Fact sheet
November 2022

Emissions impacts of food waste dehydration

On-site units that dry food organics reduce the volume and weight of materials that need to be collected and transported. This reduces costs and greenhouse gas emissions associated with collection and transport. Unless they are powered by renewable energy, drying technologies can result in significant greenhouse gas emissions due to energy consumption.

Introduction

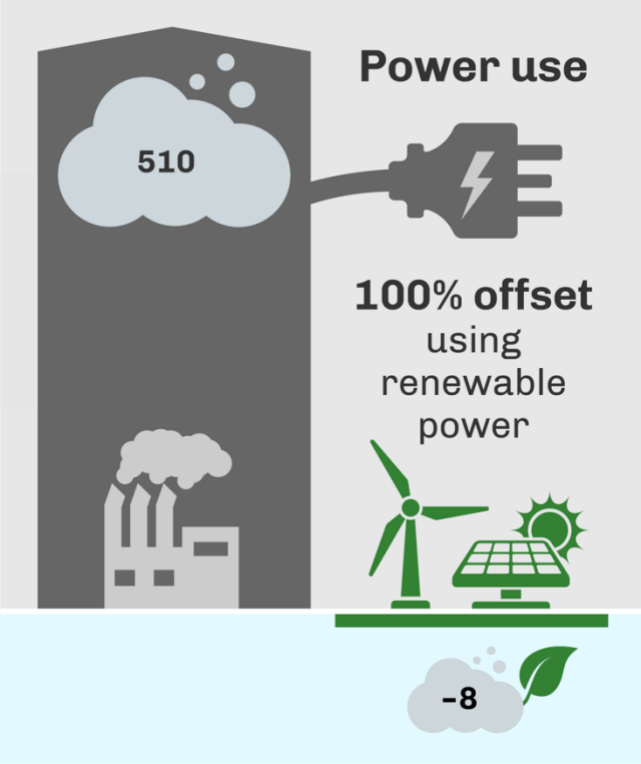
This fact sheet is one of a series analysing the emissions impacts of different processing technologies for food waste in NSW. It draws on modelling of the greenhouse gas (GHG) emissions of energy efficient, average, and high energy consuming dehydration and bio-dehydration units. It models outputs used on site or collected and transported to a windrow composting facility 50 kilometres away for further processing before the outputs are applied to land as a soil conditioner.

About on-site dehydration units

Dehydration and bio-dehydration units use energy or gas to heat vessels that dry organics into a friable form. Bio-dehydration units also require the addition of specialised biological agents (microbes and enzymes) to process organics. Some units turn the material and can take days to process the food waste, whereas others can process a batch of food waste within 12-24 hours. Units should not be overloaded and must be operated in accordance with their design. Underloading units will reduce the energy efficiency and therefore increase GHG impacts per unit of food input.

In addition to the benefits of diverting food organics from landfill, drying units reduce the volume and weight of organics and convert the matter into a material with a lower odour risk that can be stored. This reduces collection and transport costs, traffic, and odour pollution. The size of units varies, but they are generally compact, commonly available for commercial sites, and occupy the same space as a corral of four-to-six 240 litre wheelie bins. Smaller 10-15 litre units are also available.

Exhaust gases need to be treated or managed to avoid odour. Units can also generate liquid condensate that needs to be kept out of stormwater.



A few units have Resource Recovery Order and Exemption for land application in NSW, but in most instances, outputs will need secondary processing such as windrow composting.

Limitations of these systems include:

- Energy consumption.
- The organics outputs need to be managed to minimise environmental and community risks.
- They can have short- and longer-term toxicity impacts on plants but will generally contribute to soil carbon and nutrition.

Greenhouse impacts of drying units

Figure 1 shows the emissions of different dehydration and bio-dehydration systems based on suppliers' specifications. Performance and energy consumption varies greatly depending on the type and scale of units. If a system is not operated at full capacity (i.e., if batches are only partially full), performance is reduced.

If renewable energy is used, net emissions are reduced below zero, with emissions offset by sequestered carbon.

If renewable energy is not used, the systems can have significant GHG emissions. Net emissions can be similar or greater than a high gas recovery landfill.

In columns 1,3 and 7 the system outputs are managed on-site. For all other scenarios, the outputs are composted off-site in open windrows prior to land application. In column 1, renewable energy is used. Collection and transport emissions are relatively minor, even when waste is transported off-site for composting.

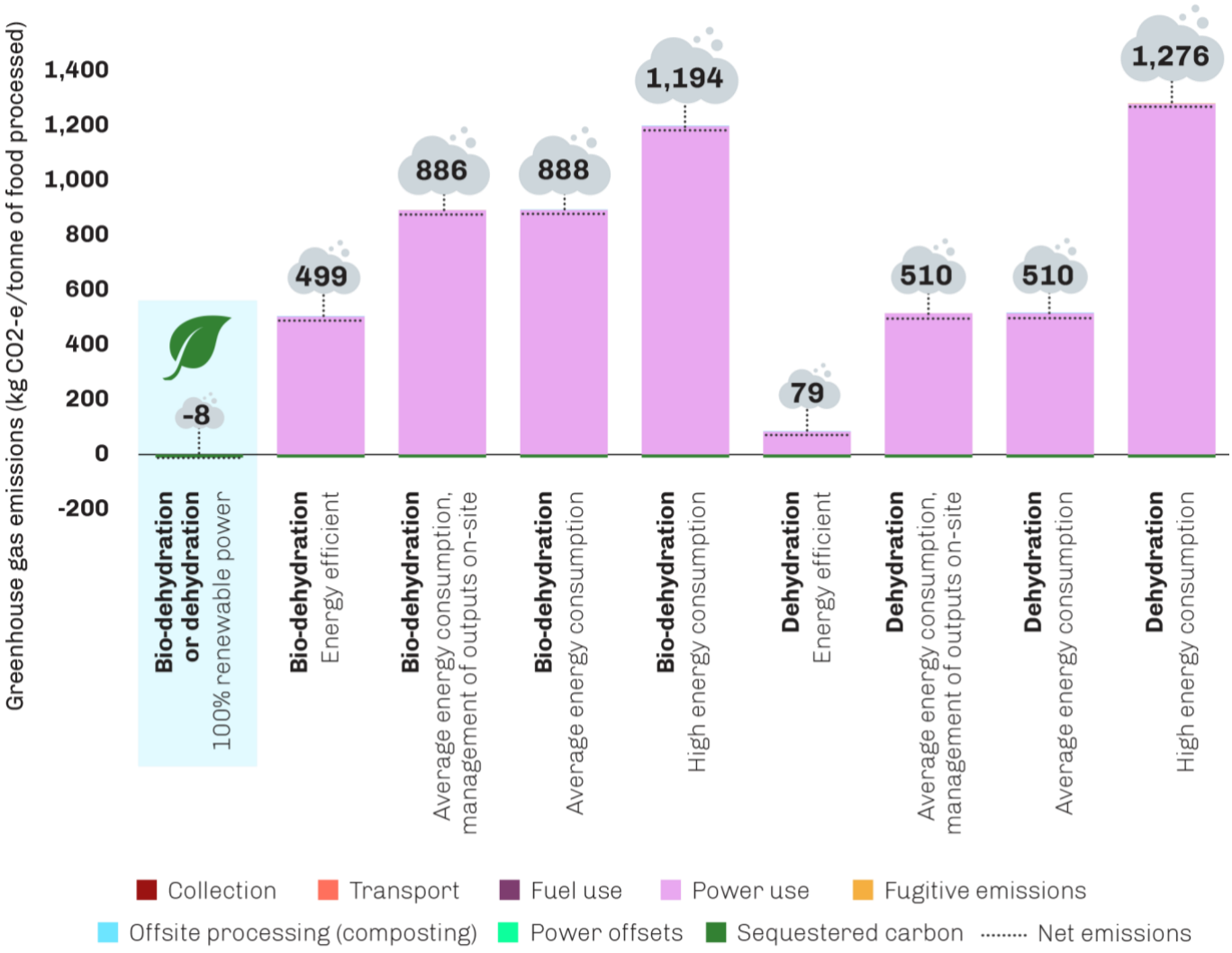


Figure 1 Emissions and offsets for on-site dehydration and bio-dehydration systems

Figure 1 shows significant differences in energy use of the various systems, and that energy use is the main contributor to the GHG emissions for this food waste management process

References

Blue Environment, 2021, Organics processing technology assessment.

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