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The ten year perspective –food waste, packaging and compostables in the UK 2020-2030

Introduction

Why are we circulating this paper now?

As 2020 comes to a close, we look forward to the next 18 months in which the UK governments will decide their policies around waste management and packaging that will influence investments over the next two decades. Their objectives include:

- Creating efficient and consistent waste collection systems for householders and the private and public sectors
- Rolling out food waste collections across England
- Reducing the plastic burden in composted material and digestates spread on land
- Improving control and management of plastics used in agriculture
- Introducing full cost Extended Producer Responsibility (EPR) on packaging and potentially other consumer products
- Introducing a Deposit Return Scheme (DRS) on liquid containers including plastic, glass and metals
- Promoting resource efficiency and especially reducing use of single-use plastics (SUP)
- Designing and delivering the infrastructure to recycle more waste, and compost more food waste
- Reducing exports of plastic waste and reducing incineration
- Reducing greenhouse gas emissions from the sector to help meet net zero 2050¹

All of these target areas are enshrined in the multiple policy papers issued by the Government since 2018. They are connected to strategies around Natural Capital, farming, the bioeconomy, and clean growth. Effective, modernised resource and waste management are therefore at the heart of the UK's future, socially and economically.

The UK waste industry “value” was calculated by Grant Thornton in 2017 to be £9 billion a year, or £134 per capita (£2.57 per person per week) and this includes all industrial, commercial and building wastes². This is about to increase dramatically as EPR systems enter into force, with an estimated additional £1.5 billion being transferred from packaging producers to waste collectors and recyclers.

This BBIA paper is intended to help contribute to ensuring best value from this additional spending by the industry, to meet the objectives laid out above. BBIA members are paying into these systems already and have an interest that their increasing contributions will be recognised and reflected in policies too. We recognise that compostables are not a universal panacea to our environmental

¹ <https://www.letsrecycle.com/news/latest-news/risk-of-substantial-waste-emissions-by-2050-ccc-says/>

² <https://www.grantthornton.co.uk/globalassets/1.-member-firms/united-kingdom/pdf/documents/annual-waste-and-resource-management-review-2018.pdf>.

challenges just as no other packaging material is, but we urge that the advantages of compostable materials in their designed applications are acknowledged and embraced.

Compostables, why bother?

Compostable packaging is a tiny part of UK packaging needs and is likely to remain so. Estimates of market share made by Ricardo in 2019³ show a potential of 138,000 tons of compostables in the UK when market maturity will be reached sometime in the next decade. This compares to 2.5 million tons of conventional plastics and circa 4 million tons of cellulose fibre packaging/paper. A drop in the ocean.

The fundamental error analysts make is this: that the market for compostable materials is so small, we shouldn't be concerned with it. They often fail to see the links beyond mere packaging. We will try to explain those now.

Ask "what is a compostable material?" and the answer is obvious- a material that can be composted. So this makes it totally different to traditional plastic or to paper/board destined to mechanical recycling- it has a route to recovery/recycling that is completely different, through composting or organic recycling, one of the three forms of recovery allowed under the Essential Requirements for Packaging⁴ (mechanical recycling and incineration being the other two).

Many then ask "why should I collect compostable materials to compost them rather than plastics or paper to recycle them?" It is a valid question- let's try to answer it.

Think beyond packaging a moment and ask another question: "what is the biggest waste stream we have to manage?" The answer is biowaste (food and garden waste). There is more garden and food waste in the UK to handle than plastics and paper put together.

Continue this thought thread and ask "what is the biggest contributor to greenhouse gas emissions from the waste we manage?". And the answer will also be biowaste landfilled or incinerated⁵. The UK presently puts seven million tons of food and garden waste into landfills and incinerators, producing methane and CO₂.⁶

How do we intercept and treat that biowaste in the future once there is an obligation post 2023 to separately collect and treat it?

This is where the lines get blurred and we are no longer talking about packaging but about biowaste management and when we do, we get from thinking about recycling plastics to making bioenergy and biofertilisers. Indeed biowaste is the only stream of waste management that produces something completely different to the input- plastics are recycled, often "downcycled" and are burnt for energy; paper becomes paper (or likewise burnt), metals become new metals. But a banana skin entering a digester or composting plant becomes gas and compost or digestate, not a new banana.

Once this is understood, and it is not complicated, then we have to start thinking about how to get the banana skin into treatment most efficiently and cleanly. Moreover, how to get as much biowaste into treatment as possible, to avoid those greenhouse gas emissions from landfills and incinerators?

³ <https://ee.ricardo.com/news/our-new-report-highlights-potential-tenfold-increase-for-uk-compostable-plastic-packaging-market-by-2025>.

⁴ <https://www.gov.uk/government/publications/packaging-essential-requirements-regulations-guidance-notes>

⁵ <https://www.letsrecycle.com/news/latest-news/risk-of-substantial-waste-emissions-by-2050-ccc-says/>

⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918270/UK_Statistics_on_Waste_statistical_notice_March_2020_accessible_FINAL_updated_size_12.pdf.

By efficient we mean:

1. **Simple to use and uniform across the country**, to enable nationwide communications programmes and reduce procurement costs for councils
2. **With the least smell** and fuss for consumers, so citizens comply with the requirement to separately collect.
3. **As much as possible**. This means intercepting in the future as much as 100 kilos per inhabitant annually (2 kilos a week) while working on food waste reduction targets too.
4. **As cleanly as possible**, so it can make biogas and digestate and/or compost. This means with the least contamination possible, avoiding blockages and leaks of contaminants to soil.
5. **With as much financial return as possible for the operators**. In turn, this means least amount of contaminating waste to strip out and send to disposal, and the highest yields of biogas and biofertilisers possible.
6. **With the best quality outputs possible** so we can ensure a marketplace for the compost and digestate produced.

If one accepts these goals, the role of compostable materials becomes an essential ingredient to meeting them. Compostable packaging, bin liners, carrier bags, bags, coffee pods, teabags, labels on fruit/vegetables, fruit and vegetable bags, magazine wraps, catering tableware, can all be materials used to convey food waste to treatment where the *packaging itself can biodegrade* with the contents. This is the use of compostables- to enhance the production of biogas, digestates and composts and reduce contamination in doing so. The Ellen MacArthur Foundation report on food systems highlights this urgent need to get organic carbon back to soil cleanly. Compostables have the role of assisting this⁷.

Compostables are therefore not simply a question of packaging, they are the biolubricant of biowaste collections and treatment.

What about cross contamination?

“We want to recycle plastics, we don’t want compostables in them” is a regular view we hear. And we agree, we do not want cross contamination. But we are getting a huge amount of it. Not compostables into plastics, but plastics into organics. As much as 20% of all inputs to composting and AD is made of non-recyclable packaging, mostly plastics. ***That is cross contamination on a huge scale***, which the organics recycling industry pays for- in terms of extracting it, disposing of it and loss of income for the compost and digestate that is so contaminated by plastics, no-one will buy it or in some cases legally apply it to land. Less than half of all AD⁸ and composting plants⁹ in the UK are PAS 100/110 compliant as a result and their outputs are waste. They are condemned to contaminate soil with plastics in their products because they receive so much plastic, they are overwhelmed. But as the focus is often unclear, policymakers never consider this.

Statistically the chances of compostables cross contaminating plastics are near to zero, since the share of compostables on the market – even at full potential of 138,000 tons – pales into insignificance compared with the 2.5m tons of plastic waste. We have to future-proof the systems to ensure

⁷ <https://medium.com/circulatenews/five-benefits-of-a-circular-economy-for-food-21c3654f4393>

⁸ <https://www.biofertiliser.org.uk/producers>

⁹ <https://www.qualitycompost.org.uk/producers>

materials find their right end of life destination- plastics to plastic recycling and not to organics; compostables to organic recycling and not to plastic recycling.

There is some leeway for tolerance as nothing is ever 100% perfect: tests undertaken in the Netherlands and Italy, financed by their Governments, show tolerance of compostable contamination in plastics of between 3 and 10% depending upon the polymer types.

The UK now, finally, has one plant with the same modern technologies capable of also sorting out compostable films should they inadvertently get into the plastic mix: the new plant opened by Jayplas¹⁰ shows that technologies can resolve sorting and contamination issues. Indeed, compostables should be even easier to sort than plastic laminated to (for example) aluminium.

The risk of contamination of the dry plastics recycling stream by compostables is therefore negligible compared to the risk of plastics contaminating food waste.

But what about AD?

The current AD infrastructure network only processes 20% of what will be necessary from 2023 onwards. So much of the 80% extra capacity will be new. This gives us an opportunity to build a new and ideal system rather than one restricted by existing practices and the risk of stranded assets.

Many ask : “Won’t AD plants just strip compostable films out anyway?” Well, even if they do at least they will not leave plastic fragments in the digestate as currently is happening.

The UK has a large AD infrastructure but a small amount of food waste (and a minimal amount of garden waste) currently goes through AD plants. Six million tons of garden waste is treated by composting in the UK and food waste is also composted in the 42 IVC plants operating across the UK.

The whole UK food waste collection stream amounts to just 1.3 million tons, of which just 400,000 tons comes from England¹¹ . Consider that in Italy (see below) this 1.3 million tons represents the capacity of just two AD/composting plants, one near Milan and one near Venice. This gives you a sense of scale. The UK AD industry currently treating food waste is quite small because volumes available are still low.

The potential growth for household food waste post 2023 is some five times the amount of food waste entering treatment today and therefore we should not fixate on current practices as the growth of the sector gives an opportunity for change as new capital invests in new, modern, larger plants.

Professor Stephen Jenkinson of Manchester Metropolitan University concluded in a study last year that UK AD is neither environmentally nor financially sustainable in its present form.¹² It will not be able to handle the extra millions of tons of waste coming along post 2023, meaning present practices like ‘depackaging’ – where packaging (whether compostable or not) is thrown out of the waste – will have to end.

When food waste collections increase from 1.3 million to 4 or 5 million tons, it will become increasingly difficult both technically and financially to depackaging wet food waste inside bags. The loss of food waste when dragged out with the bags is also a loss of biogas yield. The amount of plastic which will filter through into digestate in increasing quantities will make it even harder to meet PAS110

¹⁰ <https://www.letsrecycle.com/news/latest-news/jayplas-commits-to-uk-with-10m-film-plant/>

¹¹ WRAP Food Surplus and Waste in the UK- key facts January 2020.

¹² <https://resource.co/article/reviewing-biowaste-treatment-uk>

standards, which the EA will tighten in any case due to current plastic pollution from AD. The cost to AD plants of disposal for the residues at £120/ton when sent to incineration will be a crippling financial burden and is already a significant cost for plants accepting food and drinks wastes.

By contrast, composting has no such issues. If compostable packaging brings food waste to composting, the packaging biodegrades with the contents. Most compostable packaging can also be treated in AD plants as happens routinely across the EU, provided present practices are changed and more modern plants operate. There are examples of UK plants now handling compostable packaging with food waste and recovering that material.¹³ Therefore we can envision a situation in which food waste enters AD plants just like it does for composting, and the packaging is digested rather than stripped out or if stripped, sent to IVC afterwards. This requires both clean collections with compostables and in some cases technology at the front end such as pulpers. The SESA plant near Venice treats 550,000 tons food waste a year and pulps the inputs prior to digestion with post AD composting.¹⁴

The use of compostables in food waste collections can also be achieved through intelligent legislation. Italy and France mandate the use of compostable fruit and vegetable bags in shops which can then be reused as bin liners. Italy mandates the use of compostable shoppers, banning plastics, for the very same reason. This not only reduces plastic consumption dramatically, but gives consumers a bin liner to use at zero cost to local authorities. The Co-op model in England replicates this.¹⁵

This would simplify all collection schemes, ensuring compostable packaging is collected and processed safely alongside food and garden waste. It would also dramatically reduce plastic waste sent to incineration as well as plastics polluting soil.

Well, if compostables just biodegrade, where is the circularity ?

While circularity is an important aim for resource use generally, and packaging in particular, circularity in the case of compostables misses the point. Compostables are materials that have a purpose *in their own right* beyond packaging, as a vehicle to convey food waste to treatment cleanly. Food stuck to packaging will be lost unless it is compostable packaging sent to composting/AD. Currently our food waste streams are impossibly contaminated but compostables can play a critical role in helping them decontaminate. Compostable packaging is improving the circularity of the food system more broadly and improving soil health at the same time.

Compostables can sit alongside conventional plastics and increase the recycling rate in some of those most difficult applications (we know there is only 4% film recycling in the UK) - where they perform adequately in the packaging phase of their life cycle, they maintain or even extend the shelf-life of food and where food is attached to the packaging when it's discarded. It is in the circularity of food waste that we emphasise the role of compostable materials.

As the Eunomia¹⁶ study *Relevance of Biodegradable and Compostable Consumer Plastic Products and Packaging in a Circular Economy* finds:

¹³ Keenan Scotland, The Maltings England, Severn Trent England are examples.

¹⁴ <https://www.sesa.it/en/>

¹⁵ <https://www.co-operative.coop/media/news-releases/shoppers-can-bag-compostable-carriers-at-co-op-as-retailer-ditches-single>

¹⁶ <https://www.eunomia.co.uk/reports-tools/relevance-of-biodegradable-and-compostable-consumer-plastic-products-and-packaging-in-a-circular-economy/>.

“...there are indications that compostable bags reduce contamination and increase participation. The following examples of this are from two countries that generally have a low acceptance of compostable plastic and therefore the results may be more instructive.

Research for the City of Copenhagen and a test study for the Danish Environmental Protection Agency comparing compostable and fossil-based plastic bags found that the compostable plastic bags have the following benefits:

- *The food waste collected with a compostable bag is less contaminated with other materials;*
- *the compostable bag is likely to biodegrade over time if it is not properly sorted out and ends up in the digestate/the field;*
- *compostable bags provide a good signal to citizens to sort the food waste correctly; and,*
- *citizens perceive the compostable bag as more environmentally friendly.*

Further we quote Eunomia:

“A recent study was performed by the Witzenhausen Institut in Germany where 13 cities and municipalities were examined for the factors which affect compost quality from household organic waste. One of the main conclusions was that:

“The widespread fear that the admission of biodegradable bags leads to an increase in impurities could not be verified during the analyses. On the contrary, the admission of biodegradable bags resulted in fewer impurities in biowaste.” (translated from German)
The difference between municipalities that discourage or ban compostable bags and those that recommend them is around a 30% decrease in impurities for the later.

These two examples come from “countries that traditionally have a low acceptance of compostable plastics.” Let’s now look at an example from a country with high acceptance rates.

But has compostable packaging been routinely combined with food waste before? Why should we think this is the right approach?

Last July the Bio Industries Consortium (an EU funded body) and Zero Waste Europe¹⁷ presented data on the potential for food waste collections across the EU. It shows that currently only 16% of food waste – about 9.5 million tons- is separately collected across the EU, Norway and the UK. But a remarkable piece of data from the report shows that *two thirds (6 million ton¹⁸) of all that food waste collected in the EU is separately collected in just one country: Italy.*

The Italian experience is therefore unique and it serves as an experience we can all learn from because they started separate collections 20 years ago and today intercept over 100 kilos per capita per annum. No other country has yet emulated the performance of the Italian biowaste industry either in terms of quality or volume. They still have some way to go in southern Italy, but in the central northern regions, food waste collections are instilled as the central part of the waste and resource industry, producing biogas and compost. Over 40% of all material recycled in Italy is biowaste.

¹⁷ <https://biconsortium.eu/sites/biconsortium.eu/files/documents/BIC-ZWE%20report%20-%20Bio-waste%20generation%20in%20the%20EU%20-%20current%20capture%20and%20future%20potential.pdf>

¹⁸ This is the data for 2020, the data shown in the report refers to 2017 and states a lower figure of 4.7 million tons.

According to data from their composting association,¹⁹ the 1.3 million tons of compost²⁰ produced is all sold on the agricultural and gardening markets. Prices are as high as €100/ton.

What has this to do with compostable packaging?

As the amounts of food waste entering Italian composting plants (and later AD) grew in the period 2000-2010, so did the amounts of plastics as plastic bags were often used for collections just as in the UK now. Plastic bags attract other plastics and plastic cannot be composted or digested: it is a pollutant. The extraction of plastic overwhelmed the plants, causing not only high volumes of food waste loss, but also high costs to operators for disposal. Moreover, producing high quality compost with that amount of plastic pollution was impossible. The whole situation became untenable with as much as 20% of material entering plants was a contaminant. As we have seen, this is similar to the situation we have in the UK.

In 2010 the industry successfully campaigned for change, introducing the obligation to collect food and garden waste either “naked” without bags or if bags were to be used, these had to be compostable – bioplastic or paper – so they are compatible with the process.

Today, 10 years later, data from the composting association show that plastic contamination of plastics in biowaste collections has plummeted from an average 10% to just 1.5% across Italy.

Moreover, the composting association there undertakes regular waste characterisation tests at their plants. They have a database now of over 2000 such tests. In 2020 they reported that almost 80% of all the compostable packaging put onto the market in Italy returns to composting.²¹

What this proves is that *compostable packaging has fulfilled its role: it is the vehicle to bring food waste to treatment cleanly. That cannot be done with any other material.* There is no other case around the world that proves the contrary and as Italy has the highest (global) interception rate of food waste, we would be negligent not to learn from this lesson.

How much compostable packaging is sold in Italy?

In 2020 120,000 tons or 2% of all the food waste entering treatment was compostable packaging. This should be our barometer: we need 2% packaging to convey 98% food/garden waste to treatment. The two go hand in hand as the graphs below indicate clearly.

We have seen in Italy a perfect zero waste, circular economy situation- compostable packaging used to collect food/garden waste returned to soil through compost – with plastic waste prevented at the same time. This bioplastic industry has created 3000+ jobs, reduced overall consumption of plastic bags by 34% as well as driving employment and economy in the sector of biogas and compost. This report (referenced) contains a full picture of the industry as it has developed in the last 10 years in Italy.²² All this has been achieved without State contributions or subsidies and where food waste collections are most efficient, with the lowest per capita costs for municipal waste management²³.

¹⁹ <https://www.compost.it/>

²⁰ In order to reduce ammonia emissions and nitrate pollution to soils, Italian plants are not allowed to spread digestate so instead they dewater or compost the effluent from AD with garden waste and produce compost.

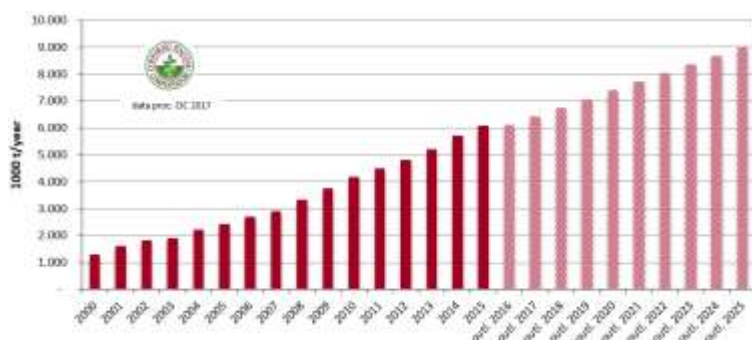
²¹ <https://www.polimerica.it/articolo.asp?id=24090>

²² <http://www.assobioplastiche.org/assets/documenti/news/news2020/arcelli%20-%20La%20filiera%20dei%20polimeri%20compostabili%20-%20Dati%202019.pdf>

²³ <https://docplayer.it/51408308-Contarina-spa-treviso-la-prima-provincia-italiana-per-livelli-di-raccolta-differenziata.html> (Contarina is a publicly owned company serving nearly 600,000 citizens in north east Italy with the highest interception rate for organic waste and the lowest national tariff for waste management).



Evolution of Italian bioplastic production 2012-19



Evolution of biowaste collected Italy from 2000 with estimate through to 2025- source www.compost.it

Is the lesson relevant to the UK?

The UK has the opportunity right now to realise this same potential as we go from small to mainstream food waste collections. The questions policymakers have to answer as food waste collections are rolled out are:

- Do we want to promote the incineration of plastic waste and the food stuck to it, as we are currently doing?
- Will we allow the transfer of financial resources from food waste collection to incineration, as now?
- Will the UK allow the biowaste plants to be overcome by plastic as currently is happening?
- Will the UK allow the biowaste plants to become terminals for what is essentially mixed waste as currently is happening?
- Will the UK permit the production of composts and digestate that contain so much plastics, farmers refuse to accept them as already is happening?

If the UK is to answer 'no' to those questions, we must take the opportunity of ensuring that food waste collections are clean, can be treated, and produce quality outputs that have value for our soils.

As Italy has shown, this requires simple legislation mandating collections with compostable packaging, a little enforcement to ensure councils do this, education to citizens to ensure compliance and an upgraded, reformed AD industry working with composting to handle new volumes and produce valuable products.

This is much the same approach that all materials handled by householders require. We would not ask our householders to put food waste in the plastic recycling bin would we? Similarly, we need to work

to get compliance and understanding to ensure clean food waste collections with high capture rates. Recycling capacities in all sectors are insufficient or technologically obsolete, hence the huge amounts of packaging waste the UK exports. Similarly, biowaste treatment needs its technologies to improve to handle the opportunity of more waste to treat.

In summary, compostable packaging is

1. A biolubricant for biowaste collections and treatment
2. A reduction instrument, reducing plastic waste entering biowaste streams
3. A plastic waste prevention instrument, substituting plastic where it does not fit
4. A zero waste option, ensuring biowaste no longer goes to incineration but back to soil
5. An instrument to drive the circular bioeconomy and protect our soils long term.

We still have a lot of work to do as an industry. We need clarity over marking and labelling, we need to get rid of “fake” biodegradables from the market to give consumers and brands certainty; we should ensure that the EPR systems recognise that contributions coming from producers of packaging materials destined for composting must contribute to the organic recycling system (Italy now has the world’s first such system²⁴); and we need to work with composters and AD to ensure they understand how to identify and treat these materials. As the Italian experience shows, these issues take years to sort out. We have to give ourselves a trajectory, a trajectory of quality.

Conclusion

We started out saying why bother with compostables? We finished talking about how to get biowaste back to soils in a zero waste, circular bioeconomy. Sounds complicated? It is not rocket science. Just as a huge machine needs a few litres of lubricant to stop it seizing, so biowaste needs a biolubricant to ensure it is collected and treated properly. Such an approach requires us to adhere to the principle that whatever goes into food waste treatment must be compatible with both the quality of the process and the quality of outputs. We have a clear choice to make : using compostable materials as a vector for clean food waste collections or prolong the practice of contaminated, poor quality inputs, processes and outputs.

The film *Kiss the Ground*²⁵ and the book *Wilding*²⁶, show the way forward for regenerative practices to improve our soils with compost. Getting organic carbon (compost) back to soil is one of the most important actions the resources and waste sector can undertake to combat climate change, soil erosion and mineralisation, sustain food production and nourish biodiversity.

The United Nations FAO²⁷ and UNFCCC²⁸ both recognise this and urge countries to do more to restore compost to soils. The UK has the Presidency of COP26 and what better way to celebrate that than to put words into action and make soils one of the main focusses?

Compostable packaging may be a small part of the complex packaging and resource puzzle but if we ensure it is used in the right places, where biowaste needs to be collected for treatment, we can both reduce plastic waste and improve soil quality: a double win for our natural environment.

We hope you will work with us to realise these goals.

²⁴ <https://www.convertingmagazine.it/approvato-lo-statuto-biorepack-pronto-a-partire/>

²⁵ <https://kisstheground.com/>

²⁶ <https://www.isabellatree.com/books>

²⁷ <http://www.fao.org/soils-2015/news/news-detail/en/c/280674/>

²⁸ https://unfccc.int/resource/docs/publications/09_resource_guide3.pdf.