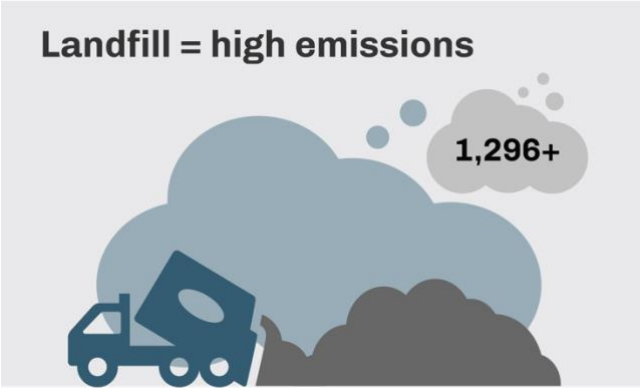
Fact sheet
November 2022

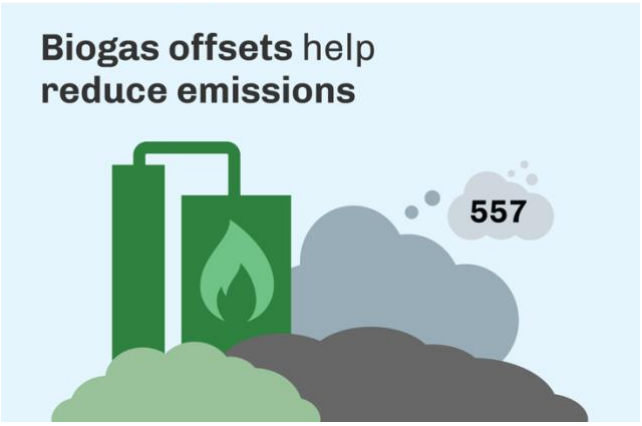
Emissions impacts of landfilling food waste

Landfilling food waste results in significant greenhouse gas emissions. Even landfills with high gas recovery and energy generation cannot capture much of the methane emitted by food. Diverting food from landfill avoids these emissions.

Introduction

This fact sheet is one of a series analysing the emissions impacts of different processing technologies for food waste in NSW. It summarises the impacts of landfilling food waste in NSW and can be used as a baseline to compare the performance of food waste recovery technologies. The food waste recovery technologies considered were composting, anaerobic digestion, dehydration/bio-dehydration, and protein farming using insect larvae.





Greenhouse impacts of landfill

The largest source of potential greenhouse gas (GHG) emissions from food waste management are fugitive emissions of methane from the anaerobic decomposition of organic matter in landfills. Methane has a global warming potential (GWP) equivalent at least 28 times higher than carbon dioxide (CO_2)[1].

Food in landfill provides moisture and nutrients that speed up decomposition of other organics in landfill, including high carbon materials such as paper and timber, which increases the rate of GHG emissions from landfill. National Greenhouse and Energy Reporting (NGER) factors suggest that in landfill, food organics will generate methane with a GWP over a 100-year period of at least 2.1 tonnes CO_2-e per tonne of food.

Although many NSW landfills receiving food waste have gas recovery systems installed, these do not capture all gas and often systems are not installed until 3-5 years after waste is deposited. During that time, most of the emissions from food waste will have already been generated.

This fact sheet compares different scenarios, including collection, transport, and the type of landfill used to manage food contained in 'red lid' general waste bins. Modelling of scenarios has considered the typical fuel use for collection and transport vehicles, the fuel and energy use at landfills to manage wastes, and the extent to which the landfill captures and oxidises methane or recovers energy from the methane to generate electricity. The landfill scenarios are:

- High gas recovery with power generation. This describes a few large landfills including those

[1] GWP is a measurement of the relative strength of various GHGs over a 100 -year period and expressed in terms of carbon dioxide equivalents (CO_2-e). Methane is a strong GHG but does not persist in the atmosphere for more than 10-15 years. This means that over 100 years, methane (CH_4) has a GWP of 28-36 CO_2-e over 100 years, but around 65-85 CO_2-e over a 20–30-year period. The modelling of the warming potential of CH_4 emissions have used the Australian National Greenhouse and Energy Reporting (NGER) emissions factors of 28 CO_2-e.

serving much of the Greater Sydney area. Much of the household waste collected in the Sydney area is transported to landfill by rail. Rail has lower transport emissions per tonne than road.

- Average or expected levels of gas recovery with power generation. This describes most landfills in NSW.
- No gas recovery or oxidisation. This describes worst case landfill gas management and applies to smaller sites. These landfills are often closer to the source of waste than other scenarios.

Modelled outputs

The modelling results in Figure 1 show:

- High net emissions, which are the total emissions less offset.
- Overwhelmingly, the GHG emissions from landfilling food are from uncaptured methane emissions at the landfill.
- Collection (stop/start of collection truck) and transport (fuel used once the collection truck is full) emissions are relatively minor, even if waste is transported over 200km.
- Where landfills recover energy, this can offset some emissions if it replaces fossil fuel power. Benefits will decline as more of the mains grid power is supplied by low emissions sources.
- Some carbon from food will remain 'sequestered' in landfill, but this offset is minor compared to the methane emissions.

Other limitations of landfill include community amenity and truck movements, the generation of polluting leachate, localised odour and pest animal and bird issues.

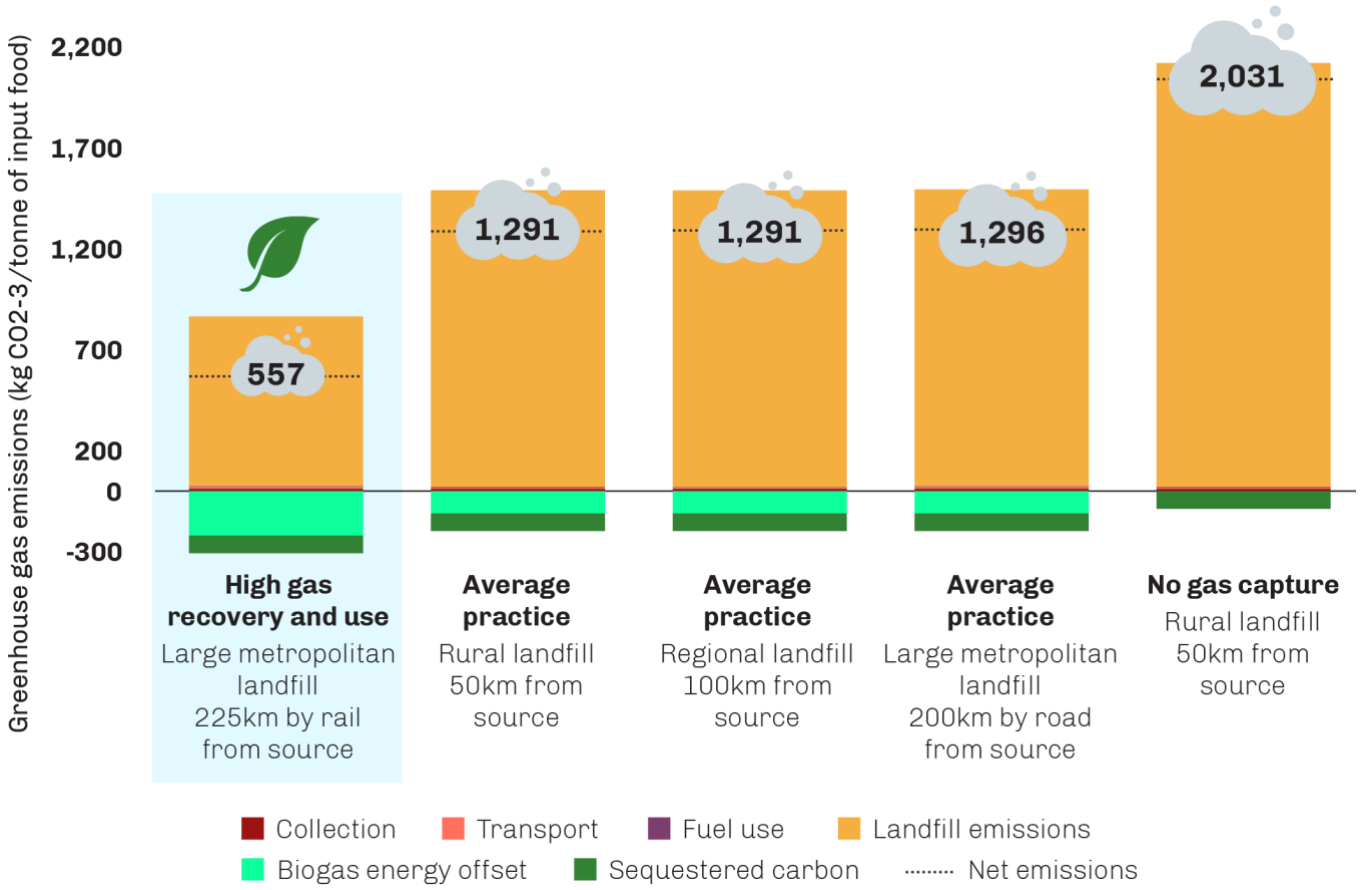


Figure 1 Emissions and offsets for five landfill scenarios

Net emissions are high, even if reduced by offsets such as biogas recovery and carbon sequestration.

References

Blue Environment, 2021, Organics processing technology assessment.

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