

## Peer Review Report

# Review Report on Geoscience solutions for sustainable offshore wind development

Review, Earth Sci. Syst. Soc.

Reviewer: Jordan Eamer

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### EVALUATION

#### Q 1 Please summarize the main theme of the review.

This review is generally concerned with the challenges and opportunities presented by global development of offshore wind energy, and how geoscientific information can benefit stakeholders in offshore wind developments and increase the efficiency and usefulness of offshore wind. Thank you for the opportunity to review this interesting manuscript.

#### Q 2 Please highlight the limitations and strengths.

This review is well written, expertly researched, and highly relevant. Cited research is generally recent or very recent (much of the citations are < 5 years old). I found it useful and informative to read in its current form. I would highlight that some of the figures are a limitation of the review – they could be improved. I would also say that the review is somewhat UK-centric... but this is also reflective of the industry in its current state.

#### Q 3 Does the review include a balanced, comprehensive and critical view of the research area?

Yes, other than the spatial scope mentioned above.

#### Q 4 Check List

Is the English language of sufficient quality?

Yes.

Is the quality of the figures and/or tables satisfactory?

Yes.

Does this manuscript refer predominantly to published research? (unpublished or original research is non-standard for a review article, and should be properly contextualised by the author)

Yes.

Does the manuscript cover the topic in an objective and analytical manner

Yes.

Does the reference list cover the relevant literature adequately and in an unbiased manner?

Yes.

Does the manuscript include recent developments?

Yes.

Does the review add new insights to the scholarly literature with respect to previously published reviews?

Yes.

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**Q 5** Please provide your detailed review report to the editor and authors (including any comments on the Q4 Check List):

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L135 - I had to read this statement a few times. It reads as if it's an opinion of the authors (I say this despite recognizing it comes from analyses in the cited works), and the temporal scope of the statement is poorly defined. A subtle change to make it more neutral would help. It could also just be the relaxed grammar of the sentence. An example would be "To date, offshore wind technology has been fairly immature, and the sector's initial focus has been more on project development and commissioning and less on decommissioning and repowering. As some of the first commissioned projects reach end-of-life, operations on the latter are thus more difficult." Or something to that effect.

L150 I would replace "Goal 7" with "SDG 7", and elsewhere, just to make the link to the UN SDGs more explicit, as done with the targets below.

L264 In a review of geological applications for offshore wind, I would like to see more cited examples of regional geoscience studies. There are many countries that have developed regional offshore wind geological suitability products.

L293 Typo

L301 I would argue that modern 2D deep tow sparker/boomer DTS can also resolve boulders quite well, in particular dropstones.

L313 Piles have evolved quite a bit since 2009, 2015... but I was surprised to confirm that there are still no monopiles embedded deeper than 40m. Perhaps mention of the future specifications of "XXL" monopiles, and related embedment depths?

L333 some confusing punctuation

L338 this is an awkward sentence, maybe just remove the "and it", e.g., Geotechnical ground characterisation and examination is essential, is governed by the type of foundation, and depends on the depth of the water, geology of the area, and environmental conditions (Bhattacharya, 2019).

L396 While satellite-derived bathymetry is novel, and improving, I would still provide an example of the current difference between multibeam or bathylidar derived difference mapping and those developed from optical satellite derivation. A (somewhat dated) but still relevant example would be the repeat MBES collected for Scroby Sands - also a great and clear example of scour and bedform interaction with offshore wind installation.

L404 "fit for this purpose"

L412 I might add that the implications for improved model development would extend beyond OW - this could benefit a wide range of marine infrastructure projects, habitat mapping/modeling, and the broader science and engineering community in general!

L458 the "therefore" here doesn't seem to build on any earlier thought. Yes scour on pipelines/cables is a major issue, but the sentence previous discusses how that was previously mitigated, and the external/environmental factors causing cable failures discussed earlier didn't explicitly mention scour. Perhaps link this paragraph a little more fluidly.

L480 A demonstration plant in Switzerland as well. <https://energyvault.com/commercial-demonstration-unit/>

L544 mine- or minewater

L613 I have been thinking that the authors may want to include some discussion, or include in their integrated energy system, the opportunities for increased seabed biodiversity provided by hard surface creation (on the foundations themselves or through scour protection). This is hinted at in this section (as well as in the intro), but could be expanded upon to discuss how improved modelling of sediment suspension and scour would

assist modeling of habitat creation/modification, which would in turn provide model inputs and improvements into sediment suspension and scour...

L726 I see the previous point does get some discussion.

L734 I do find it interesting that this is the first mention of MSP – I would have thought a review based on whole system integration would have laid out this approach to stakeholder engagement a little sooner. For example, in section 2.1.2.

L763 Amen!

Figure 1 – I find the greyscale across the whole region really challenging to interpret. I recognize that the point is to highlight the offshore wind installations, but perhaps a colour gradient on land would help differentiate the marine and terrestrial space.

Buffers around the farm footprints would also help them stand out.

Figure 2 – I appreciate this is a difficult figure to lay out, and applaud the effort.. I just really struggle to read it. I would hazard a guess that most readers want to refer to a challenge (e.g. users), and read through each example, referring back to the main topic to tie it back in. There are just too many different text angles and orientations to do that efficiently. I do feel like there is an opportunity to include graphics as well – centred on something like Figure 6 but with components replaced by challenges/opportunities.

Figure 3 – Good but the text size + buffer makes 2 & 3 very busy..

Figure 5 – Love the imagery – not sure the “windfarm” labels in A and B are necessary, nor are the crude north arrows (perhaps just mention in the caption N is up)

Figures 6 and 7– These are fantastic – they belong on the cover of the journal. Really great work.

#### QUALITY ASSESSMENT

<b>Q 6</b> → Quality of generalization and summary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Q 7</b> → Significance to the field	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Q 8</b> → Interest to a general audience	<input checked="" type="checkbox"/>				
<b>Q 9</b> → Quality of the writing	<input checked="" type="checkbox"/>				

#### REVISION LEVEL

**Q 10** → what is the level of revision required based on your comments:

Minor revisions.