

Estimated Costs of Managing Plastics Arriving at UK Organics Recycling Facilities and AD Operator Case Study



The UK's commercial composting and anaerobic digestion sectors spend significant sums per annum on removing and paying for other recovery or disposal of plastics and those which are non-compostable represent a considerable proportion of those costs. The Association for Renewable Energy and Clean Technology (REA) has estimated those costs in this document and included an AD operator case study, which includes that operator's total annual cost for removing, further processing, transporting and landfilling packaging and liners which are unsuitable to digest and their associated cost per tonne.

This document provides excerpts from the REA's October 2019 response to Defra & BEIS's call for evidence on standards for bio-based, biodegradable and compostable plastics. Text in square brackets in this document shows additions the REA has since made, for the purpose of publishing this document and to take account of further information published since October 2019.

'Costs of dealing with plastics that arrive at organics recycling facilities

Based on information the REA has gained from members and from surveys of the UK organics recycling industry, the concentration of non-compostable plastics in biodegradable wastes delivered for organic recycling / recovery is, conservatively, 1 % weight for weight [on a fresh matter basis]*.

[Delivered] tonnages to composting facilities totalled 5.92 million tonnes **in the year 2014** and 'waste-fed' AD facilities reported treating 3.84 million tonnes that same year (see <http://www.wrap.org.uk/sites/files/wrap/asori%202015.pdf>). Assuming 80 % of those 9.76 million tonnes of waste contained, on average, 1 % w/w plastic, the UK organics recycling sector incurs an annual cost of **£7.26 million** (excl VAT) for removing approx. **78,080 tonnes of plastic** and sending it for recovery at Energy from Waste facilities. This is a very conservative estimate which does not include all costs incurred by the organics recycling sector for dealing with non-compostable plastics.

Assumptions made in the calculation and exclusions;

- a) extraction of 1 tonne of plastic waste costs approximately £10 / tonne of waste received at the organics treatment facility,
- b) the cost of washing organic waste off the extracted plastic and managing the used wash water is excluded, or alternatively the extracted plastic is not washed and the value of the organic waste that sticks to it is lost at the organics treatment facility, [or the extracted plastic is dried before sending to other treatment/disposal and the cost of drying is excluded] and the extracted plastic waste is sent to Energy from Waste facilities that charge a median gate fee of £83 / tonne excluding VAT {in reality an unknown percentage of the extracted plastic waste goes to landfill (median gate fee of £107 / tonne incl landfill tax) instead of EfW; REA's perception is that the proportion of extracted plastic waste that goes to landfill is lower than the proportion that goes to EfW facilities}.

Excluded from the calculation;

- a) the costs of transporting the extracted plastic waste from the organics treatment facility to the EfW facility, and
- b) the costs of managing plastics at concentrations above 1 % w/w in wastes delivered to those AD facilities that accept at least some of their organic waste - usually separately collected

food waste - bagged in non-compostable plastic (some of them have estimated that plastic is approx. 10 % w/w in waste delivered for treatment).'

We made an assumption that 80 % of those 9.76 million tonnes of waste contained, on average, 1 % w/w plastic on a fresh matter basis; 80 % may have been too high but it seems likely that the 1 % non-compostable plastic is much too low a figure for sources where users of caddies/bins for biodegradable wastes use non-compostable bags/liners.'

[SEPA published in November 2019 a report which includes figures which show that non-compostable plastic bags/liners and non-compostable plastics 'in bag' ranges from an average of 3.4 %, weight for weight on a fresh matter basis, in one local authority area where compostable liners were not provided to householders up to an average of 6.7 % in another local authority area with the same policy, see <https://bbia.org.uk/wp-content/uploads/2019/11/plastic-in-compost-SEPA-report-2019.pdf>, table 2, p14.]

[* One percent, weight for weight, non-compostable plastics may be typical in unpackaged food waste streams in the UK. Operators estimate/report that packaged food and drinks waste streams include significantly higher percentages of non-compostable plastics, other multi-material packaging (that includes non-compostable plastic) and other non-plastic packaging material which is also non-compostable. We have not factored into the calculation the additional percentage of non-compostable plastics above 1 % in packaged food/drinks waste streams as we do not have statistics on the tonnage or proportion that those waste streams respectively amount to or represent. It should also be noted the delivered tonnages to composting facilities include separately collected garden / plant wastes and food and garden wastes; again we do not have data on levels of non-compostable plastics in these particular waste streams and they were also factored into the calculation at 1 % weight for weight on a fresh matter basis.]

The REA supports the following part of the BBIA's response to question 26:

'Given the exclusions quoted [above] it would not be an exaggeration to say that **the organics system managing food/garden waste is bearing a cost of circa £10 million annually from having to handle plastic contamination**. No compensation or even recognition is given to the organic recycling plants for having to handle and dispose of what is effectively the equivalent to 20% of all the plastic packaging sent to recovery in the UK. See figure 3.' [Figure 3 not included in this excerpts document.]

'As food waste collections in particular are destined to grow considerably (two or three times current levels) we could assume that in a future time, if the contamination levels remain unvaried, the cost to food waste treatment facilities of handling plastic contamination could rise to £20 or £30 million annually.'

Anaerobic Digestion Operator Case Study

Operator A [anonymised] manages a wet-AD system which digests food wastes which receives liquid and solid biodegradable wastes suitable for low-solids anaerobic digestion. Food waste deliveries total 23,000 tonnes per annum, approximately 30 % from commercial sources and 70 % from local authority sources; packaging that wraps these food wastes is included in that total tonnage figure.

The majority of packaging from LA source food wastes is compostable caddy liners* and where bin users have used something else it tends to be polyethene bags. Packaging from commercial sources includes cartons, cardboard and polyethylene bags. This operator has not quantified how much of the total packaging is compostable plastic and how much is non-compostable plastic but says the 'bulk' of packaging from municipal sources is compostable caddy liners.

* Under the current EPR system liners are not classified as packaging but when organics recyclers communicate about packaging the product forms/formats they have in mind tend to include bin/caddie liners.

All of the food wastes are depackaged by being fed through a machine which shreds and depackages the waste (max 12 mm particle size, £150,000 per annum operating cost). This machine undertakes two necessary functions; shredding the food waste so that it's pumpable and depackaging. The operator believes it would be fair to attribute a half of these costs to the depackaging element; £75,000 per year.

Screened food waste soup is then sent on to the buffer then digester tanks.

Photo 1. Example of municipal food waste received



Photo 2. Example of commercial food waste received



The larger than 12 mm packaging from the shredder is fed through a drum washer (£20,000 per annum operating cost). Washing removes food waste that had stuck to the packaging. Washings are fed into the buffer tank then digester tanks.

The washed packaging is put through a screw press, with the pressed liquid sent to the buffer tank and digester tanks, and the plastics sent to the rejects bay and on to disposal at landfill. The screw press costs the company circa £15,000 per annum to operate.

The operator estimates that the total 1,689 tonnes of washed and screw pressed packaging is approximately 25 % less than it would be if washing was not carried out, i.e. approx 422 tonnes of food waste is washed off the packaging.

Photo 3. Removed packaging before washing



Photo 4. Removed packaging after washing before being pressed



The 1,689 tonnes of washed and screw pressed packaging is obtained from 23,000 delivered tonnes of bagged/liner-contained food waste, representing 7.3 % of those inputs. This removed, processed packaging is sent to landfill at a cost of circa £130 / tonne including haulage (£120/t excluding haulage), so £219,570 for 1,689 tonnes.

Using the figures above, **this facility's total annual cost** for removing (£75,000), washing and pressing (£35,000), and transporting and paying gate fees for landfill disposal (£219,570) of **unsuitable-to-digest packaging [and liners] is £329,570!** This waste represents just 7.3 % of the 23,000 tonnes of food waste delivered to this facility per annum. **Each tonne of unsuitable-to-digest packaging [and liners] and the organic waste was stuck to it** (1,689 + 422 tonnes = 2111) **costs £156 to remove, wash, press, transport and pay for its disposal.**

Operator A produces whole digestate which is certified by Renewable Energy Assurance Ltd under its Biofertiliser certification scheme. Certified waste-derived digestates are allowed to be supplied to specific end-use markets and stored and used in those markets without being subject to waste regulatory controls.

The operator's comments about compostable bags/liners were as follows: 'The compostable packaging absorbs moisture making it more difficult to separate from the food waste and more weight to dispose of' and it 'does not degrade within the AD process'.

This operator also tried composting the AD facility's shredder-removed packaging material but although the compostable pieces biodegraded, the non-compostable pieces did not and needed to be removed at the compost particle size screening/sieving stage. This operator said '**If 100% compostable packaging was used then this would not be an issue and reduce costs significantly.**'

REA comment: The operator means is that if all the food waste* for anaerobic digestion were to arrive in compostable packaging it could be removed and then composted and that would significantly reduce the costs of dealing with the currently unsuitable-to-digest packaging. This is a subject we intend to discuss with more of our AD operator members.'

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