

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"

Amit C. Bhosale¹

¹ Indian Institute of Technology, Roorkee

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," in my view, lacks clarity and technical information. In my opinion, the manuscript cannot be published in its current form. I would suggest the authors go through the following comments and try with a fresh submission. Few of the concerns are:

1. Why did the authors just choose PEMEC and AEMEC, and ignore AEC and SOEC?
2. When discussing wind energy for green hydrogen as a low carbon approach, why haven't other sources such as solar PV, hydro, nuclear, etc., been explored?
3. Abstract seems to be too general and lacks scientific output of the study. Seems more like an introduction section. The methodology and scientific findings of the study need to be added to the abstract section.
4. Novelty statements need to be clearly mentioned in the abstract and introduction sections. Furthermore, what gap the present study fills needs to be explained in the introduction section.
5. Is Figure 1 directly copied from the source? If yes, consider redrawing it.
6. Below the paragraph following Figure 1, the authors have mentioned the reduction of the cost of renewable hydrogen. Please add a reference to it.
7. The manuscript contains some incomplete sentences and grammatical errors. I recommend the authors to check the manuscript for such errors.
8. The authors mentioned that "currently 23% of hydrogen is generated from coal..." and provided a reference to work done in 1992. Please check these numbers with the present-day study.
9. Sections 1.1 and 1.2 can be combined in the introduction section itself. It would reduce the general statements in the manuscript.
10. The manuscript contains too many general statements that reduce its quality based on scientific outputs. I recommend the authors to recheck the entire manuscript and discuss more on technical attributes rather than general statements.
11. The source cited for Figure 4 (Eh et al. 2022) does not match with the contents of the reference.

12. Some punctuation errors are there in the manuscript. For example, Line 2 of section 3. Please recheck the manuscript for such errors.
13. Content of Section 3 does not match with the provided heading. There should be a discussion on carbon emissions from these technologies which I don't see. Several authors have done such work. For example, Int J Hydrogen Energy 2021;46:38612–35. <https://doi.org/10.1016/j.ijhydene.2021.09.142>; Renew Sustain Energy Rev 2023;187. <https://doi.org/10.1016/j.rser.2023.113691>. The discussion on the cost provided here can go on to section 2.
14. Rather than presenting Figures 6A and B, a combined figure should be presented.
15. In section 5.1, the authors have mentioned facts about hydrogen storage from literature of 2011. Not sure how relevant they are in 2024.
16. Following the stating of drawbacks in Section 5.1, some discussion on possible mitigation is advised.
17. How come the fuel cell is consuming power from the DC bus in Figure 8?
18. Figure 11 should be modified to show OH⁻ ions, O₂, and H₂ different from the molecule of water. Water molecules should remain in the outer portion of the Titanium GDL.
19. Please add a reference to the fact that AEMEC produces hydrogen with purity >99.999%. (Last paragraph of section 6.)
20. I see merely any discussion of PEMEC in the section 7 with the title “Proton Exchange Membrane Electrolysis Cells for Low-Carbon Hydrogen Generation.” What the authors intend to discuss in this section is unclear to me.
21. The Conclusions section needs to be improved.