

Review of: "Low-Carbon Hydrogen Economy Perspective and Net Zero-Energy Transition through Proton Exchange Membrane Electrolysis Cells (PEMECs), Anion Exchange Membranes (AEMs) and Wind for Green Hydrogen Generation"

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Potential competing interests: No potential competing interests to declare.

The manuscript titled "Low-Carbon Hydrogen Economy Perspective and Net Zero-Energy Transition through Proton Exchange Membrane Electrolysis Cells (PEMECs), Anion Exchange Membranes (AEMs), and Wind for Green Hydrogen Generation" is important today because it deals with renewable hydrogen as a decarbonised solution. Nevertheless, it is more like a draft rather than a finalised manuscript; there is not a clear structure and concepts.

The following points may be considered for further improvement of the manuscript. I suggest the authors modify accordingly:

- The title is too long and must be shortened, as well as more closely linked to the text.
- The different parts or paragraphs are not well integrated and seem isolated; they are not adequate. There is not a logic behind them.
- There are some grammatical errors to be properly addressed in order to avoid inconsistencies.
- The novelty of the study needs to be highlighted; it seems missing. The conclusion needs to be rewritten with the findings of the study. The text does not provide a proper discussion of the different topics addressed; they are mentioned generally without a real analysis and discussion. Mention of future actions of this work must be included. Also, the abstract needs to be linked to the work presented clearly.
- Reference to acronyms such as AEM, PEMEC, NEF, CCS, IRENA, etc., should be provided.
- In the manuscript, the years may be uniformly used to represent various data.
- The text mentioned year 2024 without providing data for. Reference to more recent links and papers could be more adequate and must be added. The literature review must be improved to do it properly. More data needs to be provided, such as the percentage of the automobile market related to electric vehicles, or the cost of green and grey hydrogen, without making a general statement without reference.
- Uniformity in citations, viz., "C. Park et al., 2022" or "Park et al., 2022," as well as in the way to mention hydrogen or H₂, is needed.
- Check the figures and their text: Figure 2 needs to be adjusted for the years on the x-axis to be separated; Figure 3

needs to be cited and adjusted in relation to the different generation hydrogen processes (like in section 1.2, useful to introduce some graphical representation); Figure 5 reference is missing in the text; Figure 9 needs some description about the labels mentioned. Sizes of the figures need to be also reviewed.

- The authors used units for CO₂ emissions at ppm/year and it must be in tons/year or similar.
- Some other parts of the hydrogen value chain need to be mentioned, analysed, and commented on in a review paper, such as hydrogen transportation, which impacts greatly on the final cost of the hydrogen.
- The text mentions Mg-Al double-layered hydroxide but, as a review paper, it needs to consider other alternatives too.