The possibilities of *Ex-Situ* Mineral Storage of CO_2 in Greece

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This research is focused on the CO_2 storage potential that outcropping minerals can offer in Greece, through *ex-situ* processes. Carbon storage is a relatively new and effective technique during which, carbon dioxide can be stored into surface or subsurface rocks and minerals. When applied at a large scale, CO_2 storing process can offer a viable solution to effectively lower GHGs emissions, thus combating climate change. In general, CO_2 storage can be applied by two main methods: (i) the surface method (*Ex-situ*) and (ii) the subsurface injection method (*In-situ*), through mineral carbonation. Mineral carbonation is an attractive technology in which CO_2 chemically reacts with calcium, sodium, and magnesium containing materials in order to precipitate stable and environmentally harmless minerals, usually carbonates (Mucsi et al, 2021).

A wide range of materials can be used to achieve mineral carbonation and can be broadly classified into two main categories (Mazzotti et al., 2005): (i) Naturally occurring formations such as: ultramafic rocks (olivine, serpentine and wollastonite) and zeolites, and (ii) wastes comprised of Mg/Ca-rich materials, such as: fly ash, iron and steel slags, ultramafic mine wastes (Li et al, 2018) and other wastes (red mud).

The present bibliographic research is focused on the CO_2 sequestration potential of red mud, a solid residue produced during the alumina extraction from bauxite (Kasmaeeyazdi et al., 2021). Various studies have tested the CO_2 sequestration potential of red mud, among other materials and wastes (Sanna et al 2014), revealing promising results. Furthermore, it has been demonstrated that mechanical activation of red mud can enhance its CO_2 sequestration potential, neutralizing the waste at the same time (Mucsi et al, 202)1. That way, red mud can be reused in other applications, while promoting circular economy.

References

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