
Policy on liners and re-purposed bags suitable for separate collection of targeted food waste streams from households, businesses and non-domestic premises in England

Introduction and document scope

This document sets out the REA's policy on bags and liners suitable for separately collecting particular biodegradable waste types from the particular source types specified in our policy below, in England from 2023 onwards. Its implementation should coincide with the introduction of mandatory separate food waste collections in England and whatever government decides on rules for co-collecting food and plant wastes and corresponding timings.

This policy is supported by a number of trade associations, consultancies, plastics and packaging industry manufacturers, product certifiers and companies in the biowaste management sector: A Plastic Planet, BBIA, Carbon Clarity, Co-op, CIWM, Cromwell Polythene, FPA, Keenan Recycling, Nature 2030, NFU, NNFCC, Paper Round, PlasticsEurope, REAL, & Westaways Sausages (see p 7 - 11 for further info).

Government, regulators and industry are seeking ways to reduce the amount of visible plastics and microplastics that reach soils via waste-derived composts and digestates. Advances are being made in the design of plastics, their functionality in the use phase of their lifecycle and their suitability for targeted end of life waste management scenarios. These include plastics likely to be well suited to anaerobic digestion processes in their EoL phase but they are not yet market ready, available in sufficient quantity and price competitive.

Compostable plastic and paper kitchen caddy and food waste bin liners have a successful track record of biodegradation in industrial / commercial scale composting systems and given the significant waste collection system change that will begin soon in England, we have an important opportunity to change soon to a system of exclusively using liners and using re-purposed bags that the UK's anaerobic digestion (AD) and composting sectors can collectively process.

Our policy's inclusion of industrially compostable **plastic** and **paper** liners / re-purposed bags, allowance of re-purposed paper items as liners or even no liners, re-purposed bags or re-purposed paper items means our policy is proportionate and practicable. Stakeholder support of this policy can and should bring about a near-future cease in the use of non-compostable bags/liners for collecting the wastes covered in our policy.

Our policy facilitates higher quality and higher marketable / usable yields of composts and digestates produced from organic recycling and recovery of specific, separately collected biodegradable wastes (details in Annex I). It will also support lower contamination by non-compostable plastics, avoiding the financial costs of sending front-end removed bags/liners to recovery (e.g. energy from waste) or landfill facilities and the associated negative impacts on the environment. Our policy will also enable the compostable bags/liners to be fed into the digester after suitable pre-treatment or sent and fed into in-vessel composting (IVC) after front-end removal at the AD facility.

This document also includes brief supporting reasons and outlines actions that will need to be taken in support of the policy, along with providing an overview of measures in the food waste

recycling chain that aim to remove the types of plastics that are unsuitable for biodegrading in commercial composting and anaerobic digestion facilities. We have not set out how re-purposing of policy compliant bags could help to reduce the need for and costs of supplying policy compliant liners for householders; this is a topic we would be pleased to discuss with policy makers and stakeholders.

Policy scope

This policy applies to liners and re-purposed bags used for separate collection of non-packaged and user-unpackaged food waste from households, businesses and non-domestic premises in England from new service commencement dates (currently scheduled for 2023/2024) and by transition deadline dates for existing, relevant waste collection services (yet to be decided by government). This policy also applies where such food wastes are co-collected or co-mingled in waste collection vehicles with plant wastes, e.g. from household gardens, other privately owned premises and publicly owned premises.

This policy does NOT apply to food waste discarded in non-compostable packaging nor such waste mixed in the same container with food waste discarded in compostable packaging, as per as per current arrangements at many back-of-food-retail store locations.

Policy criteria

- 1. Non-packaged and user-unpackaged food that is discarded and separately collected - including where co-collected with plant waste - must be presented:**
 - a) in plastic or paper liners or re-purposed bags (inside the caddy/bin) independently certified compliant with BS EN 13432 or BS EN 14995¹;**
 - b) in a user-made caddy/bin lining made of a re-purposed, paper, non-bag / non-liner item, e.g. newspaper; or**
 - c) loose inside the bin (also referred to as naked), as the least preferred but still acceptable option if the bin user or organisation responsible for such bins so chooses.**
- 2. All criterion 1a) plastic liners and re-purposed bags must contain a minimum of 50 %² renewable raw materials.**
- 3. All criterion 1a) liners used and re-purposed bags must be marked as uniformly as possible to enable their rapid identification through the supply chain.**

¹ The liner or re-purposed bag must have a valid certificate of conformance to BS EN 13432 (for packaging recoverable through composting and biodegradation) or BS EN 14995 (for organically recoverable plastics), issued by an independent certification body. Paper bags / liners must have a valid certificate because they often have glued seals and printed on ink(s) which need to be checked for their compostability. BS EN 14995 is comparable to EN 13432, both standards including disintegration and biodegradation pass/fail criteria for industrial scale composting. As an option, these standards include pass/fail criteria for an item's anaerobic biodegradation - based on biogas production - and its disintegration under a combination of anaerobic digestion then aerobic stabilisation test conditions. Item testing and assessment for its conformance to these AD-relevant criteria has tended not to be pursued to date. **N.B.: In this document we use 'industrially compostable' as a short-hand term for independently certified liners and re-purposed bags that comply with our policy.**

² Determined by testing as per the test methods specified in BS EN 16640, 'Bio-based products. Bio-based carbon content. Determination of the bio-based carbon content using the radiocarbon method.' Bio-based carbon is carbon from living organisms, such as plants, which has not been fossilised.

4. **After re-use(s) for their original purpose as fruit and vegetable bags and lightweight carrier bags** - that respectively meet criteria 1a, 2 and 3 where made of **plastic** or criteria 1a and 3 where made of **paper** – **they should be re-purposed as liners for kitchen caddies and bins for food waste.**
5. **Contamination by liners and re-purposed bags that do not meet our policy must not exceed the relevant contaminants limits in the biodegradable waste treatment operator's permit to operate and the contract, and all reasonable steps must be taken to minimise their concentrations at the point of discard and through the waste collection supply chain¹.**

How the policy can work in the anaerobic digestion sector

Industrially compostable **paper** bags/liners are suitable for wet- and dry-anaerobic digestion as well as industrial composting.

Industrially compostable **plastic** bags/liners would be suitable for collecting the relevant waste types and feeding into an AD facility's digester only if:

- 1) it uses front-end treatment steps² that make those bags/liners suitable for pumping through their system (in systems that rely on pumps), and more susceptible to biodegradation conditions in the digestion treatment phase(s); and
- 2) there is no floating layer of industrially compostable plastic bags/liners in the digester³; and
- 3) it uses a post-digestion separation step that separates any residues of those bags/liners into a stackable fibre digestate fraction which is then,
 - a. aerobically matured on-site⁴ or
 - b. sent to a composting facility so that biodegradation of those residues is completed⁵; or

¹ Where they do not already do so, permits to operate will, by 2022 at the latest, require treatment facilities to take all reasonable steps to reduce concentrations of contaminants to As Low As Reasonably Practicable (ALARP). New Standard Rule Permits, to be issued in 2021, and bespoke permits when updated will also include limits on contaminants in biodegradable wastes delivered for composting or anaerobic digestion. Non-compostable plastics in wastes delivered and wastes prepared for the biological treatment phase(s) will continue to count as contaminant.

² Machinery that shreds or otherwise tears open the bags/liners, reduces bag/liner piece sizes and includes an autoclave step - which subjects the waste to high temperatures and high pressures – or an equivalent step which makes the bags/liners more susceptible to biodegrade under anaerobic conditions. An autoclave is used at one wet-AD facility in England and also serves as the pasteurisation step for ABP regulation and PAS 110 compliance purposes.

³ This is not expected because compostable plastics tend to be hydrophilic (absorb water) whereas non-compostable plastics tend to be hydrophobic (do not absorb water).

⁴ In this phase digestate solids and any 'industrially compostable' item pieces or residues would further biodegrade under aerobic, composting-like conditions, as is allowed in PAS 110.

⁵ New Standard Rule permits which will come into effect this year will enable dewatered digestate solids to be fed into non-IVC composting processes, which will enlarge the network of facilities that could compost such digestates if they include any incompletely digested industrially compostable plastic bag / liner residues.

- 4) as an alternative to 1), 2) and 3) it has done a trial that has demonstrated that industrially compostable plastic bags/liners were successfully managed and biodegraded by the end of the facility's last phase of biological treatment, and
- 5) contamination by bags / liners that do not meet our policy does not exceed relevant contaminants limits in the AD operator's permit to operate and contract.

AD operator collaboration with composting operators:

Where AD operators and their waste collection clients choose policy compliant **plastic** bags/liners we envisage the majority of them would, at least in the short term, remove all bags / liners during waste pre-treatment then, provided contamination by off-spec bags/liners is low enough, send them for biodegradation in in-vessel composting facilities, i.e. those with approval to treat animal by-products.

REA's analysis of UK facilities with approvals for treating animal by-products - specifically those likely to have approvals that mean they treat inputs that include separately collected food wastes - is that in November 2020 there were approximately 96 such AD facilities and 42 such IVC facilities. Facilities could, where necessary, work collaboratively to biodegrade liners (and re-purposed bags) that comply with our policy.

Actions in support of our policy

We believe the following actions are important in support of our policy:

1. **Further talks with policy makers and stakeholders:** Following talks with policy influencers and Defra, the latter's consultation on Consistency in Household and Business Recycling in England proposes that 'the provision of caddy liners in the collection of separately collected food waste should be promoted as good practice and that guidance should be provided on caddy liners, including on caddy liner material types'.

They acknowledge that 'caddy liners help to increase yield and improve cost effectiveness of a separate food waste collection service' and although their modelling of the costs of introducing free caddy liners for householders 'assumes that compostable liners are supplied and not cheaper than polyethylene liners', it also assumes 'the liners are supplied by request to participating households to minimise wastage'. Their consultation document goes on to say that 'differing standards for caddy liners or the use of different materials can cause difficulties separating liners in treatment facilities' and call for 'a joint approach between industry and local authorities to ensure caddy liner material type can be matched to the end-destination' and this 'would help to ensure that material can be processed effectively and minimise contamination of food waste feedstocks'.

We will participate in the work Defra has, in its consultation document, **committed to doing with WRAP, local authorities and the AD sector** to 'promote effective material processing and minimisation of contamination in these feedstocks'. We have committed to doing this as part of a range of actions in WRAP's Organics Strategic Report 2021 (aka Organics Roadmap), which is due to be published soon.

Taking account of Sancroft International Ltd's study (see Annex I, pages 11 - 16 below), **we believe government funding of local authority supply of liners that comply with our policy (no other kind of liner) to householders - at least when they ask their local authority to supply liners - would enable a net efficiency gain in the overall**

management of food wastes, substantial progress in reducing the amount of plastics (above and below 2 mm) **that reach soils via 'food waste'- and 'food + garden waste'- derived digestates and composts, a higher percentage of marketable yield of digestate per AD plant processing food waste, a higher percentage of marketable yield of compost per composting plant processing wastes that include food waste, and lower life cycle impacts.** For example, where the biowaste treatment facility can feed in policy-compliant liners, this enables avoidance of energy and water usage financial costs and 'external resource consumption impact' environmental costs that arise from necessity to front-end remove, wash, press and send non-compostable bags / liners to Energy from Waste facilities or landfill. Similarly, where an AD facility front-end removes policy-compliant bags / liners and sends them to a local IVC facility, at the very minimum washing costs and impacts could be avoided and it may be unnecessary to press them prior to transportation.

2. **Gaining devolved administrations' support of our policy:** We would like to our policy to also apply in Scotland, Wales and Northern Ireland so we plan to discuss it with the devolved administrations, their regulators responsible for protection of the environment and our members in those countries.
3. **Updating relevant parts of our national End of Waste rules (Quality Protocols) for digestates and composts and aligning them with waste management permit requirements:** Current AD Quality Protocol rules applicable to waste-derived digestates that achieve product status include that 'biodegradable plastic packaging that is independently certified to BS EN 13432 or either of the similar standards DIN V 54900 or ASTM D6400 that is used to collect food waste shall be permitted' (in the list of allowed inputs to these processes). We want these and other associated conditions to be updated during the imminent revision of the ADQP and for the provisions to align with those in the Compost Quality Protocol – which allows the feeding in of packaging and plastic wastes that are independently certified compliant with BS EN 13432, BS EN 14995 or ASTM D6400 (in terms of this QP's provisions relevant to industrially compostable items).

We are participating in the EA's Task and Finish Group for revision of the ADQP and CQP and outcomes are likely to include substantial tightening of limits on plastics (of any kind larger than 2 mm in any dimension) in composts and digestates. It is anticipated that limits on plastics in compost/digestate will become the same as or closer to stringent plastics limits in Scotland's national End of Waste positions¹; 0.06 % w/w plastic > 2 mm in 'air-dry' compost of plastics and 8 % of the PAS 110 plastics limit for digestates (set on a % w/w in fresh matter basis).

The ADQP and CQP rules should also become better aligned with new Environment Agency Standard Rule permits to operate composting and AD facilities, revised bespoke permits to operate and this regulator's permit-underpinning guidance 'Appropriate measures for the biological treatment of waste'; the EA's consultation proposed they would 'only allow plastic that is certified to EN 13432 standard'.

¹ <https://www.sepa.org.uk/media/219843/wst-g-050-regulation-of-outputs-from-composting-processes.pdf> and <https://www.sepa.org.uk/media/219842/wst-ps-016-regulation-of-outputs-from-anaerobic-digestion-processes.pdf>

4. **Marking of policy-compliant bags & liners as uniformly as possible:** The REA and its subsidiary Renewable Energy Assurance Ltd – the latter owning and managing a Compostable Materials Certification Scheme - will continue to work with stakeholders to develop the uniform marking referred to in criterion 3 above. A project between Renewable Energy Assurance Ltd and the On-Pack Recycling Label Ltd will aim to develop and drive more uniform labelling of independently certified, industrially compostable plastics and packaging. These and other stakeholders are engaging with University College London Plastic Waste Innovation Hub's current R&D project on 'Compostable plastics: unlocking barriers to systems change' which includes a workstream on how compostables labelling could be optimised for maximum efficacy in driving compostable items into food waste bins after their use, e.g. a 'Recycle with food waste' and an alternative 'Biorecycle with food waste' call to action, for inclusion in item labelling, is likely to be evaluated for its effects on bin user behaviour.
5. **Education and behaviour change resources to support use of policy-compliant bags / liners:** Critical to ensuring that contamination is low enough, **local authorities must have adequate resources for educating householders** about suitable bags and liners to use for containing their food waste and encouraging behaviour change. Public sector organisations and businesses would benefit from information resources, templates and services from training providers for educating and supporting behaviour change amongst their staff and contractors who work on-site. We will communicate further on this topic with Defra, the Environment Agency, WRAP and organisations that represent local authorities.
6. **Reducing contamination to sufficiently low levels:** Contamination by bags / liners that do not meet our policy must not exceed any contaminants limit in the biodegradable waste treatment operator's permit to operate and the contract, and all reasonable steps must be taken to minimise their concentrations. In practice, this will enable the feeding in of policy compliant bags / liners to wet-AD processes with suitable front-end treatment equipment and to dry-AD processes. Such bags/liners are already fed into in-vessel composting process unless contamination by off-spec bags, liners or other non-compostable plastics or packaging exceeds the permit's and/or contract's contaminants limit.
7. **Pursuing policy that enables compostable plastics to become more price competitive:** To date, plastic bags/liners that do not meet our policy are cheaper than those that do and unfortunately if government's Finance Bill remains as currently drafted compostable plastics will be taxed at £200/tonne. HMRC's intention is to tax compostable liners as well as compostable bags, even though the former are not packaging. The REA, BBIA and NFU have called for an amendment to the draft Finance Bill which would exempt independently certified compostable plastic packaging (and liners) from this tax.
8. **Fair competition:** To ensure fair competition, public and private sector tender invitations for new and revised contracts with operators who digest or in-vessel compost the in-scope waste types will need to require their collection only in policy compliant liners/re-purposed bags, where bin users need or choose to use them. Any bidder who offers to manage any type of liner / re-purposed bag or only liners / re-purposed bags that do not comply with our policy (e.g. PE ones) must be scored non-compliant. Tender invitation documents must make these things clear. We will talk to stakeholders about managing this transition.

9. **'Biodegradable in soil' as a potential future criterion:** In the near future our policy could also require that the liners and re-purposed bags are independently certified compliant with a new standard that specifies they are biodegradable in soil. There is no standard which, without adaptation, could be specified in our policy right now. (BS EN 17033 is a standard that specifies the biodegradability in soil of plastic agricultural mulch film, while ISO DIS 22403 - in development - considers the intrinsic biodegradability of plastic materials exposed to marine microorganisms.) We will further discuss the issues with the Environment Agency and involve Defra because it is important that waste-derived composts and digestates that comply with national End of Waste rules can continue to do so if their production process treats policy-compliant liners/re-purposed bags and those composts/digestates continue to meet EoW rules.

10. **Pre-treatment technologies to aid digestion:** we recommend further R&D and evidence gathering from other countries with experience in pre-treatment technologies is carried out, e.g. pulpers and autoclaves that aid the management and digestibility of compostable liners/re-purposed bags. Associated guidance on process management and the business case for pre-treatment technologies should also be provided. Need for financial support for the installation of beneficial pre-treatment technologies should also be considered.

About the biodegradable waste management sector

The UK's biodegradable waste recycling and recovery sector, comprising numerous composting and AD operators, plays a key role in our progressively circular economy. It uses food, garden and other biodegradable wastes from agriculture, food supply chain businesses, hospitality sector businesses, households and other premises to make composts and digestates that contain vital nutrients and organic matter and, in the case of AD, production also of renewable energy.

In England in 2018, AD facilities approved for treating food / food-included wastes digested 2.66 MT separated solid food waste and 174 KT co-collected food and green waste in 2018, while composting facilities approved for treating food / food-included wastes composted 127 KT separated solid food waste and 1.2 MT of co-collected food and green waste. Overall, these operators manage a total of 4.16 MT wastes that wholly consist of or include food waste.

Organisations who support this policy

This policy is supported by the following organisations:

A PLASTIC PLANET

We founded **A Plastic Planet** to ignite and inspire the world to turn off the plastic tap. We want to dramatically REDUCE the use of indestructible plastic that is destroying our oceans, our soils, our air and the health of future generations. We have two Plastic Free Certification Marks for different purposes: the Plastic Free Certification Mark identifies products and packaging; and the Industry Commitment Mark is for businesses, demonstrating their intention to reduce plastic across their operations. <https://aplasticplanet.com/> Supporter of this policy on behalf of A Plastic Planet: Sian Sutherland.



The **Bio-based and Biodegradable Industries Association** (BBIA) is the UK trade body for companies producing bio-based and biodegradable products and promotes the circular bioeconomy. Its mission is to unite those working in the biodegradable and bio-based industries and to develop partnerships with those who share our vision: to put the bioeconomy agenda at the centre of the political debate on sustainability and economic growth in the UK. To open up opportunities and standards in the emerging green economy market, BBIA works with companies and organisations involved in the production of bio-based and biodegradable chemicals and polymers for the benefit of the environment.

<https://bbia.org.uk/> Supporter of this policy on behalf of BBIA: David Newman.



Carbon Clarity works to support the circular economy, by providing a systems based approach to address key resource and waste challenges. Drawing on 25 years of experience, we focus on organics recycling and closing the bio-resource loop. <http://www.carbon-clarity.com/> Supporter of this policy on behalf of Carbon Clarity: Dr Jane Gilbert.



The **Co-op** is one of the world's largest consumer co-operatives with interests across food, funerals, insurance and legal services. Owned by over 4 million UK consumers, the Co-op operates 2,600 food stores, over 800 funeral homes and provides products to over 5,100 other stores, including those run by independent co-operative societies and through its wholesale business, Nisa Retail Limited.

Employing over 60,000 people, the Co-op has an annual turnover of £10 billion. As well as having clear financial and operational objectives, the Co-op is a recognised leader for its social goals, environmental and community-led programmes. The Co-op exists to meet members' needs and stand up for the things they believe in.

When Co-op Members buy selected Co-op branded products and services, 2p for every pound spent is shared equally between the Local Community Fund for local causes and a new Community Partnerships Fund, intended to support communities through like-minded national charities and organisations.

In 2021 Co-op announced a new ten-point climate plan which sets out a blueprint for it to achieve net zero for its direct and indirect carbon emissions by 2040. <https://www.coop.co.uk/> Supporter of this policy on behalf of Co-op: Iain Fergusson.



Chartered Institution of Wastes Management (CIWM) is the leading professional body for the resource and waste management sector representing around 5,700 individuals in the UK, Ireland and overseas. CIWM is a non-profit making organisation, dedicated to the promotion of professional competence amongst waste managers and its goal is to improve the management of all resources and wastes. CIWM seeks to raise standards for those working in and with the sector by producing best practice guidance, developing educational and training initiatives, and providing information on key waste-related issues. It uses the body of knowledge represented by its membership to inform and influence policy and regulation on resources and waste management to increase resource efficiency and productivity and promote sustainable development. <https://www.ciwm.co.uk/> Supporter of this policy on behalf of CIWM: Tina Benfield.



Since 1983, **Cromwell Polythene Ltd**, has been working with UK local authorities, waste management industry, and cleaning services sectors, as supplies of waste and recycling sacks, and liner. As well as supporting various trade associations, for example as a CIWM affiliated organisation, and LARAC corporate partners, the managing director is a Chartered Waste Manager and member of CIWM since 1983. <https://www.cromwellpolythene.co.uk/> Supporter of this policy on behalf of Cromwell Polythene Ltd: James Lee.



The **Foodservice Packaging Association** represents the manufacturers, distributors and users of packaging used to serve and prepare food and drink for the UK's hospitality sector. <https://www.foodservicepackaging.org.uk/> Supporter of this policy on behalf of FPA: Martin Kersh.



Keenan Recycling is the largest food waste collection company in the UK with over 16 depots stretching from the top of Scotland to the South Coast of England. The company now collects food waste from every postcode in Wales, Scotland and England on Keenan wheels. As well as collections, Keenan also owns large scale in-vessel and biofuel facilities, supplying AD plants with quality feedstock. <https://www.keenanrecycling.co.uk/> Supporter of this policy on behalf of Keenan Recycling: Grant Keenan.



Nature 2030 is a campaign bringing together some of the foremost thinkers across business, politics and international activism, launched in June, 2019. Nature 2030 aims to bridge the gap between the often disparate fields of commerce and campaigning, building a formidable coalition for global change. The campaign will see some of the UK's most visionary thinkers come together to tackle overpopulation, climate change,

biodiversity loss and plastic pollution. <http://nature2030.org/>
Supporter of this policy on behalf of Nature 2030: John Higginson.



The **NFU** is the most successful representation body for agriculture and horticulture in England and Wales. Its purpose is to champion British agriculture and horticulture, to campaign for a stable and sustainable future for British farmers and to secure the best possible deal for its members. <https://www.nfuonline.com/> Supporter of this policy on behalf of NFU: Phillipa Arnold.



The **NNFCC** is a strategic consultancy with in-depth knowledge of the bioeconomy. We offer clients a wealth of experience in the bioenergy and biofuels markets and the growing biobased products sector. The team has international experience to guide businesses through policy hurdles and assist in the development of technology and international markets. Our objective is simple - to provide clients with a strategic view of feedstock, technology, policy and market development across the bioeconomy, enabling them to make informed business decisions and develop sustainable business strategies. <https://www.nfccc.co.uk/> Supporter of this policy on behalf of NNFCC: Dr Adrian Higson.



Paper Round (part of BPR Group) is the commercial recycling expert dedicated to transforming the future of resource management, today. Our ethical approach means we're reliable, flexible and responsive to everyday needs, while enabling businesses to manage resources sustainably, for a less polluted planet. We bring insight to forward-thinking, environmentally-aware companies of all sizes, challenging one another to constantly evolve and improve. Together, we find new uses for old resources, promoting the circular economy and creating a better future for everyone. <https://www.paper-round.co.uk/> Supporter of this policy on behalf of Paper Round: Tom Mockridge.



PlasticsEurope is a leading pan-European association and represents plastics manufacturers active in the European plastics industry. The plastics industry in Europe is a vibrant sector that helps improve the quality of life by enabling innovation, facilitating resource efficiency and enhancing climate protection. We network with European and national plastics associations and have more than 100 member companies, who are responsible for producing more than 90% of all polymers across the 27 member states of the European Union, plus Norway, Switzerland, Turkey and UK. <https://www.plasticseurope.org/ena> Supporter of this policy on behalf of PlasticsEurope: Adrian Whyte.



The Association for Renewable Energy and Clean Technology (REA) is the UK's largest trade association for renewable energy and clean technologies with around 550 members operating across heat, transport, and power. The REA is a not-for-profit organisation that represents renewable energy and clean technology companies operating in over fourteen sectors, ranging from biogas (anaerobic digestion), renewable fuels and commercial composting (as a clean tech sector) to solar and electric vehicle charging. www.r-e-a.net Supporter of this policy on behalf of REA: Jenny Grant.



Renewable Energy Assurance Limited (REAL) carries out a range of certification and consumer protection activities, all of which promote sustainable energy and resource management. REAL owns and manages the Compost Certification Scheme and Biofertiliser Certification Scheme, which are the UK-wide route for waste-derived composts and digestates to achieve end of waste status. REAL recently launched the Compostable Materials Certification Scheme, which uses a UK-registered certification mark and independent testing to well-established standards to improve recognition and clarity in use of these materials. REAL is a wholly-owned subsidiary of the REA. <https://www.realschemes.org.uk/> Supporter of this policy on behalf of REAL: Justyna Staff.



Westaways Sausages is a family owned sausage producer in Devon, we are aware that not all packaging ends up where it should. We believe that certified compostable, packaging and non-packaging items, such as kitchen caddy and food bin liners, can be part of the solution to the legacy of plastic pollution. <https://www.westawaysausages.com/> Supporter of this policy on behalf of Westaways Sausages: Charles Baughan.

Annex I: Policy drivers

The importance of high quality composts and digestates

We welcome the considerable attention that plastics pollution has gained since the Blue Planet II series raised awareness of the issues in 2018. There is an urgent need to tackle plastic pollution in our soils, rivers and seas. *The biowaste recycling and recovery sector is committed to producing digestates and composts of the highest possible quality.* In order for this quality to be achieved and to comply with regulations for treating food and food-included wastes, they go through some intensive pre-treatment and particle size reduction steps prior to their biological decomposition.

Despite best efforts and technology, some of the plastics may enter the biological phase(s) of the treatment process. Therefore it's important to reduce to As Low as Reasonably Practicable the non-compostable plastics in the wastes fed into their biological treatment phase(s). Later steps remove plastic fragments - of any kind - larger than 2 mm as best as possible (depending on the technology) but the resulting composts and digestates may contain some microplastics. Those

microplastics may have ecotoxic effects and not biodegrade within an acceptable timescale in the soil on which compost or digestate is spread.

When testing samples of composts and digestates, all plastic pieces retained on a sieve with 2 mm apertures are counted as contaminant under rules set in Publicly Available Specification 100¹ for composted materials and Publicly Available Specification 110² for anaerobically digested biowastes and materials, regardless of the plastic's composition or behaviour.

The benefits of supplying liners for kitchen food caddies and outdoor food bins

It is well known that supplying liners for kitchen food waste caddies and kerbside food waste bins increases the amount of food waste that is separately collected, diverting more of it from residual waste bins. Householder surveys carried out as part of WRAP food waste collections trials in 2008 - 2009 suggested that participation would be significantly affected if supplies of free liners were removed and residents were then required to purchase liners from retail outlets. Building on this, more recent WRAP research on barriers to participation found that households without an ongoing or adequate liner supply tended to stop participating with subsequent difficulties in re-recruiting these households onto the scheme later³.

WRAP's summary document⁴ also highlights that 'providing householders with a combination of well-designed internal and external containers plus a supply of caddy liners supported by quality communication materials can help ensure good engagement and good participation and capture rates'.

Findings arising from Defra's first consultation on 'Consistency in Household and Business Recycling Collections in England' (in 2019) included that householders broadly supported the principle of free provision of caddy liners, there was a range of views from respondents (all stakeholder types) and that 'there is evidence that caddy liners can significantly increase uptake in food waste collection services'⁵. Proving an example, Defra says 'without their provision, WRAP estimate around 20 % lower yield per household in year one of implementing a separate food waste collection service, compared to if free caddy liners are provided to participating households, dropping to 50 % of expected yield by year three.' They add that 'caddy liners help to increase yield and improve cost effectiveness of a separate food waste collection service'.

Local authorities' policies on provision of liners and liner type and their influence on plastic contaminants in the food waste stream and food waste recycling operations

Currently, where separately collected food wastes are sent to composting facilities, some local authorities advise householders to use compostable liners but leave them to buy their own, while others supply compostable liners free of charge. Non-compostable plastics are frequently

¹ PAS 100:2018, Specification for composted materials, available via <http://www.qualitycompost.org.uk/standards/pas100>

² PAS 110:2014, Specification for whole digestate, separated liquor and separated fibre derived from the anaerobic digestion of source-segregated biodegradable materials, available via <https://www.wrap.org.uk/content/bsi-pas-110-specification-digestate>

³ https://www.wrap.org.uk/sites/files/wrap/HH_food_waste_collections_guide_section_4_caddies_and_liners.pdf, section 4.2, pages 5 – 6 (currently not downloadable).

⁴ Household food waste collection guide, <https://wrap.org.uk/resources/guide/household-food-waste-collections-guide>

⁵ Consistency in Household and Business Recycling - Consultation Document, May 2021, <https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/>

present in food wastes delivered for composting and the proportions of non-compostable bags/liners used by householders seem to vary according to whether the local authority provides compostable bags/liners free of charge, the level of communication with householders and their engagement with food waste recycling.

The case study on Compostable Bags for Organic Waste Collection, published at https://www.bpf.co.uk/topics/compostable_bags_for_organic_waste_collection.aspx, looks into the role certified compostable bags can play in improving the efficacy and flexibility of local authority organic waste collection schemes.

A SEPA funded study¹ on physical contaminants (with emphasis on plastic contaminants) in domestic and commercial food wastes received at Scottish composting sites found that the results of examining and quantifying the plastics provided 'a strong indication that **provision of compostable caddy liners by local authorities leads to lower plastic contamination (both in terms of the bag itself and the contents of the bag)**'. REA presents analysis of some of the study's Table 2 data in Annex II, finding that where local authorities provided compostable caddy liners, total non-compostable plastics (bags/liners and plastic inside the bags) was 0.224 %, 1.46 times higher than the 0.327 % w/w they represented where other local authorities did not provide compostable caddy liners (figures on a % w/w fresh matter basis).

We suspect that where LAs send separately collect food waste for AD, do not supply liners, do not recommend any particular type of liner or recommend use of polyethylene liners², that the percentage of total non-compostable plastics as a percentage of total food waste in that stream is substantially higher in comparison with food waste collected from LA areas where compostable caddy liner use is recommended but they are not supplied by the LA. We have commented further on this point in Annex II.

The SEPA study's section 4.3 (p 27) includes findings from the Consorzio Italiano Compostatori (CIC)'s continuous monitoring programme for assessing the quality of source-separated biowaste across Italy. 'When household food waste collections take place in conventional polyethylene bags the non-compostable fraction will be around 9 % (on a fresh weight basis)³. Their programme has also found that 'where collections use compostable bags, this fraction can reduce to 1.4 %' on a fresh weight basis.

Appropriate provisions in waste supply and treatment contracts and at-waste-source measures that reduce contamination by non-compostable plastics are important. SEPA's study said that 'feedstock with 5 %, or even 1 %, of contamination requires significant clean-up if the final compost is to achieve either PAS 100 or the new [SEPA] regulatory limits' and '...achieving such reduction levels [at composting facilities] is extremely difficult'. Lastly, in Scotland AD sector compliance with considerably tighter plastics limits than in PAS 110 has been achieved through more finely screening digestates to remove even more plastic > 2 mm in the digestate, with the screened out digested solids being sent to EfW or landfill. If non-packaged and user-unpackaged food waste were to be collected only in bags/liners compliant with our policy (or none) then a higher percentage of the organic matter and nutrients locked into the organic matter in the food

¹ Scottish Environment Protection Agency, Plastic in food waste at compost sites, Project report, November 2019, <https://www.r-e-a.net/resources/sepa-report-on-compost-feedstock-quality/>

² Where separately collected food wastes are sent to AD facilities many local authorities advise householders they should use conventional plastic liners, e.g. polyethylene. Such liners do not biodegrade within a timescale anywhere near acceptable when anaerobically digested or composted or if they end up in soil.

³ CIC Country Report 2017, p 34, <https://www.compost.it/en/publications/>

waste could reach soils, via higher marketable yields of digestates and composts (the latter where the AD operator front-end removes compostable bags/liners and sends them to IVC).

Changes to Environment Agency Permits set to drive down contamination by non-compostable plastics

In their response to their 2020 consultation on revision of standard rules permits for biowaste treatment¹, the Environment Agency said that over the next 5 years:

- a) they will 'require all facilities to implement pre-acceptance and acceptance procedures that demonstrate waste contamination levels are minimised';
- b) they will 'aim for a year on year reduction on incidental plastic contamination on waste received from kerbside collection, starting with non-compostable plastic at 5 % w/w input for Standard Rules Permits;
- c) they will 'require operators to remove all non-compostable and digestate plastic contamination to As Low As Reasonably Practicable prior to treatment';
- d) 'Where an operator wishes to continue to take highly contaminated waste streams they will need a bespoke permit. But they must demonstrate that plastic is removed to As Low As Reasonably Practicable prior to processing. The majority of our food waste plants are already operating under bespoke permits and we will require them to demonstrate they have implemented this requirement.';
- e) 'By 2022 all operators [bespoke and SR permits] taking contaminated feedstock will be required to demonstrate adequate and efficient plastic removal prior to and during processing';
- f) 'All farm operations and green waste only sites should be able to control incidental plastic to a 0.5 % w/w limit with immediate effect [within 3 months of publication of the revised SR permit appropriate to their facility]. They should work with local authorities and reject any contaminated loads as appropriate.'; and
- g) they will set limits for materials spread as 'waste'.

Financial and systems efficiency considerations

We estimate the annual, UK-wide costs of removing – and at some AD facilities also washing and pressing - **plastic bags/liners and packaging wastes², transporting them to EfW or landfill facilities are tens of millions of pounds.** The REA's case study³ of a wet-AD operator receiving food waste from LA and business sources found the company was spending £329 K per year on managing all plastic and packaging types in those waste streams and the food waste adhered to them. **Each tonne of plastic/ packaging and food waste stuck to it cost £156 to manage;** the plastic and packaging fractions undergoing removal, washing, pressing, transportation and incurring landfill gate fees and the adhered food waste fraction undergoing removal, washing and feeding into the digester.

¹ <https://www.gov.uk/government/consultations/environmental-permitting-standard-rules-consultation-no-20/outcome/standard-rules-consultation-no-20-revision-of-standard-rules-permits-for-biowaste-treatment-summary-of-response>

² All types in the food waste streams because sorting compostable ones from non-compostable ones has not been feasible to date and contamination by non-compostable materials is unacceptably high.

³ <https://www.r-e-a.net/resources/estimated-costs-of-managing-plastics-at-uk-organics-recycling-facilities/>

Sancroft International Ltd's study¹ evaluated options and carried out detailed cost analysis of the implications of using different types of food waste caddy liners (referred to in the study as bags) and no liners to understand the most effective option. This study considered;

1. cost comparisons between using polyethylene bags, compostable plastic bags, paper bags or no bags at all,
2. existing cost of extraction and disposal of non-compostable contamination from food waste prior to digestion or composting,
3. potential cost savings through sending separated bags and food waste to composting rather than burning separated plastic,
4. benefits in terms of soil quality and contamination of food systems, and
5. benefits in yields and resource efficiency through encouraging households to segregate waste and reducing contaminated waste streams.

Sancroft's graphics 1 and 2 below respectively show existing and future collections, indicating how resources would flow differently in the two scenarios. They looked at what could vary within government's policy preferred AD stream, assuming that the food waste already sent to IVC with compostable bags would continue to do so and consequently was not of concern in the study. Their principal concern was whether AD plants would face higher costs from moving away from plastics (PE bags/liners) in food waste collections to compostable ones and whether those costs are justifiable in a resource efficient future.

We support what is shown in these graphics, tables 1 and 2 below which are reproduced from Sancroft's study and their conclusion (quoted in the paragraph below). Their costings modelling (summarised by them and quoted in table 2 below) showed that where food waste is collected in PE bags, sent to AD and the bags and adhered food front-end removed and sent to EfW facilities, the overall variable costs of food waste are £25.42 / tonne and 75.53 % of the original tonne of food waste collected is recycled / managed within circular economy. In comparison, if food waste were to be collected in compostable plastic bags, the overall variable costs of food waste would be £2.79 per tonne higher at £28.21 per tonne but 85.70 % of the original tonne of food waste collected and sent to AD would be recycled / managed within circular economy, e.g. if front-end separated at the AD facility then sent to IVC. Table 2 also includes figures associated with using paper bags and no bags for food waste collection.

Sancroft's conclusion is 'the evidence shows that **the most cost-effective option that delivers the biggest benefits for the nation is the use of compostable bags as a liner, as the most effective balance of reasonable costs, minimisation of plastic contaminants in the biodegradable waste stream and maximisation of total food waste collected and processed. Based on that logic, the priority is first compostable bags, then paper bags, then lastly no bags and PE bags, since both have significant downsides whether in plastic contamination or poor yields and high GHG emissions**'.

Our policy above excludes the use of non-compostable bags / liners because it applies the principle that the only acceptable bag / liner types are those which are suitable for biodegrading with non-packaged food wastes, user-unpackaged food wastes and such food wastes co-collected with plant wastes.

¹ See report and annexes for item 'Understanding the cost-benefits of compostable caddy liners in food waste collections' at <https://bbia.org.uk/reports/>

Current prevalence of PE bag / liner use where food waste goes to AD does not help the public and business sectors and the organics recycling industry as a whole to justify and communicate that non-compostable plastics need to be excluded from non-packaged and user-unpackaged food wastes as well as any such food wastes co-collected with plant wastes.

Higher marketable / usable yields of composts and digestates

Higher marketable / usable yields of composts and digestates can be expected from organic recycling and recovery of the waste types covered in the specific, separately collected biodegradable waste types covered by our policy.

A study by the Italian Composting Consortium¹ found that the average 'drag effect' amongst 27 organic waste recycling facilities monitored was 2.75 times (on a w/w basis) the amount of non-compostable fraction in the biowaste. 'Drag effect' is a term used for the biowaste removed from the system with the non-compostable fraction.

Where food waste is sent to AD, a switch from collecting food waste in PE liners / re-purposed bags to compostable ones would particularly reduce the drag effect in any facilities that do not wash food waste off the front-end removed plastics (and packaging) and feed the liquid washings into their digesters.

To comply with plastics limits in End of Waste rules for digestates, some AD operators who treat food wastes received in PE liners/re-purposed bags have had to pass their digestates through finer screened meshes, e.g. when adjusting to tighter plastics limits now applicable in Scotland or a switchover from receiving food waste in compostable liners to PE ones (a liner unit price-driven change pursued by the local authority client).

Changeover to collecting the food wastes in liners and re-purposed bags that meet our policy would enable those AD operators to aerobically mature their separated fibre digestate on-site (where available space and permit conditions permit this) and give any compostable liner / bag residues time to complete their biodegradation on-site. Alternatively the fibre digestate could be supplied to a composting facility for composting, thus giving any compostable liner / bag residues time to complete their biodegradation. Such liner/bag type changeover and digestate management would support higher marketable / usable yields of fibre digestate and compost. It may also help reduce non-compostable plastic contamination in food waste collected and sent for IVC as there would be consistency across England in the acceptable type of liner / re-purposed bag for collecting food waste.

Supporting renewable materials

Our policy's criterion 2 specifies a minimum bio-based carbon content for plastic bags/liners because this supports the bioeconomy, circular economy of biodegradable, renewable resources and reduces our consumption of fossil-derived carbon.

Today, the vast majority of polyethylene (a key type of plastic used in many countries) produced globally is from fossil fuels whose extraction and consumption we must decrease. The Ellen

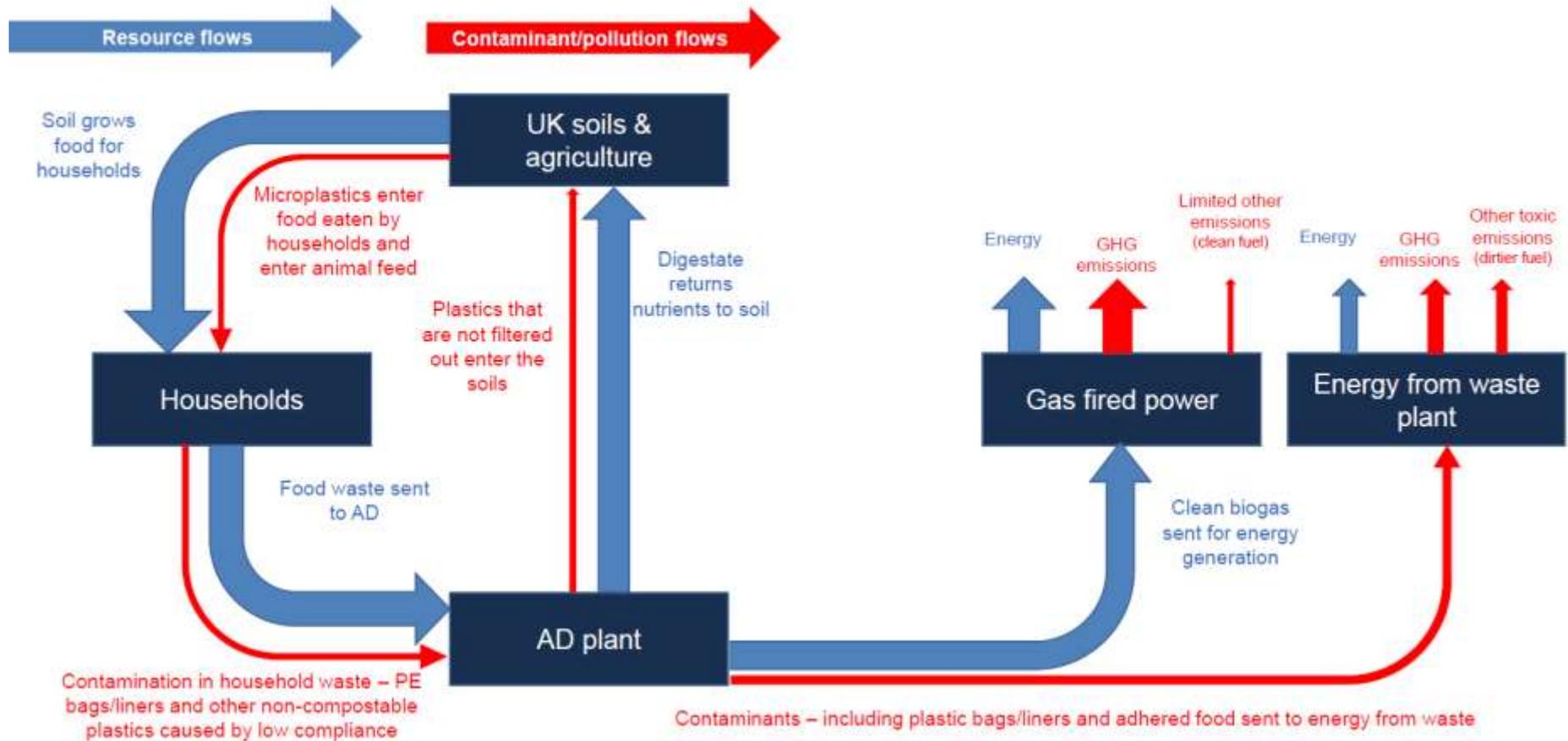
¹ M. Centemero, CIC (Italian Composting Consortium), Webinar 'CIC-Corepla 2019 - 2020 Study - Plastics and bioplastics in the organic recycling chain', 7th July 2020, Optimization of organic waste recycling, Summary of the results of the monitoring programme, p28, see <https://www.r-e-a.net/resources/plastics-and-bioplastics-in-italian-organics-recycling/>.

McArthur Foundation has set the following target: 70 % bio-based content in compostable packaging by 2025.

In order for bio-based carbon materials to be developed there needs to be market alignment with targets that incrementally increase, such as have been set in Italy and France for fruit and vegetable bags; 50 % from 2021, then 60 % from 2023.

Graphic 1

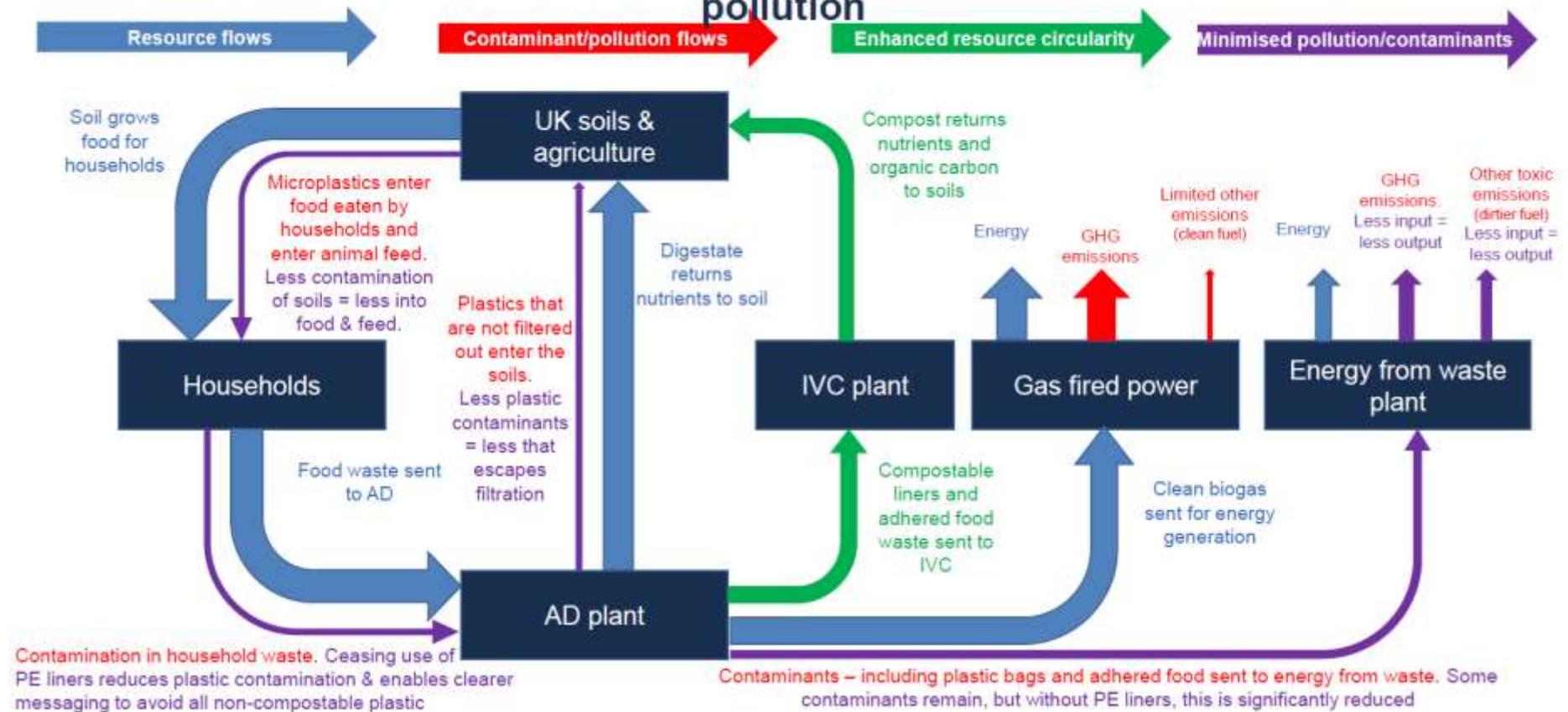
Current model of AD with PE bags/liners and inconsistent guidance



Source: Sancroft International Ltd, December 2020, Understanding the cost-benefits of compostable caddy liners in food waste collections, Annex 2 Flow diagrams for biogas modelling at <https://bbia.org.uk/reports/>.

Graphic 2

AD with compostable bags/liners only – increases circularity and minimises pollution



Source: Sancroft International Ltd, December 2020, Annex 2 Flow diagrams for biobag modelling at <https://bbia.org.uk/reports/>, under web item Understanding the cost-benefits of compostable caddy liners in food waste collections.

Table 1. Evaluated options for collecting domestic food waste using different choices of liners or no liners, for household caddies for food waste

	Low cost for taxpayers: includes liner costs and collection/disposal costs	Encourages collection of high volumes of food waste	Encourages collection of high quality of food waste	Minimises risks for the nation	Minimises GHG emissions	Increases circularity, including returning nutrients and organic carbon to the soils
Polyethylene bags, sent to AD, separated bags/adhered food sent to energy from waste	Variable costs: £25/tonne of food waste (Liner costs plus separation/disposal costs of liners and contaminants)	Simple approach, supports collection	Having plastic in collection makes it challenging to tell households not to include plastic in caddies, studies indicate this increases contamination ¹	Increases amount of plastics into the soil. Weaker messaging and compliance will increase other contamination	Significant amounts of plastics filtered out then sent for incineration	76% recycling of original food waste No composting, only digestate, controls required to limit ammonia emissions and on digestate application to avoid pollution of water courses
Compostable biobags sent to AD, separated bags/adhered food sent to IVC	Variable costs: £28/tonne of food waste (Liner costs plus separation/disposal costs of liners and contaminants)	Simple approach, supports collection	Clear messaging enabled: only food waste and compostable materials in caddies	Fully composts liners, messaging supports avoidance of other plastics	Minimises incineration of waste	86% recycling of original food waste Digestate from food waste and food adhered to bags contributes to compost production
Paper bags, send to AD, bags shredded alongside food waste and digested within AD	Variable costs: £42/tonne of food waste (Liner costs plus separation/disposal costs of liners and contaminants)	Bags degrade much faster making them harder to handle during collection and not preferred by users	Clear messaging enabled: only food waste and compostable materials in caddies	Fully composts liners, messaging supports avoidance of other plastics	Minimises incineration of waste	86% recycling of original food waste (likely lower due to compliance issues mentioned). Digestate from food waste and food adhered to bags contributes to compost production
Naked - no use of bags/liners in household caddies, waste sent to AD	Variable costs: £77/tonne of food waste. (Related to low collection, more food waste to residual stream and inefficient collection)	WRAP estimates this leads to 50% less food waste collection after 3 years, which undermines the purpose of the whole system ²	Clear messaging enabled: only food waste, no packaging, no bags/ liners	No liner to compost, messaging supports avoidance of other plastics	Significant reduction in amount of food captured means high GHG emissions from methane breakdown in landfill/greater risk of toxic emissions from combustion	43% recycling of original food waste - low food waste yields mean more landfill of food, significantly reducing circularity
Compostable biobags sent to IVC	Higher costs for IVC under <i>current</i> incentive structure (£45/tonne gate fee vs £27/tonne for AD)	Simple approach, supports collection	Clear messaging enabled: only food waste and compostable materials	Fully composts liners, messaging supports avoidance of other plastics	Minimises incineration of waste	Slow release of nutrients and higher quantities of organic carbon to the soils compared with digestate, lower ammonia emissions and nitrate challenges compared with AD

Source: Sancroft International Ltd, December 2020, Evaluating the cost implications for caddy liners in food waste, table on page 2, <https://bbia.org.uk/reports/>, under web item Understanding the cost-benefits of compostable caddy liners in food waste collections.

Table 2. Summary of overall variable costs per tonne of food waste, % of original tonne of food waste recycled or managed in circular economy, other costs harder to quantify and conclusions associated with each option on bag type and the 'no bag' option

	Overall variable costs per tonne of food waste	% of original tonne of food waste that is recycled/circular (vs incineration/landfill)	Other costs that are harder to quantify	Conclusions
PE bags, sent to AD, separated bags/adhered food sent to energy from waste	£25.42	75.53%	Gate fees for energy from waste may be even higher since adhered food waste is wet and inefficient for energy from waste - unless there was an additional dewatering phase before disposal. Contamination under this scenario could be even higher. Using non-compostable plastic bags (e.g. PE) limits the ability to make strong and clear arguments around the need to have no non-compostable plastic contamination in kitchen caddies and food waste bins, since people see there is already plastic in there. As food waste collection scales up and becomes expected of all households, the contamination challenge is expected to grow, so anything that further increases risk of contamination needs to be addressed.	Closest to the current system - appears slightly cheaper, but is significantly less circular, making it harder to meet ambitions and hit recycling targets, reducing the nutrient value of digestate and increasing the gas scrubbing burdens on treatment steps that control emissions to air from Energy from Waste facilities. At the same time, it ignores the cost and risk to soils from plastics contamination.
Compostable biobags sent to AD, separated bags/adhered food sent to IVC	£28.21	85.70%	Greater potential to reduce contamination of plastics and non-compostables, by allowing significantly clearer and simpler messaging on adding no non-compostable plastics to caddies (compared to requiring no non-compostable plastics, but clearly using non-compostable plastics as the liner). Further cost reduction potential from allowing ventilated caddies that better retain biogas potential while reducing weight for transport.	The overall logical choice - based on current technology and standards, costs are almost equivalent to PE bags, while delivering a much more circular solution that supports a healthy bioeconomy where all resources are returned to the soil, avoiding the need for creating carbon-intensive fertilisers and burning valuable nutrients. It also guards against the significant risks of plastic pollution to the soil. In addition, when there is a higher volume of compostable plastics produced, this so far nascent industry will be able to reduce unit costs further by developing economies of scale.
Paper bags, shredded alongside food waste and digested within AD, no IVC or energy from waste	£41.81	85.70%	Additional costs to transport and store, because paper is significantly bulkier and heavier than compostable biobags and PE bags. Faster degradation of paper liners is likely to result in more liners being used and swapping them out more frequently. Increases costs related to cleaning as the bags are more likely to soak through and break. This will also likely reduce the level of participation of households as they are judged messy and dirty, therefore reducing the yields of food waste. Note this would be important to model but given that these bags are generally not considered suitable, there is little use and therefore no available data to model the impact.	Significantly more expensive, while not being a functional choice during collection given the degradability of paper and likely lower yields of food waste.
Naked - no use of liners in household caddies, waste sent to AD	£77.21	42.85%	Additional costs to wash home caddies, containers, trucks etc. at every stage of the journey and increasing health hazards related to exposure to mouldy food for workers in the supply chain.	Significantly more expensive since it undermines the aims of simply and efficiently collecting a large amount of food waste and diverting that from landfill, and efficiently turning it into valuable biogas through anaerobic digestion.

Note we have not taken into account co-mingled collection of garden and food waste because this waste will go to IVC where the use of compostable bags is notably preferable.

Source: Sancroft International Ltd, December 2020, Evaluating the cost implications for caddy liners in food waste, summary table on page 9, <https://bbia.org.uk/reports/>, under web item Understanding the cost-benefits of compostable caddy liners in food waste collections.

Annex II, Further information

Influence of caddy liner type on plastic contamination in domestic food waste samples, Scotland

Table 3 below shows REA's analysis of Table 2 in the SEPA supported study on plastic in food waste at compost sites¹, focussing on the sub-set of figures relevant to plastic contamination on a % w/w in fresh matter basis. (REA has also analysed the report's table 2 contamination figures in % on a dry weight basis and they can be supplied upon request.)

Where local authorities provided compostable caddy liners, total non-compostable plastics (bags/liners and plastic inside the bags) was 0.224 %, 1.46 times higher than the 0.327 % w/w they represented where other local authorities did not provide compostable caddy liners, leaving householders to source their own (figures on a % w/w fresh matter basis).

Where local authorities provided compostable caddy liners, non-compostable plastic bags/liners represented 0.012 %, 26.7 times lower than the 0.320 % w/w they represented where other local authorities did not provide compostable caddy liners (figures on a % w/w fresh matter basis).

Plastic contamination in amongst the food waste inside the bags was 0.012 % where LAs provided compostable caddy liners, nearly 4.6 times higher than the 0.055 % they represented where other LAs did not provide the compostable caddy liners (figures on a % w/w fresh matter basis).

Some of the household food waste from areas where the LAs did not provide compostable bags/liners was in compostable bags/liners, householders being left to source their own ones. It can be seen from photographs in the report that some householders have re-purposed Co-Operative compostable lightweight carrier bags for food waste purposes. We suspect that where LAs send separately collected food waste for AD, do not supply liners, do not recommend any particular type of liner or recommend use of polyethylene liners, that the percentage of total non-compostable plastics as a percentage of total food waste in that stream would be substantially higher in comparison with food waste collected from LA areas where compostable caddy liner use is recommended but they are not supplied by the LA. Non-compostable plastic liner prices per liner tend to be higher than for compostable ones and non-compostable bags re-purposed for food waste caddy/bin lining purposes are also likely to be higher – taking account of current policies - because these types dominate the lightweight carrier bags and fruit and veg bags markets.

¹ Scottish Environment Protection Agency, Plastic in food waste at compost sites, Project report, November 2019, <https://www.r-e-a.net/resources/sepa-report-on-compost-feedstock-quality/>

Table 3. REA's further analysis of SEPA report's table 2 on plastic contamination in domestic food waste samples

Sample number	Compostable caddy liner provision	Subsample weight				% of sub samples containing 'in bag' plastic	Contamination (% on a fresh weight basis)							
		Average subsample weight (g)	Standard deviation above and below average subsample weight (g)	Average plus SD	Average minus SD		By plastic bag/liner, incl compostable bags/liners	By plastic bag/liner, after removing compostable bags/liners	Plastic 'in bag'	Total non-compostable bags/liners & 'in bag' plastic	Non-compostable plastic bag/liner as % of average subsample weight	Plastic 'in bag' as % of average subsample weight	Total non-compostable bags/liners & 'in bag' plastic as % of average subsample weight	
1	Mixed source whole sample	1201	815	2016	386	30	3.5	Not reported on mixed source whole sample basis	0.9	Not reported on mixed source whole sample basis		NC	NC	NC
Group 1: compostable caddie liners provided														
1	Yes	768	558	1326	210	10	3.90	0.000	N/D	0.000	0.000	NC	0.000	
4	Yes	962	431	1393	531	20	3.80	0.000	0.005	0.005	0.000	0.001	0.001	
8	Yes	1047	610	1657	437	15	3.50	0.600	0.500	1.100	0.057	0.048	0.105	
11	Yes	1383	636	2019	747	5	3.40	0.000	0.005	0.005	0.000	0.000	0.000	
12	Yes	873	447	1320	426	7	8.50	0.005	0.005	0.010	0.001	0.001	0.001	
Mean (+/- SD where relevant)		1007	536	1543	470	11	4.62	0.121	0.129	0.224	0.012	0.012	0.022	
Median						10								
Group 2: compostable caddie liners not provided														
1	No	1634	928	2562	706	50	3.40	3.400	N/D	3.400	0.208	NC	0.208	
3	No	987	728	1715	259	20	3.80	3.100	1.200	4.300	0.314	0.122	0.436	
9	No	440	114	554	326	20	6.50	2.700	0.200	2.900	0.614	0.045	0.659	
10	No	685	415	1100	270	10	4.60	1.000	0.650	1.650	0.146	0.095	0.241	
Mean (+/- SD where relevant)		937	546	1483	390	25	4.58	2.550	0.683	3.063	0.320	0.055	0.327	
Median						20								
Notes:														
NC means not calculatable due to relevant data not having been determined.														
Note 3 to SEPA report's Table 2 states 'percentage in parenthesis is whole sample plastic contamination after removing confirmed compostable packaging'. Such packaging means 'compostable bin liners or bags which gave a positive result with the chloroform test' (Solidsense, pers. comm. 2021).														
Figures for mixed source WHOLE sample not included in groupings below and their statistics. Figures corresponding with 'Yes' fraction included in Group 1 and 'No' fraction included in Group 2.														
All figures reported as < 0.1 % have been converted to a mid-point figure of 0.005 % for the purposes of calculating statistics, highlighted as grey shaded cells.														
Sample 9, plastic 'in bag' was reported as < 1.3 % w/w FM and annotated as 'high level of food contamination'; REA used mid-point value of 0.65 in Group 2 corresponding figure.														

Examples of current measures for reducing non-compostable plastics in the household food waste recycling chain

Contractual requirements – contracts between local authorities and waste contractors specify the type of liner food waste is collected in, if any. Contracts also specify the maximum acceptable level of contamination the treatment facility can handle and may include financial penalties for breaching these limits. The REA has produced guidance on maximum contamination levels to set in contracts and this includes maximum figures for total 'contaminant' plastics and within that, the number of items of thin, flexible (non-compostable) plastics (e.g. bags).

Communication - information provided to householders about the type of material that are acceptable in food waste bins and other types of material which should be put in other bins.

Visual inspections of bins – waste collectors can undertake a visual inspection of food waste bins upon collection and divert them away from the food waste stream if contamination levels are too high. This should prompt communication with the householder to ensure they understand how they should sort their waste and why it is so important.



Site acceptance procedures – operators have waste acceptance procedures which include visual inspections of waste when it is delivered to the site, and they will reject loads with unacceptably high plastic contamination.



Operational processes – most AD facilities will have appropriate depackaging equipment to remove plastics. Composting sites also use screening processes to remove contamination.



Compost and digestate quality – Publicly Available Specifications (PAS 100 and PAS 110) set limits on physical contaminants and are adopted by most facility operators. The PASs are recognised by the appropriate regulators and operator compliance is checked by independent certification schemes which provide an audit and certification. SEPA's regulatory positions applicable to compost and digestate products placed on the market in Scotland set tighter limits on plastic contaminants.