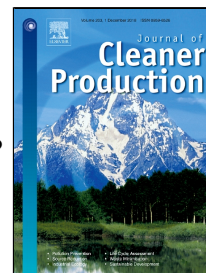


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How do methodological choices affect the carbon footprint of microalgal biodiesel?
A harmonised life cycle assessment



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1 **How do methodological choices affect the carbon footprint of** 2 **microalgal biodiesel? A harmonised life cycle assessment**

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7 **Abstract**

8 The environmental feasibility of microalgal energy systems is often evaluated through the
9 Life Cycle Assessment (LCA) methodology. In particular, biodiesel derived from the
10 transesterification of microalgal oil has been extensively assessed following a life-cycle
11 perspective. When making comparisons between these LCA studies, the consistency of the
12 methodological choices should be a key requirement to guarantee the reliability of the
13 comparative results and interpretations. However, a harmonised LCA framework is not
14 typically found in the scientific literature when addressing comparative studies. In this
15 work, the carbon footprint of microalgal biodiesel is revisited for a sample of 31 LCA case
16 studies in order to allow a reliable comparative study. As a key outcome, a harmonised
17 LCA framework is defined with focus on consistent methodological choices regarding
18 functional unit, system boundaries, multifunctionality approach, and CO₂ balance approach.
19 Furthermore, the application of this novel framework leads to the provision of a library of
20 31 robust carbon footprints of microalgal biodiesel. This harmonisation initiative proves to

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