

- This manuscript presents a comprehensive review of the environmental, social, and technological challenges surrounding the deployment of floating offshore wind (FOW) in Japan. It covers a wide range of topics—from site selection and metocean conditions to design, operation, and maintenance—and draws on international case studies to contextualize Japan's situation. The paper provides useful background and may serve as a reference for early-stage researchers or policymakers seeking an overview of Japan's FOW landscape.
- However, while the breadth of the review is notable, the manuscript would benefit from a significant revision to improve focus, originality, and structural clarity. Below are my detailed comments:

1. Lack of Prioritization Despite Explicit Research Question

The authors explicitly include the question “What are the gaps and what shall be prioritized?” among their three research questions (Section 1.3). While the paper identifies a wide range of technical and institutional gaps, it falls short of addressing the “prioritization” aspect. There is no framework, criteria, or comparative discussion provided to help readers understand which issues are most urgent, impactful, or feasible. A structured prioritization matrix would strengthen the paper's contribution significantly.

2. Limited Insight on Research Directions for Environmental Constraints

The review offers a thorough description of Japan's unique geological and metocean challenges—such as complex seabed topography, high geohazard risk, insufficient metocean data, and port-access limitations. However, it largely reiterates the existence of these challenges without proposing how future research might address them.

Especially, Section 6.1 identifies two major gaps: (1) limited prior research and (2) lack of site-specific data. Yet it does not extend to suggesting potential directions to close these gaps. For example, no specific methodologies are proposed for enhancing site investigations, improving metocean forecasting in cyclone-prone areas, or adapting installation strategies to Japan's long-period swell conditions and port limitations. As a review paper, offering even preliminary suggestions—such as promising modeling techniques, remote sensing tools, or infrastructure planning frameworks—would help the reader better understand how these environmental constraints might be systematically addressed in future work. Including such insights would strengthen the paper's contribution to shaping Japan-specific floating offshore wind research.

3. Need for Explicit Contextualization of International Case Studies

While the manuscript introduces a range of international case studies on floating offshore wind development—particularly in Europe—these are often presented descriptively and left for the reader to interpret their relevance to Japan. In several instances (e.g., the discussion of tow-to-port maintenance in Kincardine and Hywind Scotland, or digital twin applications for predictive maintenance), there are implicit connections to Japan's environmental or infrastructural conditions, and Japanese examples are occasionally mentioned alongside. However, these links remain largely implicit rather than analytically articulated.

To strengthen the paper's contribution as a review intended to inform Japan's FOW deployment, it is recommended that the authors move beyond implicit juxtaposition and provide explicit interpretation and contextualization. For example, when discussing European O&M strategies or data infrastructure challenges, what specific lessons are applicable to Japan, and what modifications or local considerations would be required? Highlighting such comparative insights more clearly—perhaps through brief analytical co

4. Minor improvement suggestions

4.1. Overly Lengthy and Redundant Sections

The manuscript is excessively long, and several sections could be significantly condensed without loss

of content. For instance:

- The Operation & Maintenance section devotes more than four pages to describing the Hywind Scotland and Kincardine projects. While these are valuable cases, the level of detail provided (e.g., port names, tow duration, exact crane types) is excessive and not directly linked back to Japan's context.
- The Site selection and metocean challenges (e.g., typhoons, earthquakes, steep bathymetry) are described repeatedly across Sections 2, 3, and 4 without synthesis or cross-referencing.
- Similarly, the emphasis on Japan's lack of oil & gas infrastructure and limited metocean data is mentioned in multiple sections with nearly identical wording.

Reducing such repetition and consolidating related content would improve readability and focus.

4.2. Section 5 lacks clear linkage to the paper's research objectives and Japanese context

Section 5 is titled in a way that suggests it will examine how floating offshore wind contributes to Japan's societal, environmental, economic, and energy (S+3E) goals. However, this linkage is only briefly mentioned in Section 5.1 (Introduction), and not meaningfully carried through in the subsequent subsections. For example, Section 5.2 (National Security with Scale) introduces European "energy island" projects, but does not explain why these are relevant to Japan or how they relate to national security in the Japanese context. Similarly, Section 5.3 (Power-to-X (P2X) concepts) explains Power-to-X (P2X) technologies in general terms, without specifying how these technologies contribute to S+3E goals in Japan or why they are particularly important in this setting. Section 5.4 on cyber security suffers from the same lack of contextualization.

Overall, the section reads as a collection of general technical topics rather than a focused analysis. It does not provide a systematic or evidence-based discussion of how floating offshore wind supports Japan's S+3E goals, nor does it directly contribute to answering the research question posed in the introduction. Given the already substantial length of the manuscript, I recommend removing Section 5 unless its structure and content are significantly revised to clearly support the core objectives of the paper.

4.3. Structural Suggestion for Section 3.4

Section 3.4 contains only a single sub-section (3.4.1). Given that no additional sub-sections are provided, the hierarchical structure appears unnecessarily complex. I recommend removing the sub-section numbering and simplifying the structure to improve readability.