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Anaerobic co-digestion of municipal food waste and sewage sludge: A comparative life cycle assessment in the context of a waste service provision

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1 ABSTRACT

This study used life cycle assessment to evaluate the environmental impact of anaerobic co-digestion (AcoD) and compared it against the current waste management system in two case study areas. Results indicated AcoD to have less environmental impact for all categories modelled excluding human toxicity, despite the need to collect and pre-treat food waste separately. Uncertainty modelling confirmed that AcoD has a 100% likelihood of a smaller global warming potential, and for acidification, eutrophication and fossil fuel depletion AcoD carried a greater than 85% confidence of inducing a lesser impact than the current waste service.

KEY WORDS: Anaerobic co-digestion, municipal solid waste, life cycle assessment, food waste, biogas

2 INTRODUCTION

Anaerobic digestion (AD) at wastewater treatment plants (WWTP) is a crucial technology that can generate high value resources from a perceived 'waste.' AD is also becoming a crucial technology for solid waste managers handling municipal food waste (FW). Changes in FW management policy are increasingly promoting recycling and energy recovery, creating a demand for AD treatment of FW (J. Edwards et al., 2015). Because of this demand a great number of FW anaerobic digesters have been built over the past decade. A small number of WWTPs have also begun treating FW by simultaneously digesting FW with sewage sludge (SS) known as anaerobic co-digestion (AcoD). AcoD has been shown consistently in these cases to have a synergistic effect; making AD more efficient, boosting biogas

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