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Life cycle assessment to compare the environmental impact of seven contemporary food waste management systems

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Abstract:

Municipal food waste (FW) represents 35 – 45% of household residual waste in Australia, with the nation generating 1.6 Tg annually. It's estimated that 91% of this FW ends up in landfill. This study used life cycle assessment to determine and compare the environmental impact of seven contemporary FW management systems for two real-life jurisdictions; incorporating the complete waste service and expanding the system to include inert and garden waste. Although, no system exhibited a best ranking across all impact categories, FW digestion based systems were all revealed to have a lower global warming potential than composting and landfilling systems. Mechanical biological treatment, anaerobic co-digestion, and home composting all demonstrated the lowest environmental impacts for two or more of the environmental impact categories assessed. The assessment included market and technological specific variables and uncertainties providing a framework for robust decision making at a municipality level.

1 INTRODUCTION:

Australia has a successful history of recycling municipal metal, plastic and paper(OECD, 2017). The progressive implementation of many garden waste collection and diversion programs has also furthered a reputation for high municipal waste recycling rates(Sustainability Victoria, 2015). Yet, municipal food waste (FW) has largely remained untouched by efforts in recycling kerbside waste. FW instead is most commonly disposed of to landfill co-mingled with inert and non-recyclable metals, plastics and other municipal waste. Approximately 91% of the 1.6 Tg of FW generated annually in Australia ends up In landfill, where it is a significant contributor to environmental pollution (Randell et al., 2014). However, many governments have begun focusing on the diversion of FW away from landfill, using more stringent policy measures including landfill levies, source separation incentives and renewable energy incentives, to promote alternative collection and treatment methods. Whilst, many FW management and treatment alternatives are technologically feasible, the