Fact sheet
March 2024

Emissions impacts of composting food waste

Composting food waste avoids landfill emissions and produces soil improving compost. The collection, transport, and processing of food waste into compost reduces emissions by 96% compared to landfilling it.

Introduction

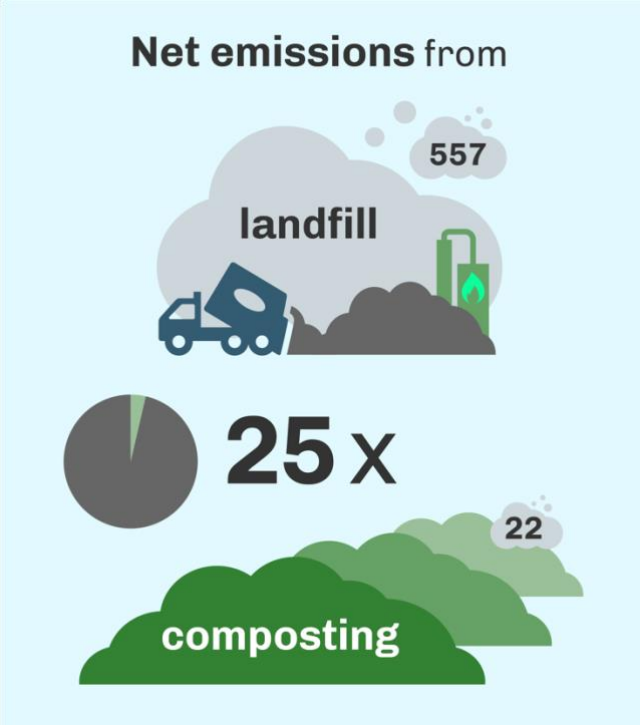
This fact sheet is one of a series analysing the emissions impacts of different processing technologies for food waste in NSW. It draws on modelling of the greenhouse gas (GHG) emissions generated from the collection and transporting of source separated food waste, the commercial composting process, and the carbon sequestration benefits of applying compost to land.

About commercial composting

Commercial composting processes use controlled aerobic ('with oxygen') conditions to convert a mix of 'wet' organics (such as food and garden organics) and 'dry/woody' materials (such as shredded branches and timber) into a soil conditioner rich in humus, stable organic matter, nutrients, and beneficial organics matter. Compost can improve soil health, improve water retention, and reduce the need for other GHG intensive farm inputs such as synthetic fertilisers, mined gypsum and lime. This can reduce net emissions. However, it is difficult to fully quantify these benefits, so they have not been included in the modelling used for this fact sheet. Composting is a relatively lower cost method for managing organics and creates useful products with a range of applications.

A limitation of industrial composting is that facilities need to be well located and managed to avoid off-site odour, and this often means larger facilities need to be located away from sensitive uses. This often results in facilities having to be located a long way from sources of organics waste which adds to travel costs, traffic and emissions, particularly in more densely populated urban areas.

In NSW, major composting businesses use a combination of housed or 'in-vessel' composting, aerated open piles, and turned windrow composting to produce high quality composts. More than two million tonnes of garden, food and other organics are composted in NSW annually[1].



Greenhouse impacts of composting food

Figure 1 compares two composting methods (turned windrows and aerated piles) located 50,100, and 200 kilometres from where the food waste was collected. The modelling assumes a small truck for transport of 50 kilometres and larger truck for greater than 50 kilometres. Emissions from the transport of the compost to a market as distances are likely to be variably minor as an overall contribution.

[1] National Waste Reporting data, 2020

Figure 2 compares the emission profile of food waste disposed to landfill with a high and average gas capture 225 kilometres by train and 200 kilometres by truck respectively, with food waste composted in aerated piles 200 kilometres from source. Landfill emissions are more than 25 times greater than composting, even in the lowest net emissions landfill scenario. This is primarily because food waste breaks down quickly in landfill, generating methane before landfill gas recovery systems are in place.

On-site composting

Some businesses may have capacity to compost food organics on site. Where such composts are well managed, they achieve the benefits associated with avoided landfill emissions and use of compost products without incurring emissions and other impacts of collection and transport. Poorly managed on-site composts may result in higher emissions of methane and nitrous oxide GHG, which can create local amenity problems.

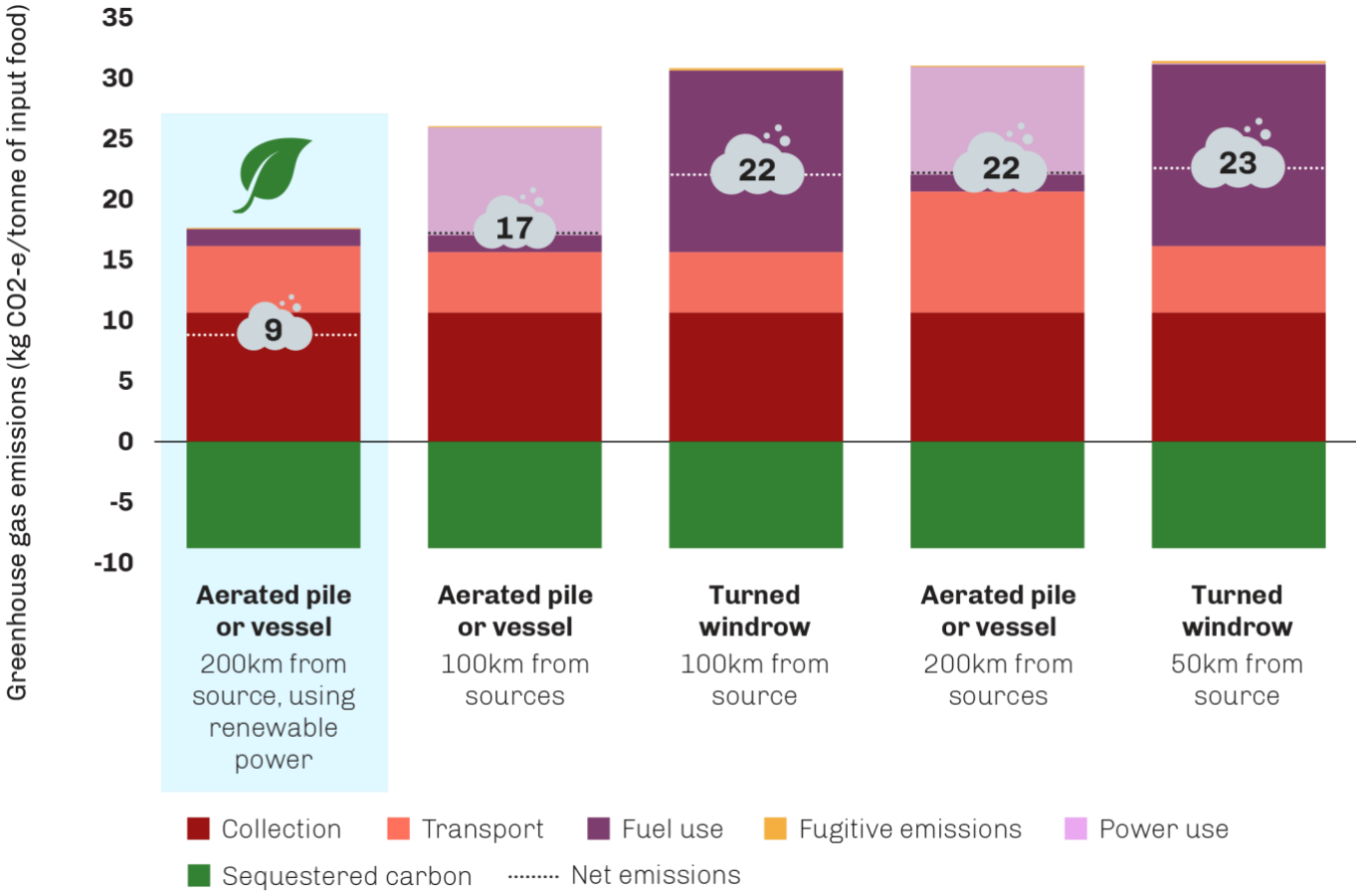


Figure 1 Emissions and offsets for off-site aerobic composting scenarios

All scenarios have net emissions of less than 25 kg CO_2-e per tonne of food recovered. Turned windrow systems have higher emissions due to fuel use. Use of renewable power can reduce net emissions from aerated composting systems.

The modelling in Figure 1 shows turned windrow systems typically use more fuel to turn and move compost piles, whereas aerated systems use power to aerate piles and turn them less frequently, therefore using less fuel per tonne of input.

Composts can also provide GHG abatement benefits associated with the substitution of synthetic fertilisers, which is not included in the figures above because only a small proportion of the compost is currently used to displace synthetic fertilisers. The GHG benefits of substituting synthetic fertiliser are estimated as a reduction of approximately 20kg CO_2-e per wet tonne of food input. In this scenario, the processes in the Figure 1 would be close to, or better than, net zero emissions.

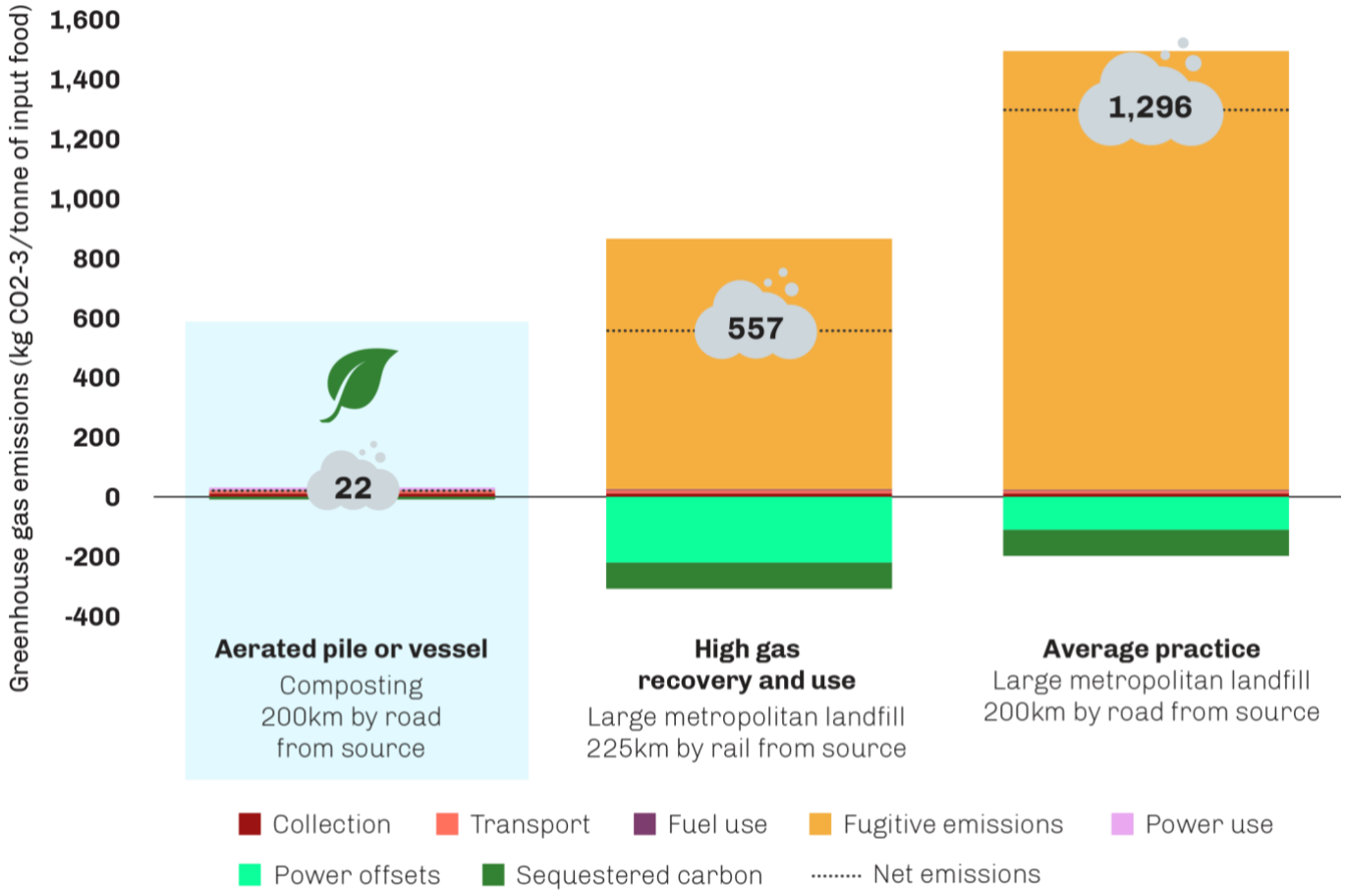


Figure 2 Composting emissions and offsets compared to landfill scenarios

Net emissions from food dispose in high gas recovery landfills are 25 times greater than the net emissions of food waste processed by aerated pile/ in vessel composting systems. This means, processing of food waste into compost reduces emissions by 96% compared to landfilling.

References

Blue Environment, 2023, Organics processing technology assessment.

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