many uncertainties remain around the impacts of all types of offshore wind on wildlife. Resolving these would help progress floating wind development and the wider offshore wind sector in harmony with nature.

There are four priority areas where more research is needed:

1. Monitoring populations and their trends:

- The size of breeding season populations and non-breeding regional populations of species need to be established through census work.
- The demographic rates of key species (ie lifespan, population age structure, productivity, mortality rates) should be gathered through research and monitoring.

2. Behavioural response of birds to turbines

- Seabird tracking of birds interacting with operating wind farms. This must include 3D representations to identify not only location and flight direction but also flight altitude, diving heights and diving depths.
- For species under the surface, we need to identify risks relating to:
  - existing, or new, underwater noise impacts
  - entanglement for marine mammals
  - electromagnetic radiation
  - displacement or attraction of sub-surface species.

3. Species distributions at sea

- GPS tracking of seabirds and marine mammals to identify important foraging areas and migration or commuting routes.
- Aerial and boat-based surveys.

4. Habitat impacts

- Increased understanding of location and type of important deep-water habitats through survey and data collation of existing information.
- The impacts of a substantial increase in cable installation and maintenance associated with deep-water floating wind farms need to be identified.

How to support floating technology to reduce the risks to marine wildlife

To achieve an environmentally sustainable offshore wind sector that delivers decarbonisation with lower levels of damage to our wildlife around UK shores, a shift towards floating wind technology deployed in deeper water is required. Such a transition could be achieved by establishing a clear and focused policy framework and dedicated investment in innovation to support the sensitive development of this technology, making the UK a world leader in sustainable renewables development.

Recommendations for decision-makers to accelerate floating offshore wind deployment

1. Commit to enhanced funding for floating wind technology innovation.
2. Tailor support mechanisms to secure commercial-scale floating wind deployment.
3. De-risk investment in floating offshore wind by supplying dedicated demonstration sites in areas of confirmed low ecological risk, for example by:
   - collation of environmental baseline data
   - government undertaking survey work
   - supporting delivery of infrastructure such as grid connection.
4. Commit funding for innovation in ways to avoid floating wind impacting on wildlife.

And to support the environmental sustainability of the offshore wind sector as a whole

5. Require robust impact monitoring programmes and ensure data from all fixed and floating sites are promptly made publicly available.

6. Invest in long-term species monitoring programmes, including regular updates to the UK seabird census to ensure we have reliable and up-to-date data on species at risk.

7. Strengthen co-ordinated research on issues such as cumulative impacts and species behavioural responses to bottom-fixed and floating offshore wind.

8. Use a constraints analysis[4], to inform early strategic UK-wide spatial planning for future offshore wind generation and electricity cable infrastructure based on the mitigation hierarchy (an approach designed to achieve "no net loss" of biodiversity firstly through avoidance of impacts, then mitigation or minimisation of impacts and finally, as a last resort, through habitat restoration or compensation).

9. Fully integrate appropriate and robust environmental baseline data into the consenting process.

[4] See spatial mapping approach taken to inform the RSPB's 2050 Energy Vision – https://www.rspb.org.uk/our-work/conservation/projects/energy-futures-project.

For more information please visit
rspb.org.uk/energypolicy

RSPB UK Headquarters
The Lodge
Sandy
Bedfordshire
SG19 2DL

rspb.org.uk

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