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Energy and Emery Analysis to Evaluate Sustainability of Small Wastewater Treatment Plants: Application to a Constructed Wetland and a Sequencing Batch Reactor

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ABSTRACT

The aim of this study is to assess the sustainability of two wastewater treatment systems by energy and emery analyses. The first system is a Sequencing Batch Reactor (SBR) which is a concrete and electricity dependent intensive process. The second is a constructed wetland, usually considered as an extensive process. The two studied facilities have similar treatment capacity and removal efficiencies. This study sheds new light on the comparison of wastewater treatment plants. We defined a new unit, the " Functional Efficiency Index" (or FEI) to describe the energetic efficiency of the facilities, expressed in kJ per year and per kg of removed COD. The energy analysis showed that, after its construction, the constructed wetland system uses only renewable energy, in marked contrast to the SBR, totally dependent on electricity which is considered here as a non renewable. The emery analysis showed no significant differences between the two processes, but energy and emery indices are in favour of the constructed wetland process and thus confirm its sustainability.

KEYWORDS

Constructed Wetland, Emery Analysis, SBR, Energy, Sustainable Development

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