Round 1

Authors' response to Reviewer 1 comments

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February 7, 2025

We appreciate your feedback and comments on our manuscript. Following are our responses.

The provided comments are in the standard black font, and our responses to the comments are in blue. The associated changes are in the revised manuscript submitted with this document.

Provided comments

1. There seems to be no variance between the mass dependence of horizontal take-off and landing (HTOL) kites, ground-generation kites (ground gen) and air-generation kites (air-gen).
    a. HTOL kites would expect higher structural mass to handle landing loads, but probably better than VTOL configuration
    b. VTOL lift-based kites would expect added mass due to VTOL weight as mentioned in the article
    c. VTOL kites with air-gen would expect added mass of VTOL weight, as well as higher drag of tether due to having a conductive tether (thicker diameter and more mass).
        i. Perhaps add a comment on system mass depending on configuration and how this is (not?) accounted for in the analysis

    Correct, an explanatory text is now included in Section 2.3: Kite mass model.

2. The article uses a lot of colors. When printing the article for reading to do a proper review, it was difficult to discern differences between the meanings, and I had to use digital version for assessing the figures. Consider to add dashed lines for it to be readable in black and white.
    Figure 5 is changed to have different lines. Figures 7, 9, 11, and 13 are contour maps requiring colour differentiation; they are not changed. Figures 8, 10, 12, and 14 have curves in close proximity, and the combinations of dotted lines will eventually overlap, causing the same problem; hence, we decided to keep the colours for these figures. Figures 20, 21 and 22 are changed to include different markers.

3. Page 2 line 39: Recommend to use lift instead of thrust for power production. It is typically the lift of the kite that produces pulling force, not the thrust.
    We used the word 'thrust' since, in that section, we are making an analogy with horizontal axis wind turbines (HAWTs). But we agree that it can be confusing and hence now removed.

4. Looking quickly through the code base at github it is not clear how the tether drag is accounted for. I see that you mention it on page 10, where it is considered as a lumped at the kite, but it remains a question if this is correct, or representative enough. At the core, there are two main factors that limit the cut-in speeds: kite mass and tether drag where the latter tends to dominate. This means that the lumped model might not capture the tether drag effect to a sufficient degree.
    We have now cleaned the GitHub repository. The tether drag equation can be found in AWE-SE » AWE-Power » src » computePower.m » Lines 65-67. Indeed, the lumped tether drag approach is not highly accurate, but such an approach is widely used in AWE literature in steady or quasi-steady models. It has been shown to be representative enough in design studies by (Houska and Diehl, 2006; Argatove et al., 2009, Fechner and Schmehl, 2013; Joshi et al., 2024)

5. In terms of figure 22, and scaling of airborne wind, I would say that it is too early to say anything about scaling beyond 1MW, but that this is indicative based on our current understanding (and of course the square cube law in terms of mass). The output of this figure is also closely tied to the assumptions in the article.
We agree that it is too early to state with high confidence about scaling beyond 1 MW. Hence, we have discussed our assumptions throughout the paper, and the limitations in the Discussion and Conclusions section. We therefore focus more on the trends and not the absolute numbers, as also stated in the Introduction.