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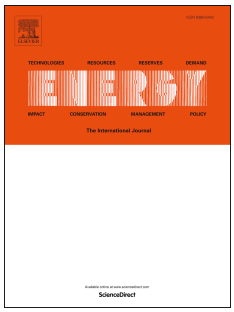

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The environmental effect of substituting energy crops for food waste as feedstock for biogas production

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ABSTRACT

Assuring environmental sustainable bioenergy production is an international priority nowadays. The objective of this study was to identify the environmental consequences of the feedstock selection for biogas. Two real biogas plants were assessed and compared from a life cycle perspective. Plant A performs the co-digestion of energy crops (78%) and animal waste (22%) while Plant B consumes energy crops (4%), food waste (29%) and animal waste (67%). According to the results, electricity production from biogas implied lower impacts in climate change than the existing electric mix. Maize silage (650 Nm^3/TVS_{fed}) and food waste (660 Nm^3/TVS_{fed}) were identified as an interesting source of bioenergy. However, the cultivation of energy crops was identified as the main hotspot in Plant A. The use of organic substrates with lower energy potential and high nutrients concentration such as animal manure (450 Nm^3/TVS_{fed}) produces higher amounts of digestate, producing impacts in acidification and eutrophication categories. Finally, in order to improve the environmental sustainability of bioenergy, specific guideless should be established to achieve harmonised lire cycle studies. In addition, environmental policies should promote the use of waste streams and prevent the use of energy crops as well as including goals related with acidification and eutrophication impacts.

KEYWORDS

Anaerobic biogas potential; biogas; digestate composition; life cycle assessment; organic waste, renewable energy