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Abstract

This study performs an environmental techno-economic assessment (ETEA) for multiple microalgae biorefinery concepts at different locations, those being Belgium and India. The ETEA methodology, which integrates aspects of the TEA and LCA methodologies and provides a clear framework for an integrated assessment model, has been proposed and discussed. The scenario in India has a higher profitability with a NPV of €40 million over a period of 10 years, while the environmental impact in Belgium is lower. The inclusion of a medium recycling step provides the best scenario from both perspectives. The crucial parameters for feasibility are the β-carotene price and content, the upstream environmental impact of electricity and the maximum biomass concentration during cultivation. The identification of these parameters by the ETEA guides future technology developments and shortens the time-to-market for microalgal-based biorefineries.

Keywords: TEA; LCA; process design; *Dunaliella salina*; betacarotene

1. Introduction

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