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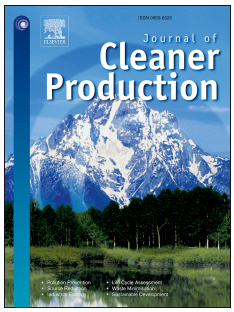

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Levelized Cost of Energy from Private and Social Perspectives: The Case of Improved Alkaline Water Electrolysis

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Abstract

The concept of the levelized cost of energy or respectively hydrogen (LCH) is frequently chosen for techno-economic analyses of energy technologies. However, the results of the LCH very much depend on the assessment perspective, which may be either private (or synonymously business) or social. The paper identifies three points as being basically responsible for differences: (1) tax deductibility of cost components, (2) external environmental costs, and (3) discounting.

The objectives of the paper are to present the levelized cost of hydrogen for improved alkaline water electrolysis (AWE) and to highlight the different results from private and social perspectives. Accordingly, the methodology comprises the different LCH calculation schemes, an energy scenario focusing on electricity, a Life Cycle Assessment for environmental impacts of AWE technology, and the monetary valuation of these impacts.

As a case study, we chose the production of hydrogen from advanced alkaline water electrolysis at three different sites in Europe (Germany, Austria, and Spain). The paper shows that the private and social LCH differ strongly. Inclusion of all cost components and comparatively low discount rates provoke highest LCH from social perspective. The main differences in the case study presented here are due to full accounting for environmental costs – with the global warming potential resulting from electricity generation as the main environmental cost source – and due to electricity price projections. Finally, the paper also discusses the sensitivity of LCHs with respect to parameters such as plant lifetime, monetary values of CO_2, and tax rates.

Keywords