

Reviewer Comments:

- The authors should indicate that ocean-CDR/OAE has the potential to compensate for CO₂ degassing associated with large-scale removal of CO₂ from the atmosphere. This makes ocean-CDR one of the only pathways that delivers CO₂ removal with no CO₂ release consequences ensuring that it is one of the most (the most?) resource efficient means for large scale CDR.
- The figure number needs to be corrected: *"The two primary electrochemical processes used to generate alkalinity from brine are electrolysis (O'Brien, Bommaraju, and Hine, 2005, pp.31-34) and electro dialysis (Strathmann, 2011, pp.163-167), as shown in Fig. 3.3." ***Figure 3*
- Regarding Figure 3: It is not always necessary to have pretreatment, and to segregate the brine into divalent-rich, and -poor streams. The process flow could be shown more generally, and it could be indicated that many possible configurations exist.
- The authors may wish to consider the following two publications which are relevant to one particular approach for ocean-based CDR, but which contain commentary of relevance to many ocean-based CDR approaches:
 - a. <https://pubs.acs.org/doi/full/10.1021/acssuschemeng.0c08561>
 - b. <https://pubs.acs.org/doi/full/10.1021/acsestengg.3c00004>
- The authors are correct in that CO₂ is released in a static seawater system wherein CaCO₃'s precipitation is induced. However, when CaCO₃ precipitates under conditions of constant alkalinity generation (i.e., in the presence of a constant pH pump as proposed via the La Plante et al. process), as noted in the second reference above – no CO₂ is released. Furthermore, the process of La Plante et al. is not based only on CaCO₃ precipitation. Rather, CaCO₃ precipitation is the secondary contributor to CDR, the primary contributor being Mg(OH)₂ derived alkalinity. As such, the second sentence is inaccurate and should be corrected for content, and for its indication regarding efficiency which is not assessed herein. "In a second version of this approach, the NaOH(aq) is added to seawater to remove CO₂ as CaCO₃(s), with additional NaOH(aq) then added to restore this lost alkalinity and draw CO₂ from the air to replace the removed CO₂ (de Lannoy et al. 2018; Eisaman et al. 2018; La Plante et al. 2021). *The precipitation of CaCO₃(s) releases CO₂, making this second version relatively inefficient from a CO₂-removal perspective, but may be pursued if other considerations such as ease of verification outweigh this inefficiency.*"
- Line 259: reactions at anode and cathode are interchanged. H₂ is produced at the cathode and Cl₂/O₂ at the anode
- Line 263: LaPlante (2023) discusses the approach described here to neutralize the acidic efflux of an electrolyzer using the acid-neutralization capacity of different solutes. It would be appropriate to cite this work.
- It is worth mentioning that the development of efficient and durable oxygen selective electrodes would be an important direction to make seawater electrolysis more feasible –

because otherwise the large-scale production and handling of gaseous chlorine (in addition to acid) could make standard electrolysis processes difficult to scale.

- Many figure numbers are written as 3.x. These should be updated/corrected.