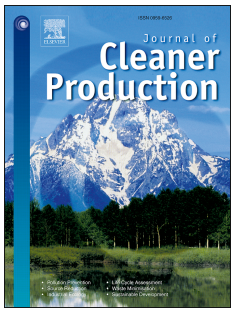
Accepted Manuscript



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PII: S0959-6526(17)31374-4

DOI: 10.1016/j.jclepro.2017.06.205

Reference: JCLP 9955

To appear in: *Journal of Cleaner Production*

Received Date: 6 November 2016

Revised Date: 14 April 2017

Accepted Date: 23 June 2017

Please cite this article as: De Feo G, Ferrara C, A procedure for evaluating the most environmentally sound alternative between two on-site small-scale wastewater treatment systems, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.06.205.

A procedure for evaluating the most environmentally sound alternative between two on-site small-scale wastewater treatment systems

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Abstract

The main aim of this study was to evaluate, in the design phase, the most environmentally sound alternative between two on-site small-scale wastewater treatment systems (designed for 15 inhabitants), namely an activated sludge compact system and a constructed wetland system (both in linear low-density polyethylene), using Life Cycle Assessment. The procedure considered three sensitive parameters with three values. All the 27 combinations were evaluated with three different impact assessment methods (generating 81 comparison cases): IPCC 2007 100 years, Ecological Footprint and ReCiPe 2008 H. The constructed wetland system was the best environmental choice in 93% of the cases. Realizing the two treatment systems in different European countries, the activated sludge system would be the best environmental choice in some cases. Considering the production of electricity with photovoltaic systems, the total impact of the activated sludge system, evaluated with the ReCiPe 2008 H method, would be smaller than that of the constructed wetland system. The variation of the operating lifetime parameter had a major influence on the constructed wetland system, where the greatest consumption of energy and resources occurs during the construction phase. There were significant differences among the results with ReCiPe 2008 H and those with Ecological Footprint and IPCC 2007 100 years. Therefore, in a Life Cycle Assessment study, it would be preferable to adopt several impact assessment methods in order to verify how the results can vary.