Options for Extended Producer Responsibility in Wales

Final Report for the Welsh Government

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Report for Welsh Government

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Executive Summary

Eunomia Research & Consulting Ltd (Eunomia) was commissioned by the Welsh Government to identify options, in line with Extended Producer Responsibility (EPR) principles, to tackle a number of issues associated with key food and drink (F&D) packaging. This work will feed into the development of a wider EPR approach in Wales, in line with the revisions to Article 8(a) of the Waste Framework Directive.[1]

Accordingly, such approaches should seek to achieve full net cost recovery, but dropping to 80% in some circumstances. Such a rebalancing of costs away from citizens/taxpayers towards consumers/producers would be entirely in line with the Welsh Government's programme for Wales, Taking Wales Forward, with its emphasis on a stronger and fairer economy.

In addition, the Welsh Government has sought further understanding of the potential scope for an EPR approach that:

> *reduces the amount of waste and increases reuse, repair, remanufacture and recycling, to the maximum practicable extent*

This is an ambitious objective, recognising a need to drive improvements and innovation in Wales that have real potential, and yet, are far from being fully realised in EPR schemes across the globe.[2] Indeed, in terms of waste prevention, as far as the target food and drink packaging types are concerned, it is far from clear that EPR on its own can deliver this objective (with the exception of stimulating lightweighting). While modulated fees can incentivise design for recyclability, and the incorporation of recycled content, to bring about significant waste prevention, in terms of a reduction in the number of items consumed, other measures are required, such as taxes or charges.

It's worth noting that the Welsh Government is not, in this project, looking to explore comprehensive EPR across *all* packaging types. The study does not therefore consider in detail how EPR for packaging might be reformed in Wales. Instead, the focus is on identifying specific measures that can be applied to particular types of packaging, which can bring about waste prevention, litter prevention, and/or increase recycling, in ways that are consistent with EPR principles.

[1] Council of the European Union (2018) Interinstitutional File: 2015/0275 (COD), Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, available at http://data.consilium.europa.eu/doc/document/ST-6516-2018-INIT/en/pdf

[2] OECD (2016), *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management,* OECD Publishing, Paris, 2016. Accessible at http://www.oecd.org/env/extended-producer-responsibility-9789264256385-en.htm

It's also important to acknowledge the wider context, of ongoing discussions regarding shortcomings in the way in which producer responsibility for packaging is currently discharged in the UK, and the likelihood of, at least, a modification, if not a more wholesale revision, of the system of producer responsibility in the relatively near term. Indeed, any requirement to approximate to the text of the Waste Framework Directive's Article 8a, recognising that the Packaging and Packaging Waste Directive remains a 'Single Market' Directive, would require a fundamental shift in the distribution of costs under the UK's scheme.

In this context, it is important to understand that while there is a jointly agreed approach to the Packaging Regulations across the four countries in the UK, the Welsh Government does have powers to have a separate approach, as long as the minimum requirements of the Packaging Directive are met.[3]

E.1.0 Approach

As a first step, a shortlist of six food and drink packaging types was drawn up in order to focus the research. The shortlist was based on the following criteria:

- Low current rate of recycling (due to either inability to be recycled, or low levels of capture, currently, for recycling, or both);
- Prevalence in the Welsh litter stream;
- Availability of suitable alternatives; and
- Levels of political and public concern.

The scope and definition of the shortlisted packaging types were then refined following input from the Welsh Government's project officers, with the following six F&D packaging types being chosen for further study:

[3] Welsh Ministers have full devolved powers for producer responsibility under the provisions in Sections 93 and 94 of the Environment Act 1995, and through direct implementation of EU producer responsibility legislation through a designation under Section 2.2 of the European Communities Act (ECA). It is the devolved administrations' choice that there are UK schemes. Policy and legislation are developed jointly with the four administrations through choice. Wales has devolved policy responsibility for developing its own legislative approach, should Welsh Government wish to do so. On taxation, the Welsh Government can make proposals for a new environmental tax that then have to be approved by both Houses of Parliament and by the UK Government.

Once the EU CE Package, including amendments to, *inter alia*, the Waste Framework Directive, are in force in EU law, Wales will have the ability under Section 2.2 of the ECA to directly implement them via regulations in Wales. It was the choice of the Welsh Government that the current version of the EU Waste Framework Directive was implemented through joint England and Wales regulations (The Waste (England and Wales) Regulations 2001 (as amended)). Wales could have had separate regulations. It is the same with the Producer Responsibility Directives – through choice Wales agreed to joint UK regulations. If desired, Welsh Government could extricate itself and have its own separate Wales-only regulations.

1) Beverage containers – plastic bottles, cans, glass, laminated pouches and cartons;
2) Single use cups and lids – paper, plastic and polystyrene filled at point of sale (including straws provided with them);
3) Takeaway food packaging – polystyrene, card, foil and plastic filled at point of sale;
4) Single portion sachets and pots – single use packaging for ready-to-consume condiments, mini pots etc.;
5) Black plastic food containers (often used to package meat and ready meals in supermarkets); and
6) Metallised film for crisps and confectionery.

As a second step, a longlist and then a shortlist of policy options was drawn up, based on expert consideration of the relative merits and shortcomings of each option, comprising both desk-based assessment and discussion with key stakeholders. The stakeholder engagement, which encompassed a wide range of relevant parties included packaging producers, retailers, regulators, and civil society representatives, involved one-to-one telephone discussions with individuals, as well as three stakeholder workshops held in Cardiff in November 2017. The input of stakeholders at the workshops was used to refine the final selection of options, and to inform the consideration of impacts.

An assessment was then made, for each of the specific policy options, as relevant, as to following:

- Waste prevention and litter prevention effects;
- Effect on recycling rates;
- The extent to which relevant costs are shifted from citizens/taxpayers to consumers/producers, in line with EPR (and polluter / consumer pays) principles; and
- Any possible negative impacts on specific groups of stakeholders and how these might be minimised, including for example consideration of the way in which specific policy options might be implemented.

The following sections of this Executive Summary are laid out as follows:

- E.2.0 briefly reflects upon the importance of litter in respect of food and drink packaging and the potential for a deposit return scheme (DRS) for beverage container to significantly reduce litter levels; and
    - E.2.1 considers the associated potential for a DRS to also boost beverage container recycling in Wales
- E.3.0 reports on the current situation in respect of waste generation and management for each of the food and drink packaging types in Wales;
- E.4.0 presents key findings; and
- E.5.0 presents key recommendations.

E.2.0 The Importance of Litter

For the food and drink packaging types considered in this study, with the exception of beverage containers, the actual tonnages of waste produced account for a very small proportion of municipal waste in Wales. However, when packaging items are littered, the negative impacts that arise are disproportionately high relative to their weight.

While there is much current public concern about the issue of plastics in the marine environment, it is the 'everyday' litter that Welsh citizens experience, in cities, towns, and the countryside that is arguably the most significant, and immediate of the negative impacts. Indeed, according to Keep Wales Tidy, littering is always in the top three issues highlighted to councillors and officials.

Economists express the unhappiness that people feel about seeing a littered local environment in terms of it being a 'visual disamenity', and use non-market valuation approaches, in line with those recommended in HM Treasury's 'Green Book' to seek to place a monetary value on this disamenity.[4] Such a value effectively calculates how much citizens would be willing to pay for a local environment that is less littered, or indeed entirely without litter.

For Wales, it is calculated that the disamenity of neighbourhood litter is of the order of £440 million per annum. This reflects the size of the 'welfare gain' that would be achieved under a zero litter situation. It can also be used to place a value to Wales of marginal reductions in litter. Given that it is the visibility of litter that drives the disamenity impacts, the level of disamenity is arguably more closely related to the volume of littered items than their weight.

Beverage containers alone are estimated to account for 40% by volume of litter on the ground (and 40% by volume of litter in bins), meaning an associated disamenity impact of £177 million. However, evidence suggests that a deposit return scheme can reduce littering of deposit-bearing beverage containers by 90%. Thus a DRS could be expected to reduce the overall volume of all litter by more than a third. This can also be expected to reduce the likelihood of other non-deposit bearing items being littered, given that the pre-existing state of an area in terms of the extent to which litter is present, has been shown to influence the likelihood that people will themselves litter. A DRS can also be expected to increase recycling rates, as explained in E.2.1.

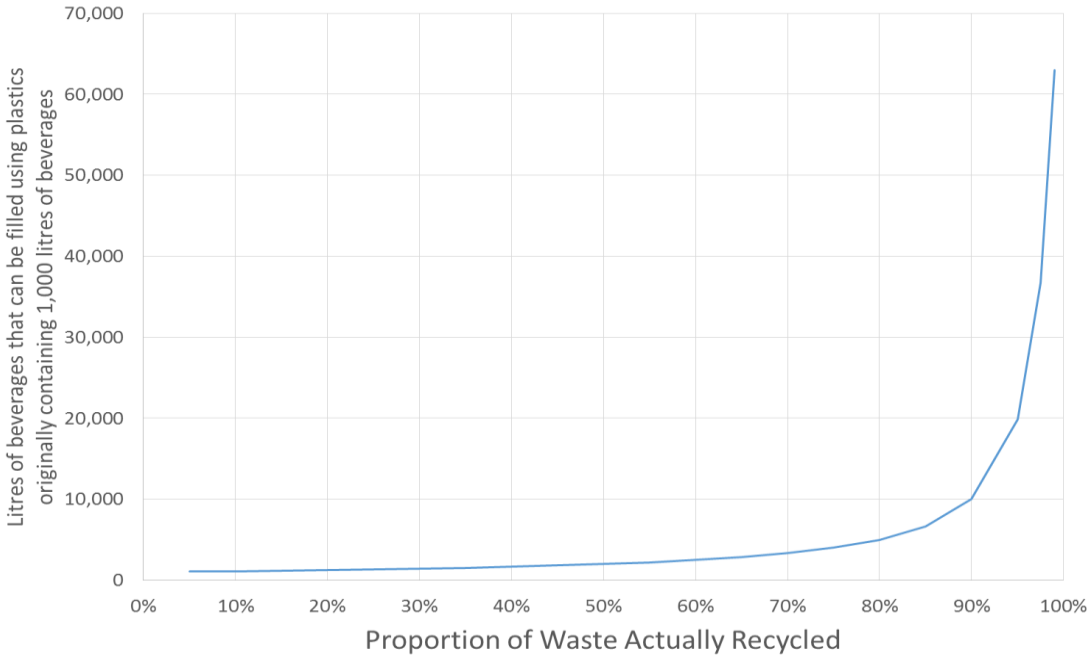
[4] HM Treasury (2018) The Green Book: Central Government Guidance on Appraisal and Evaluation, available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

E.2.1 Potential for Increasing Beverage Container Recycling

While data is poor, it is estimated that the Welsh recycling rates for plastic beverage bottles, glass beverage bottles and aluminium beverage cans are 65%, 77%, 66% respectively.[5] Under a deposit return scheme (DRS) recycling rates in excess of 90% can be achieved. This is important to know, given that Wales intends to consult on an 80% recycling target for local authorities. If Wales is to achieve an overall recycling rate of 80%, some material/item types will have to over-perform in order to compensate for those material/item types for which an 80% target would be extremely difficult.

Recycling beverage containers at such high rates also leads to a dramatic reduction in the requirement for virgin material. This becomes clear when considering the number of times material is 'circulated' in manufacturing before it is eventually discarded. To illustrate this in the case of plastic bottles, we start with plastic material originally used to contain 1,000 litres of beverages. We then show, for different recycling rates, over the course of the material lifetime, the total volume of beverages this material can be used to contain, when recycled into new plastic bottles. This is shown in Figure E- 1.

Figure E- 1: Illustrating Benefits of Higher Beverage Container Recycling Rates in Terms of Reduced Primary Material Requirements



[5] Note that the capture rate for recycling at kerbside will be higher; for example WRAP estimate that 75% of all types of plastic bottles (not just drinks bottles) collected at the kerbside are collected for recycling. The reported percentages include also what is collected as litter (most of which is not recycled) and reflect the actual proportion that end up being recycled, once sorting rejects and losses at reprocessors are accounted for.

At a 50% recycling rate this amounts to only 2,000 litres, i.e. the original capacity is doubled over the material lifetime as a result of recycling.

Higher recycling rates produce a sharp increase in the total capacity of the material over its lifetime. For example, with a 90% recycling rate the same amount of plastic can be used to contain 10,000 litres of beverages over its lifetime. A move between an 80% recycling rate and a 90% recycling rate will halve the requirement for primary materials. The resource efficiency gains achieved are, therefore, considerable at these higher recycling rates, where marginal improvement in recycling rates translates into significant resource savings.

E.3.0 Summary of Current Situation

Below we provide a summary of the current situation in terms of waste arisings and management, along with a few other observations, for the relevant packaging types.

- Beverage containers
  - It is estimated that annual beverage container arisings in the local authority collected waste stream, of circa 105,000 tonnes, account for approximately 6.8% of this stream in Wales.[6]
- Single-use cups and lids
  - While data is poor, it is estimated that 237 million coffee cups and 183 million coffee cup lids are consumed annually in Wales, representing around 2,600 tonnes of coffee cups, and 550 tonnes of lids. It is estimated that only 0.25% are recycled at present. In addition it is estimated that 320 million other takeaway cups (for smoothies, juices, milkshakes etc.) are consumed in Wales each year, giving a total for all takeaway cups of 557 million. This represents circa 0.25% of overall MSW arisings in Wales.
  - While a very small proportion of overall waste, such items are estimated to account for over 6% by weight of litter in Wales. It is further estimated that the volume of cups genuinely littered on the ground each year – not placed in a bin, but genuinely littered and subsequently picked up by local authorities – could fill five and a half Olympic swimming pools.

[6] In the absence of detailed market data it is not possible to identify the tonnage of beverage containers in the commercial waste stream. However, analysis undertaken in Scotland suggests that arisings in the local authority collected waste stream account for approximately 75% of all beverage container waste, with 25% in the commercial waste stream. Applied to Wales, this would indicate overall arisings of used beverage containers of circa 140,000 tonnes per annum. See Eunomia Research & Consulting (2015) A Scottish Deposit Refund Scheme, Final Report to Zero Waste Scotland, available at http://www.eunomia.co.uk/reports-tools/a-scottish-deposit-refund-system/

    - Heightened public awareness of the low levels of recycling for coffee cups in particular has led to initiatives to incentivise the use of reusable options, with some outlets already offering discounts for those who bring a reusable mug – 25p in the case of Starbucks. However, for the consumer, it is a confusing 'landscape', with different retailers offering different incentives, and some offering no incentive. Furthermore, there is no guarantee to consumers that even the incentives offered will endure.
- Takeaway food packaging
    - While data is poor, it is estimated that around 950 tonnes of takeaway food packaging waste are generated in Wales each year, of which we estimate that only 8.5% is recycled.
    - While accounting for less than 0.06% by weight of Welsh municipal waste arisings, takeaway food packaging is a highly visible component of litter. We estimate that takeaway food packaging waste (which includes expanded polystyrene (EPS) containers) accounts for 1.6% of litter by weight on the ground and in litter bins, but accounts for a larger proportion overall by volume.
    - Reusable alternatives, such as tiffins, already exist in some segments of the market, although the uptake to date among both restaurants and consumers is understood to be low.
- Single portion sachets and pots
    - It is estimated that 72 million single serve sachets are placed on the market each year in Wales.
    - This results in around 72 tonnes of waste, of which around 71 tonnes are estimated to be captured directly within the residual waste stream and around 1 tonne is believed to be littered on the ground and then picked up by local authorities. This equates to 0.0025% of Welsh municipal waste arisings.
    - Given an average weight of 1 gram per empty sachet, 1 tonne of littered sachets would equate to 1 million items.
    - Alternatives exist in the form of reusable dispensers or bottles for ketchup, mayonnaise etc.
- Black plastic food containers
    - We estimate that 2,100 tonnes of black plastic food containers are placed on the market in Wales each year. This accounts for 0.007% of MSW arisings.
    - Current near-infrared (NIR) technology is unable to effectively identify the carbon black pigment and sort this material from others in a materials recycling facility (MRF). This means that such black plastic food containers are not recycled, and instead end up in residual treatment or disposal.
    - Accordingly, the existence of black plastics in the waste stream hinders the growth in the Welsh recycling rate.
- Metallised film for crisps and confectionary

- Packaging for crisps, sweets and chocolate is most commonly made from metallised plastic film (usually PET or PP), which is not currently widely recycled, though some private schemes exist.
- Confusion over the recyclability of the material often results in it being misclassified as foil, contributing to contamination issues. In addition, such items are often consumed and improperly disposed of outdoors, where they consistently contribute to the problem of litter
- While data is poor, we estimate that around 500 tonnes of such metallised film is consumed in Wales each year, representing 0.015% of MSW arisings, with around 360 tonnes being captured directly in the residual waste stream, and around 140 tonnes being littered and subsequently picked up by local authorities.

E.4.0 Key Findings

The key findings are as follows:

- Beverage containers
  - The Welsh Government has a number of options through which it could bring about a DRS for beverage containers in order to drive up recycling rates to levels in excess of 90%, and reduce littering of beverage containers by approximately 90%.
  - One possibility would be for the Welsh Government to require a 90% recycling rate for beverage containers under its existing powers relating to packaging waste (under an amendment for Wales of the Producer Responsibility (Packaging Waste) Regulations). This would be expected to lead to the initiation of a 'voluntary', industry-led DRS in order to achieve the required return rate. Independent auditing would be required to verify the return rate.
  - An alternative approach would be to introduce a tax on all beverage containers placed on the market in Wales, with the size of the per-container tax being adjusted downwards as the recycling rate for the respective container type (e.g. plastic bottle, glass bottle, aluminium can etc.) increases. This would be expected to lead to the formation of an industry-led 'voluntary' DRS, as is the case in Norway, and individual fillers can choose whether or not to join the DRS. This could be designed such that, in effect only beverage containers that *aren't recycled* pay the tax. Again, independent auditing would be required to verify the return rate.
  - Another possibility would be to legislate for a DRS, with the Welsh Government setting out the key performance parameters that the scheme operator would have to achieve, including the target recycling rate for beverage containers that must be met. This would include a requirement for independent auditing of the system operator's data on return rates in order to verify performance. If this approach were taken it

would be sensible for a beverage container tax to be implemented alongside the DRS.

- While Wales could act alone in this regard, it would be preferable for the Welsh Government to work together with other UK countries in order to bring about a single DRS for beverage containers. This would avoid a number of issues that would be associated with a Wales-only DRS, such as:
  - The requirement for Wales-specific labelling in order to reduce the risk of fraudulent redemptions, and the associated cost of such separate labelling to producers; and
  - The flow of beverage containers (once purchased) between Wales and England (and vice versa) meaning that return rates might be expected to be lower than would be the case under a UK-wide approach.
- While Welsh local authority kerbside collections would lose material and associated revenue once a DRS is implemented, they would also make savings in other areas such as reduced disposal costs, and potentially through re-optimisation of collection rounds. Detailed modelling of a number of the highest performing English local authorities has shown that modest savings can be achieved (even before potential street scene savings are accounted for), and it is anticipated that the same will be found in Wales.[7]
- A DRS will deliver high quality data on the recycling rate, with independent auditing of the system operator's data being a requirement in order to verify performance. Accordingly, the beverage container recycling rate will be known by Government, and this information can then be used by local authorities to count towards their recycling targets. It is acknowledged that allowing third party reporting to count towards a local authority's statutory recycling target is not straightforward. However this could be addressed in two possible ways:
  - Firstly, the 'household waste relevant' proportion of beverage containers could be calculated (this would require a study to derive such a figure), and then be applied per local authority based on their relative overall household waste arisings; or
  - On the basis of data gathered in the study, the statutory recycling rate targets for local authorities could be lowered, albeit there are reasons why this may be less preferred from a Welsh Government perspective.

[7] Eunomia Research & Consulting Ltd (2017) Impacts of a Deposit Refund System on Local Authority Waste Services, available at http://www.eunomia.co.uk/reports-tools/impacts-of-a-deposit-refund-system-for-one-way-beverage-packaging-on-local-authority-waste-services/

- Single-use cups and lids
    - The Welsh Government could introduce a consumer facing fee (tax or charge) on all single-use cups filled at the point of sale, for hot and cold beverages to bring about waste prevention and reduce litter. Applied to all retailers, this would create a level playing field (compared with the current patchwork of discounts for the use of reusables) and give consumers certainty that investing in a reusable cup will pay for itself after a certain number of uses.
    - In addition to a tax on all single-use cups to encourage reusable alternatives, Welsh Government could introduce comprehensive EPR to cover all end-of-life costs of those that continue to be placed on the market, and incentivise the development of more readily recyclable alternatives. However, it would be preferable for this not be a standalone EPR scheme for single-use cups, but a wider reform of EPR for all packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life.
    - As explained in a recent submission to the UK Parliament's Environmental Audit Committee, it is difficult to estimate the extent to which a reduction in use of disposable coffee cups might be achieved, but reductions in the order of 30% - perhaps not immediately, but over time - do not feel wildly wide of the mark.[8] This is perhaps a conservative estimate given recent indications from Starbucks that their own research suggests that 48% of customers would carry their own reusable cup to avoid a charge.[9]

The amount which would be raised from such a tax depends on both the level of the tax, and the level of reduction achieved. A range of possible outcomes and associated revenues are shown in Table E- 1.

[8] Eunomia Research & Consulting (2017) Environmental Audit Committee Inquiry: Disposable Packaging: Coffee Cups and Plastic Bottles – Written Evidence from Eunomia Research & Consulting Ltd, available at http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/packaging/written/70645.pdf

[9] Starbucks (2018) News item: Starbucks UK tests first-ever paper cup charge, 26th February 2018, available at https://www.starbucks.co.uk/promo/5pcup

Table E- 1: Revenues (£m per annum) from a Tax on All Single-use Takeaway Cups: Varying Level of tax and % Reduction

Reduction	Level of Tax (Pence)				
	5	10	15	20	25
10%	25.1	50.1	75.2	100.3	125.3
20%	22.3	44.6	66.9	89.1	111.4
30%	19.5	39.0	58.5	78.0	97.5
40%	16.7	33.4	50.1	66.9	83.6
50%	13.9	27.9	41.8	55.7	69.6
60%	11.1	22.3	33.4	44.6	55.7
70%	8.4	16.7	25.1	33.4	41.8
80%	5.6	11.1	16.7	22.3	27.9

- Takeaway food packaging
  - Welsh Government could introduce comprehensive EPR for *all* packaging, including takeaway food packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life including the costs of dealing with the fraction that is littered.
  - In order to bring about waste prevention in quick service restaurants and other establishments serving food in single-use packaging (for both consumption on the premises and takeaway), the Welsh Government could use existing regulations combined with the development of new guidance.
    - Applying the waste hierarchy is already a duty on businesses that produce or handle waste. This includes all businesses that serve food, including in takeaway food packaging. Regulation 12 of the Waste (England and Wales) Regulations 2011, requires that every business must, as part of its Waste Transfer Note, confirm that it has properly applied the hierarchy to its waste, and Natural Resources Wales has the duty to enforce compliance. [10] The hierarchy has the potential to support Welsh Government policy and prevent waste (and boost recycling) in Wales, particularly if its implications can be made clear to business.
  - As an alternative to EPR, in order to cover the costs of cleaning up littered takeaway packaging, the Welsh Government could introduce a tax on each item of takeaway packaging used. This could, in due course be

[10] See http://www.legislation.gov.uk/uksi/2011/988/regulation/12/made

modulated to incentivise redesign of takeaway packaging towards packaging types that have a lower environmental impact when littered. It could also stimulate the further development of, and uptake of reusable alternatives.

- Single portion sachets and pots
  - As previously noted, Welsh Government could introduce comprehensive EPR for *all* packaging, including single portion sachets and pots, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life including the costs of dealing with the fraction that is littered.
  - Using existing regulations combined with the development of new guidance on the responsibilities of cafes and restaurants in respect of waste prevention, could also lead to a reduction in the use of single-serve sachets, with establishments instead using refillable dispensers.
  - The Welsh Government could also introduce a tax, payable at the point of sale, on all single serve sachets and pots in order to prevent waste (by ensuring that consumers only take as many as they need), while also stimulating uptake of reusables where appropriate.
- Black plastic food packaging
  - As previously noted, the Welsh Government could introduce comprehensive EPR for *all* packaging, including black plastic food packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life.
  - The Welsh Government could alternatively introduce a tax on black plastic packaging, in order to cover the additional costs of end of life management. This may need to be applied at the level of the retailer, and thus a *de minimus* threshold could be appropriate, such that the smallest stores would be exempt.
- Metallised films for crisps and confectionary packaging
  - As previously noted, the Welsh Government could introduce comprehensive EPR for *all* packaging, for crisps and confectionery packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life.
  - The Welsh Government could, as an alternative, introduce a tax on each item of crisp and confectionery packaging used. This could, in due course be modulated to incentivise redesign of takeaway packaging towards packaging types that have a lower environmental impact when littered.

E.5.0 Key Recommendations

The following key recommendations result from the research.

- Beverage containers
  - In order to increase recycling and reduce litter, the Welsh Government should seek, through engagement with counterparts in England and Scotland (at least), the implementation of at least a GB-wide, or ideally UK-wide DRS for beverage containers.
  - If the Westminster Government decides *against* implementing a DRS or a beverage container tax, as noted in E.4.0, the Welsh Government could still bring about a Wales-only DRS. As noted in E.4.0, the Welsh Government has a number of options for initiating a DRS. These are:
    - Requiring a 90% recycling rate for beverage containers under its existing powers relating to packaging waste (under an amendment for Wales of the Producer Responsibility (Packaging Waste) Regulations). This would be expected to lead to the formation of a 'voluntary', industry-led DRS in order to reach the recycling target. Independent auditing would be required to verify the return rate.
    - Introducing a tax on all beverage containers placed on the market in Wales, with the size of the per-container tax being adjusted downwards as the recycling rate for the respective container type (e.g. plastic bottle, glass bottle, aluminium can etc.) increases. This would be expected to lead to the formation of an industry-led 'voluntary' DRS, as is the case in Norway, and individual fillers can choose whether or not to join the DRS. This could be designed such that, in effect only beverage containers that *aren't recycled* pay the tax. Again, independent auditing would be required to verify the return rate.
    - Legislating for a DRS, with the Welsh Government setting out the key performance parameters that the scheme operator would have to achieve, including the target recycling rate for beverage containers that must be met. This would include a requirement for independent auditing of the system operator's data on return rates in order to verify performance. If this approach were taken, a beverage container tax should be implemented alongside the DRS.
- Single-use cups filled at the point of sale
  - To prevent waste by incentivising reuse, the Welsh Government should implement a consumer facing fee (tax, levy or charge) on all single-use cups filled at the point of sale, payable by the consumer at the point of sale, in order to encourage the uptake of reusable alternatives. This fee should apply to cups used for both hot and cold beverages, and should cover all retail outlets, with no exemptions for smaller retailers.
  - The level of the fee needs some consideration. All things being equal the higher the level, the greater the waste prevention effect. A level of 25

pence would seem appropriate as a starting point, as this represents the discount that major coffee chains currently offer. It is important that the implementing legislation allows for future revisions to the level of the fee in order to:
        - Maintain its effectiveness when account is taken of inflation; and/or
        - To increase the level in order to stimulate further waste prevention if the initial results prove to be limited.
    - While the waste prevention effects of a tax, a levy or a charge would be the same, a tax or levy would be preferable. Either of these would avoid the risks – that could occur with a charge – that funds disbursed by retailers displace CSR spending, and lead to undue influence over recipients, who themselves might become overly dependent upon the proceeds of the charge, potentially limiting their support for higher ambition in respect of waste and litter prevention.
    - Importantly, money raised by the fee should not be used to cover costs associated with waste management. It has been suggested by some stakeholders that money raised should be used to fund collection infrastructure for coffee cup recycling. To do so would mean undermining the principle of extended producer responsibility, whereby producers should bear the full end of life costs for management of their waste, including that which is littered.[11] The income raised from a measure designed to change consumer behaviour, and reduce consumption, and thus littering of specific single-use plastic items should not be used to cover costs that producers should themselves bear.
    - Longer term, the Welsh Government should reflect on whether there is a case for the mandatory use of reusable cups in Wales, incorporating the use of a deposit-return mechanism. We recommend that such an approach should be trialled as part of the suggested investigation into the use of deposit-return mechanisms for items other than beverage containers.
- Broader reform of EPR for packaging in Wales
    - The Welsh Government should, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across *all* packaging types. However, if the Welsh Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious, the Welsh Government could develop its own approach.
- The use of existing regulations to incentivise waste prevention

[11] OECD (2016), *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management,* OECD Publishing, Paris, 2016. Accessible at http://www.oecd.org/env/extended-producer-responsibility-9789264256385-en.htm

    - The Welsh Government should develop, and promote, guidance for businesses on their duty in respect of applying the waste hierarchy, identifying best practice examples that should be followed. Natural Resources Wales should subsequently begin to verify compliance, and undertake enforcement actions if required.
- Refillable alternatives and take-back mechanisms
    - The Welsh Government should explore the potential for take-back schemes, potentially involving a deposit-return mechanism, for metallised films for crisps and confectionary packaging to both reduce litter and increase the incentive for design for recyclability. We recommend that such an approach should be explored as part of the suggested investigation into the use of deposit-return mechanisms for items other than beverage containers.
    - The Welsh Government should conduct trials of reusable take-away packaging, perhaps within specific areas such as covered, permanent markets in the first instance, in order to better understand consumer acceptance. Examples already exist of reusable tiffins for some food types, and innovation, and expanded uptake should be encouraged in this area across the whole range of takeaway food types.
    - Once likely consumer acceptance, and concerns about hygiene, are better understood as a result of the trials, and where viable reusable alternatives have been shown to exist, the Welsh Government should explore the merit of implementing incentives for the use of reusable takeaway food packaging, such as a consumer facing tax on non-reusable takeaway packaging.
- Alternatives to EPR
    - If the Welsh Government chose not to develop its own comprehensive approach to EPR, if the reformed EPR scheme of which Wales were a part were not sufficiently ambitious in some areas, it should consider alternative approaches that could be used to bring about some of the same effects. These would include:
        - A tax on takeaway food packaging, crisps and confectionary packaging, and single-serve sachets in order to cover the costs of litter clean-up associated with these items (if these were not already adequately covered by the EPR scheme).
        - A tax on black plastic packaging to cover the additional end of life costs (if not already adequately covered by the EPR scheme).

It is recommended that the £500,000 fund relating to deposit return schemes be used to support the following:

- Detailed modelling to understand the relative cost-effectiveness, and other impacts, arising from using kerbside collections as a means, or potentially the primary means, of returning deposit-bearing beverage containers under a DRS;
- Detailed modelling with each Welsh local authority to fully understand the operational changes they will need to make in order to maximise the savings

realised once a DRS for beverage containers is implemented, and to accommodate for any losses in income from the sales of recyclate that they will not now be collecting through loss via a DRS. This work also needs to examine the impacts on Local Authorities meeting their statutory recycling targets, and how this might be mitigated. This could involve the study suggested to determine the 'household waste relevant' fraction of beverage containers;

- A comprehensive analysis of litter composition and prevalence, accounting for weight, volume and number of different items in order to establish a pre-DRS baseline against which the litter reduction effects of a DRS (and other interventions such as a tax on single-use cups filled at the point of sale) can be subsequently measured;
- An investigation into the use of deposit-return mechanisms for items other than beverage containers. This should involve, in the first instance small scale trials of reusable cups and takeaway containers, in order to determine consumer and retailer acceptance, and explore the need for innovation (in terms of container type, delivery and return mechanism etc.) and potential for wider uptake.

Contents

1.0 Introduction

Regardless of how one measures recycling performance, Wales currently enjoys the highest recycling rate in the UK, and is among the top three nations in this respect both in Europe, and globally.[12] To date, this has been achieved through a combination of statutory targets and the provision of funding for separate collections established through the Towards Zero Waste strategy in 2010. The Welsh Government continues to set ambitious targets, and intends to consult on an 80% recycling target for local authorities, while at the same time seeking to further prevent waste, and prevent litter, both on land and in the marine environment.

As part of a wider programme of work the Welsh Government has commissioned this project to assess the scope of approaches, in line with Extended Producer Responsibility (EPR) principles, to tackle end of life management issues associated with key food and drink (F&D) packaging types. This work will feed into the development of a wider EPR approach in Wales, in line with the revisions to Article 8(a) of the Waste Framework Directive.[13] This involves full net cost recovery, but dropping to 80% in some circumstances. Such a rebalancing of costs away from citizens/taxpayers towards consumers/producers would be entirely in line with the Welsh Government's programme for Wales, Taking Wales Forward, with its emphasis on a stronger and fairer economy.

In addition, the Welsh Government has sought further understanding of the potential scope for an EPR approach that:

> *reduces the amount of waste and increases reuse, repair, remanufacture and recycling, to the maximum practicable extent*

This is an ambitious objective, recognising a need to drive improvements and innovation in Wales that have real potential, and yet, are far from being fully realised in EPR schemes across the globe.[14] Indeed, in terms of waste prevention, as far as the target food and drink packaging types are concerned, it is far from clear that EPR on its own can deliver this objective (with the exception of stimulating lightweighting). While modulated fees can incentivise design for recyclability, and the incorporation of recycled

[12] Eunomia Research & Consulting Ltd (2017), *Recycling –who really leads the world? Identifying the world's best municipal waste recyclers*, available at http://www.eunomia.co.uk/reports-tools/recycling-who-really-leads-the-world/

[13] Council of the European Union (2018) Interinstitutional File: 2015/0275 (COD), Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, available at http://data.consilium.europa.eu/doc/document/ST-6516-2018-INIT/en/pdf

[14] OECD (2016), *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management,* OECD Publishing, Paris, 2016. Accessible at http://www.oecd.org/env/extended-producer-responsibility-9789264256385-en.htm

content, to bring about significant waste prevention, in terms of a reduction in the number of items consumed, other measures are required, such as taxes or charges.

In summary, the strategic policy outcomes sought by the Welsh Government in pursuing EPR are options that:

1) Ensure producers bear 100% of the net cost of the management of the products and packaging they put onto the market.
2) Reduce the amount of waste and increase reuse, repair, remanufacture and recycling, to the maximum practicable extent, for food and drink related packaging as long as this delivers the best overall environmental outcome, taking into account life cycle thinking.
3) Increase the recycled content of each item of packaging to the maximum extent possible, as long as this delivers the best overall environmental outcome, taking into account life cycle thinking.
4) Ensure the optimal 'low carbon' approach, taking into account life cycle thinking.
5) Ensure that the packaging that can't be reused or recycled bears a higher proportion of the cost – as a 'differentiated fee'.
6) Tackle effectively the litter arising from the packaging.
7) Engage the whole supply chain.
8) Prioritise packaging/materials for EPR on the basis of maximising the contribution towards the well-being goals – i.e., maximising what's 'best for Wales' overall.
9) Increase consumer education and awareness to deliver greater behaviour change and tackle attitudes towards litter and recycling.
10) Meet the requirements of Article 4 of the Waste Framework Directive.
11) Meet the requirements of the new Article 8a Waste Framework Directive.
12) Meet the requirements of the packaging and packaging waste directive 94/62/EC.

It's worth noting that the Welsh Government is not, in this project, looking to explore comprehensive EPR across *all* packaging types. The study does not therefore consider in detail how EPR for packaging might be reformed in Wales. Instead, the focus is on identifying specific measures that can be applied to particular types of packaging, which can bring about waste prevention, litter prevention, and/or increase recycling, in ways that are consistent with EPR principles. Accordingly, while this study has considered specific types of food and drink packaging, it would not necessarily be appropriate, or indeed efficient, for separate EPR schemes to be introduced for each packaging type in every case.[15] Instead, it may be expected that within a broader EPR scheme for packaging, the specific attributes, and challenges, and thus costs, of dealing with the packaging types described here will be reflected in differential charging structures across packaging types. However, a number of the supporting measures, designed to bring

[15] Beverage containers is a clear exception to this where the implementation of a DRS could go ahead without waiting for wider reform to packaging EPR more generally, while measures that bring about waste prevention such as a tax on single-use takeaway cups can also be implemented in advance of reform of EPR more generally.

about waste prevention could be implemented regardless of the nature of producer responsibility for packaging.

It's also important to acknowledge the wider context, of ongoing discussions regarding shortcomings in the way in which producer responsibility for packaging is currently discharged in the UK, and the likelihood of, at least, a modification, if not a more wholesale revision, of the system of producer responsibility in the relatively near term. Indeed, any requirement to approximate to the text of the Waste Framework Directive's Article 8a, recognising that the Packaging and Packaging Waste Directive remains a 'Single Market' Directive, would require a fundamental shift in the distribution of costs under the UK's scheme.

In this context, it is important to understand that while there is a jointly agreed approach to the Packaging Regulations across the four countries in the UK, the Welsh Government does have powers to have a separate approach, as long as the minimum requirements of the Packaging Directive are met.

This report is laid out as follows:

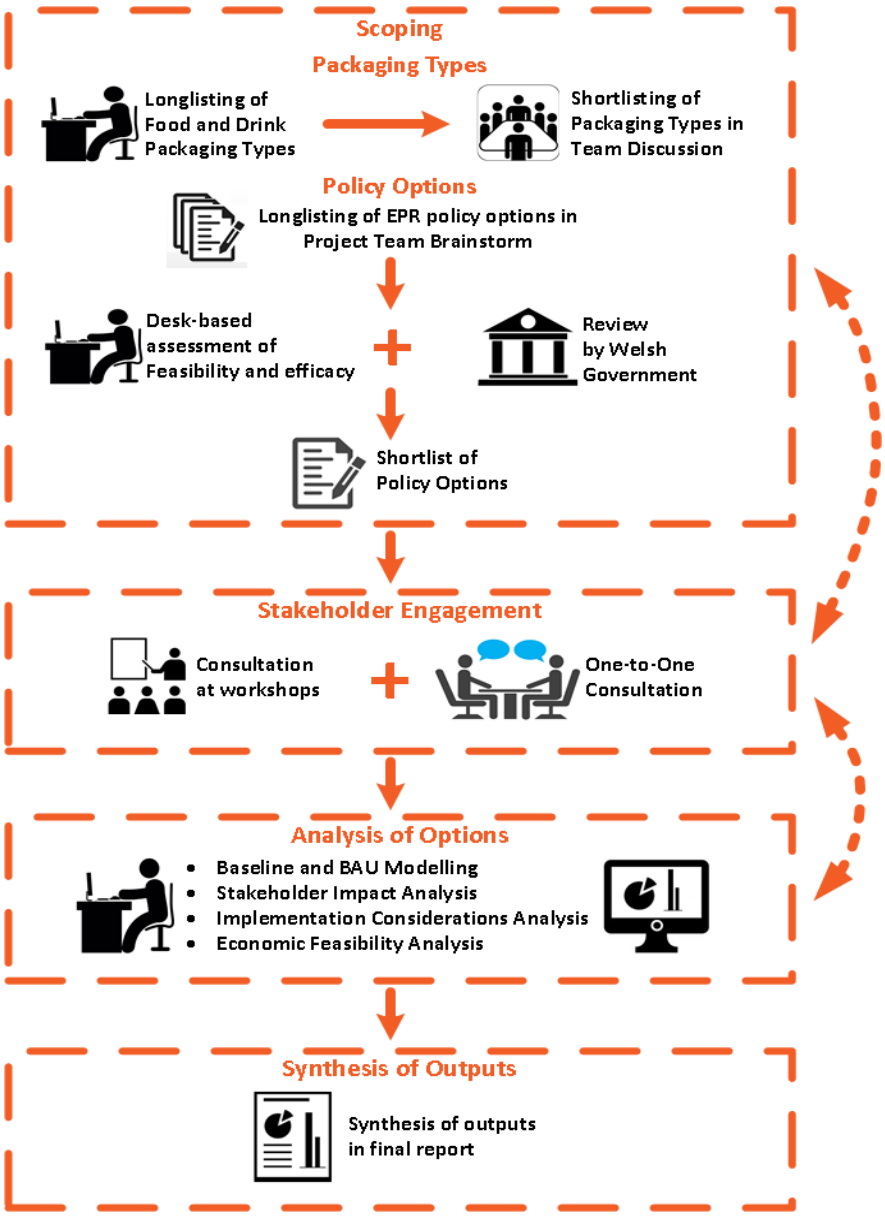
- Section 2.0 presents the methodology employed, and explains the sequencing of the tasks performed;
- Section 3.0 presents a synthesis of the findings, outlining for each of the shortlisted food and drink packaging types the assessment of shortlisted options, and key implementation criteria;
- Section 4.0 summarises the findings; and
- Section 5.0 comprises recommendations to the Welsh Government

A series of appendices provide further detail on the analysis undertaken.

2.0 Methodology

The following methodology, comprising five key tasks, was designed and agreed with the Welsh Government, and is summarised in Figure 2-1.

Figure 2-1: Summary of Methodology



Source: Eunomia R&C

2.1 Task 1 – Scoping of F&D Packaging Types for Study

The focus of the first task was to develop a long list of F&D packaging types, taking into consideration all consumer F&D packaging (including on-the-go packaging) and assessing issues around collection levels, recycling, reuse, and litter, and how they vary across packaging types. This was followed by the development of an appropriate rationale for

shortlisting of six key F&D packaging types for further analysis, including, but not limited to, the impacts of plastic packaging on marine litter and other environmental issues. A longlist of F&D packaging types for potential consideration was developed (See Appendix A.1.0) following a brainstorm session involving topic experts. Six F&D packaging types were then shortlisted based on assessment against the following criteria:

- Low current rate of recycling (due to either inability to be recycled, or low levels of capture, currently, for recycling, or both);
- Prevalence in the Welsh litter stream;
- Availability of suitable alternatives; and
- Levels of political and public concern.

The scope and definition of the shortlisted packaging types were then refined following input from the Welsh Government's project officers, with the following six F&D packaging types being chosen for further study:

1) Beverage containers – plastic bottles, cans, glass, laminated pouches and cartons;
2) Single use cups and lids – paper, plastic and polystyrene filled at point of sale (including straws provided with them);
3) Takeaway food packaging – polystyrene, card, foil and plastic filled at point of sale;
4) Single portion sachets and pots – single use packaging for ready-to-consume condiments, mini pots etc.;
5) Black plastic food containers (often used to package meat and ready meals in supermarkets); and
6) Metallised film for crisps and confectionery.

This task also involved the development of a stakeholder engagement plan in anticipation of Task 3 (see Section 2.3) including identification of an initial list of relevant stakeholders to be contacted for input on the development of the EPR options for each of the shortlisted packaging types.

2.2 Task 2 - Policy Option Development

The next stage involved the development of a series of options, in line with EPR principles, to address the issues associated with the shortlisted food and drink packaging types. This began with a project team meeting to create a long list of potential options, in which the relative merits and shortcomings of each option were discussed. The outputs of this exercise are summarised in Appendix A.2.0.

Subsequently, between three and four options were shortlisted for each packaging type in an iterative process involving:

- A desk-based assessment of the likely feasibility of the options and their ability to deliver against the policy outcomes sought by the Welsh Government as outlined in the Introduction;
- Presentation of the rejected options, the reasons for their rejection, and the recommended options to the Welsh Government, for feedback and subsequent amendment if necessary; and

- Consultation with a range of stakeholders, whose insights were used to refine the recommendations and distil the final list of shortlisted options (see Section 2.3) for full analysis.

As part of this task, the baseline situation was also identified to estimate current waste arisings within the six food and drink packaging categories, and broadly identify the fate of the arisings, be it residual waste, recycling or litter. Appendix A.3.0 provides details of the data and methods used in the baseline assessment.

The final options shortlisted are presented in Section 3.0 under the relevant sub-sections for each packaging type.

2.3 Task 3 – Stakeholder Engagement

Having identified the packaging types to be the focus of the study, and completed an initial analysis of the likely impacts of the long list of options relative to the baseline, relevant stakeholders were consulted in order to both refine the nature of the options and better understand potential impacts of the options on specific stakeholders. Stakeholders consulted included representatives of F&D packaging manufacturers, retailers, distributors, trade associations and NGOs, as well as academic experts, and policy and enforcement representatives from Wales and elsewhere in the UK.

In the first instance, stakeholders were requested to express interest in a series of three workshops that were designed to present, and seek feedback on, the options being studied. For a full list of stakeholders contacted please see Appendix A.5.0.

The first workshop dealt solely with the EPR options for beverage containers, for which the arguments in respect of the proposed options are well developed. The second workshop considered options for single-use cups and takeaway packaging due to the parallels between the issues associated with, and options identified to tackle, these F&D packaging types. The third workshop covered single portions sachets, black plastics and metallised film.

Given the overwhelming number of expressions of interest, a maximum of 30 final attendees at each of the sessions was agreed (including Eunomia facilitators and Welsh Government representatives), in order to enable facilitation of the group. Where there was a surplus of interested attendees, stakeholders were allocated on the basis of relevance to the packaging types, while at the same time seeking to maximise representation of all groups, including direct industry representatives alongside trade bodies. In all cases, those who expressed interest in the workshops were provided with materials from the sessions, and encouraged to provide input via telephone call or email where attendance was not possible. For a list of stakeholders who attended these workshops see Appendix A.5.0.

The intended purpose of the workshops, as was made clear to participants, was to facilitate their input to the design of, and feedback on, possible EPR options. In addition, the session was not carried out under Chatham House Rules, in order to encourage participants to commit to their viewpoints and have a fair and open discussion in the public domain. Specifically, the intention was not to gather arguments for or against any

particular option but to determine, as far as possible, if an option were to be implemented, how it should be designed to maximise effectiveness and minimise negative impacts.

The main outcome of this iterative process of analysis, consultation and amendment, was the shortlisting of the following options for further analysis in Task 4. See Appendix A.6.0 for rejected options and the rationale for their rejection.

- Beverage Containers
  - Deposit Return Scheme + Beverage Packaging Tax
  - Beverage Packaging Tax
  - Producer Responsibility Targets (including a litter target)
- Single Use Cups and Lids
  - Mandatory take back of cups in store
  - Consumer-facing financial incentive
  - Ban on single use cups as an eat-in option
  - Mandatory use of reusables supported by DRS
  - EPR for single use cups and lids
- Takeaway Food Packaging (filled at the point of sale)
  - Consumer-facing financial incentive
  - Ban on single use items for eat-in option
  - EPR for takeaway food packaging
- Single Portion Sachets, pots etc.
  - Consumer-facing financial incentive
  - EPR for Single Portion Sachets, Pots, etc.
- Black Plastic Food Packaging
  - Ban on certain uses accompanied by NIR sortability requirement
  - EPR for Black Plastic Food Packaging
- Metallised Films for Crisps etc.
  - Takeback/ DRS mechanism for metallised films for crisps etc.
  - EPR for metallised films for crisps etc.

2.4 Task 4 – Analysis of Options

The strategic policy outcomes sought by the Welsh Government in pursuing EPR are options that:

1) Ensure producers bear 100% of the net cost of the management of the products and packaging they put onto the market.
2) Reduce the amount of waste and increase reuse, repair, remanufacture and recycling, to the maximum practicable extent, for food and drink related packaging as long as this delivers the best overall environmental outcome, taking into account life cycle thinking.
3) Increase the recycled content of each item of packaging to the maximum extent possible, as long as this delivers the best overall environmental outcome, taking into account life cycle thinking.

4) Ensure the optimal 'low carbon' approach, taking into account life cycle thinking.
5) Ensure that the packaging that can't be reused or recycled bears a higher proportion of the cost – as a 'differentiated fee'.
6) Tackle effectively the litter arising from the packaging.
7) Engage the whole supply chain.
8) Prioritise packaging/materials for EPR on the basis of maximising the contribution towards the well-being goals – i.e., maximising what's 'best for Wales' overall.
9) Increase consumer education and awareness to deliver greater behaviour change and tackle attitudes towards litter and recycling.
10) Meet the requirements of Article 4 of the Waste Framework Directive.
11) Meet the requirements of the new Article 8a Waste Framework Directive.
12) Meet the requirements of the packaging and packaging waste directive 94/62/EC.

As previously stated, in terms of waste prevention, as far as the target food and drink packaging types are concerned, it is far from clear that EPR on its own can deliver this objective in terms of a reduction in the number of such items consumed. While modulated fees can incentivise design for recyclability, and the incorporation of recycled content, to bring about significant waste prevention, other measures are required, such as taxes or charges. Accordingly, this study considered supporting options that could work in isolation from EPR schemes to bring about waste prevention and prevent litter.

Therefore, our approach to the analysis, of necessity, exhibits some variations in the way different food and drink packaging types are considered, with the overarching intention of identifying preferred options that, as relevant to the specific packaging type and option:

- Bring about waste prevention, litter prevention, and/or high levels of high quality recycling;
- Shift the financial burden as far as possible away from citizens/taxpayers towards consumers/producers;[16]
- Stimulate the increased use of recycled content, and encouraging 'design for recyclability' through the use of modulated fees.

For each of the shortlisted options, the relevant economic, environmental and social impacts, both positive and negative, and the specific stakeholders who might be affected, were described. Where key risks and possible unintended consequences of options were identified, a description of whether, and if so how, such risks or unintended consequences could be mitigated or avoided was provided.

Account was also taken, where relevant, of how impacts might vary between the situation where Wales unilaterally implements a particular measure, and the situation

[16] Such a rebalancing of costs away from citizens/taxpayers towards consumers/producers would be entirely in line with Welsh Government's programme for Wales, 'Taking Wales Forward', with its emphasis on a stronger and fairer economy.

where such a measure is implemented across the whole of the UK (or combinations thereof, e.g. England and Wales).

As part of this analysis, the current situation established as part of Task 2 (see Section 2.2) was extrapolated in order to determine a business-as-usual (BAU) baseline, which assumed the absence of any intervention prior to 2025. The methodology and data used in the BAU forecast is provided in Appendix A.4.0.

A summary of the findings of this analysis is presented in Section 3.0 under the headings for each relevant packaging type.

2.5 Task 5 – Synthesis of Findings

The final task in this project includes the synthesis of findings from the preceding analysis, and reporting on the evaluated feasibility of the EPR options, including the key considerations in respect of implementation. This is presented in Section 3.0.

3.0 Synthesis of Findings

In this section we first consider the importance of litter in respect of the food and drink packaging types under consideration, and then outline the ability of the Welsh Government to take action in respect of EPR and taxation. The findings for each of the food and drink packaging types are subsequently presented.

3.1 The Importance of Litter

For the food and drink packaging types considered in this study, with the exception of beverage containers, the actual tonnages of waste produced account for a very small proportion of municipal waste in Wales. However, when packaging items are littered, the negative impacts that arise are disproportionately high relative to their weight.

While there is much current public concern about the issue of plastics in the marine environment, it is the 'everyday' litter that Welsh citizens experience, in cities, towns, and the countryside that is arguably the most significant, and immediate of the negative impacts. Indeed, according to Keep Wales Tidy, littering is always in the top three issues highlighted to councillors and officials

Economists express the unhappiness that people feel about seeing a littered local environment in terms of it being a 'visual disamenity', and use non-market valuation approaches, in line with those recommended in HM Treasury's 'Green Book' to seek to place a monetary value on this disamenity.[17] Such a value effectively calculates how

[17] HM Treasury (2018) The Green Book: Central Government Guidance on Appraisal and Evaluation, available at

much citizens would be willing to pay for a local environment that is less littered, or indeed entirely without litter.

Research undertaken for Zero Waste Scotland has explored the hidden costs of litter – i.e. those beyond the direct costs to local authorities and other duty bodies (and private landowners) of clearing litter on their land.[18] This covered a number of impacts leading to direct expenditures or costs to various actors in society including:

- The links between a littered local environment and crime (and fear of crime), based on the broken windows theory that if the appearance of an area suggests that people don't care, then the chances of people intervening to stop, or even to report, criminal activity might be lower;
- The impact of a littered environment on mental health and wellbeing;
- The effect on property values (as an indication of the importance people place on the locational attributes of the property);
- The contribution of litter to road traffic accidents and punctures; and
- A number of other costs attributable to litter such as those associated with vermin and wildfires.

For each of these categories the study estimated the cost that could reasonably be attributed to litter. The study also considered the external costs associated with the disamenity impacts of litter, i.e. residents' willingness to pay for a less littered environment. In principle the external cost estimates will encompass all of the other costs noted above. For Scotland, it was identified, based on the best available Defra-funded primary research, that the willingness to pay to move from current levels of litter to a local environment that was effectively litter free was £770 million per year.

Transferring this figure on the basis of relative population size, and without adjusting for inflation, the disamenity of neighbourhood litter in Wales is of the order of £440 million per annum. This reflects the size of the 'welfare gain' that would be achieved under a zero litter situation. It can also be used to place a value to Wales of marginal reductions in litter. Given that it is the visibility of litter that drives the disamenity impacts, the level of disamenity is arguably more closely related to the volume of littered items than their weight.

Beverage containers alone are estimated to account for 40% by volume of litter on the ground (and 40% by volume of litter in bins), meaning an associated disamenity impact of £177 million.

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

[18] Eunomia Research & Consulting Ltd (2013) Exploring the Indirect Costs of Litter in Scotland, Report to Zero Waste Scotland, available at https://www.zerowastescotland.org.uk/sites/default/files/Exploring%20the%20Indirect%20Costs%20of%20Litter%20in%20Scotland.pdf

While data does not permit the calculation directly of the proportion by volume overall accounted for by coffee cups and other takeaway cups, it is possible to estimate, from weight-based date, the *actual* volume accounted for by such cups. It is estimated that just over 500 tonnes of single-use takeaway cups are littered (genuinely littered on the ground and subsequently picked up by local authorities) each year in Wales. Assuming an average weight of 11g and an average volume of 300 ml, this means that approximately 13,800 cubic metres of single-use takeaway cups are littered, not placed in litter bins, but genuinely littered, each year in Wales. To use the frequently-turned-to comparator of Olympic swimming pools, five and a half such pools could be filled by the littered takeaway cups picked up from the ground by local authorities each year.

3.2 The Ability of Welsh Government to Implement EPR and Taxation

Section 93 of the Environment Act 1995 outlines the functions of the Secretary of State in relation to producer responsibility.[19] Section 93 (1) states that:

> *For the purpose of securing an increase in the re-use, recovery or recycling of products or materials, the Secretary of State may by regulations make provision for imposing producer responsibility obligations on such persons, and in respect of such products or materials, as may be prescribed.*

The functions of the Secretary of State under sections 93 to 95, so far as exercisable in relation to Wales, were transferred to the National Assembly for Wales by virtue of Article 2 and Schedule 1 to S.I. 1999/672, The National Assembly for Wales (Transfer of Functions) Order 1999.[20] By virtue of section 162 of, and paragraph 30 of Schedule 11 to the Government of Wales Act 2006, those functions are now vested in the Welsh Ministers.[21]

Accordingly, Welsh Ministers have the same powers, in respect of producer responsibility in Wales, as the Secretary of State has in England. However, to date, through choice, Wales has worked with Defra in order to implement a joint approach to producer responsibility.

The Welsh Ministers also have a role in transposing EU Directives. By virtue of section 80 of the Government of Wales Act 2006, the Welsh Ministers are generally responsible for the transposition of EU Directives made in areas where legislative competence has been devolved.[22,23] The power to make such legislation is given by virtue of section 2(2) of the

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[19] See https://www.legislation.gov.uk/ukpga/1995/25/section/93
[20] See http://www.legislation.gov.uk/uksi/1999/672/contents/made
[21] See http://www.legislation.gov.uk/ukpga/2006/32/contents
[22] See http://www.legislation.gov.uk/ukpga/2006/32/section/80
[23] Welsh Government (2016) European Law and Wales, Law Wales, available at http://law.gov.wales/constitution-government/how-welsh-laws-made/introduction-to-european-law/eu-law-wales/?lang=en#/constitution-government/how-welsh-laws-made/introduction-to-european-law/eu-law-wales/?tab=overview&lang=en

European Communities Act 1972 (for those subjects in which Welsh Ministers have been 'designated' to implement EU law by Order in Council).[24,25]

Specifically, Welsh Ministers are designated under the European Communities (Designation) Order 2005 (SI 2005/850) in relation to:[26]

> *Measures relating to the prevention, reduction and elimination of pollution caused by waste and the management of packaging and packaging waste*

Furthermore, on 1st April 2018, the provisions of section 20 of the Wales Act 2017 will come into force.[27] This will insert a new section 58B into the Government of Wales Act 2006, which will, so long as the UK is within the EU, give Welsh Ministers power under section 2(2) of the European Communities Act to implement EU legislation as long as the provisions are not outside the legislative competence of the Assembly (the Assembly has legislative competence for environment and waste).

For example, once the EU Circular Economy Package, including amendments to the Waste Framework Directive, are in force in EU law, these could be implemented directly through regulations in Wales.

For a new environmental tax, the Welsh Government would need approval from the UK Parliament.[28] Proposals for a new tax would have to be approved by both Houses of Parliament and UK Government.

3.3 Beverage Containers (including cartons, laminated pouches, etc.)

If the Welsh Government were to seek to achieve an overall 80% recycling rate, it will be necessary for recycling rates for some types of item to be in excess of 80%. Such high performance would be required to make up for other items where obtaining an 80% recycling rate is not achievable, or achievable only at great expense. In a number of other European countries, beverage container recycling rates are at circa 90%.[29] As well as having the potential to be recycled at higher levels than at present, beverage containers are also a significant component of litter in Wales.

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[24] See https://www.legislation.gov.uk/ukpga/1972/68/section/2

[25] Welsh Government (2016) European Law and Wales, Law Wales, available at http://law.gov.wales/constitution-government/how-welsh-laws-made/introduction-to-european-law/eu-law-wales/?lang=en#/constitution-government/how-welsh-laws-made/introduction-to-european-law/eu-law-wales/?tab=overview&lang=en

[26] See http://www.legislation.gov.uk/uksi/2005/850/made

[27] See http://www.legislation.gov.uk/ukpga/2017/4/section/20/enacted

[28] See Welsh Government (2018) The Process of Developing a New Tax for Wales, available at http://gov.wales/docs/caecd/publications/180213-developing-infographic-en.pdf

[29] The category of 'beverage containers', for this study, includes laminated pouches, bags and sacks (such as those used for concentrates, juices, cocktails etc.) as well as liquid packaging board (e.g. Tetra Pak), alongside more conventional beverage container materials (plastic, glass, metals).

In Wales, 'recyclable drinks-related litter' was found in a recent study to make up 17.3% of the average composition of litter (in litter bins, recycling on the go bins, and picked up by street cleansing teams via carts and manual sweeping), by weight, in 2017.[30] This comprised:

- Plastic bottles - 4.2% by weight of all litter;
- Glass bottles and jars – 9.2% by weight of all litter;
- Non-ferrous cans (mostly aluminium drinks cans) – 3.1% by weight of all litter; and
- Ferrous cans and tins – 0.8% by weight of all litter.

Additionally, drinks cartons were found to make up 0.3% of litter by weight, and multilayer packaging (including pouches) 0.2%. The authors comment that:[31]

> *It would be interesting to carry out some further litter analysis including both volume and weight measurements. Volume is a key consideration for litter bin provision and collection frequency.*

Additionally, the total volume (which relates to both the number of items and their individual volume) is likely to be more closely related to the disamenity impact of litter than weight. It's worth noting that Eunomia's 2015 DRS Feasibility Study for Zero Waste Scotland identified that the average proportion of beverage containers in litter from four studies in Estonia, Czech Republic, Slovakia and Luxembourg was 46% by volume.[32] This is consistent with a recent study from New South Wales that noted that total beverage container litter accounted for 49% by volume.[33,34] For the DRS Feasibility study itself, it was (arguably conservatively) assumed that beverage containers accounted for 40% of litter by volume.

In a separate study, which focused on the ubiquity of littered items (rather than the proportion accounted for by specific items) an increasing trend in drinks-related litter (including cartons and coffee cups) was identified, with material found to be present in 44.7% of streets in Wales.[35]

Some beverage containers, such as laminated cartons and pouches, are currently not widely recycled, though some companies, like Terracycle, have been established to accept certain brands and types of packaging for recycling. On a wider scale, it has been

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[30] Resource Futures for WRAP (2017), *Litter Composition Study – Wales,* March 2017
[31] Resource Futures for WRAP (2017), *Litter Composition Study – Wales,* March 2017
[32] Eunomia Research & Consulting (2015) A Scottish Deposit Refund Scheme, Final Report to Zero Waste Scotland, available at http://www.eunomia.co.uk/reports-tools/a-scottish-deposit-refund-system/
[33] New South Wales Environment Protection Authority (2016) 2015–16 National Litter Index Results for New South Wales, available at http://www.epa.nsw.gov.au/resources/litter/nsw-national-litter-index-results-160513.pdf
[34] Beverage containers due to be included in the proposed DRS accounted for 43% of the total volume.
[35] Keep Wales Tidy (2016), *All Wales Local Environmental Audit and Management System Report 2015-16*, accessible at: https://www.keepwalestidy.cymru/Handlers/Download.ashx?IDMF=82300fb7-b6f5-4b4b-8d09-3f146e69d167

reported that it is not currently financially viable to separate out laminated materials, which are often highly contaminated and which therefore continue to be sent to landfill or incinerated.[36] Alternatives exist in the form of more readily recyclable containers. Debate on the merits of flexible packaging tend to focus on the resource efficiency associated with their minimal use of materials and light weight leading to reduced transport emissions. However, such life-cycle analyses do not consider the litter impacts associated with such items.

3.3.1 Current Levels of Arisings and Future Trends

Data on the proportion of containers that are beverage containers are relatively poor. The final estimates must therefore be treated with caution, and cannot be reported with confidence. It is estimated that arisings of beverage containers in the local authority collected waste stream, and associated recycling rates, are as shown in Table 3-1. An explanation of the methodology for calculating the estimates can be found in Appendix A.3.2.1.

Overall consumption of beverage container packaging is expected to increase at just below 4% per year out to 2025.

Table 3-1: Estimated Beverage Container Arisings in Local Authority Collected Waste and Associated Recycling Rates

	Estimated LAC Waste Arisings (tonnes)	Estimated Recycled (tonnes)	Estimated Recycling Rate
Glass Beverage Bottles	63,500	48,900	77%
Plastic Beverage Bottles	29,600	19,200	65%
Steel Beverage Cans	2,400	1,570	64%
Aluminium Beverage Cans	5,900	3,900	66%
Beverage Cartons	2,750	800	30%
Laminated Plastic Pouches, Bags, Sacks	370	0	0%
Total	**105,000**	**74,400**	**71%**

[36] WRAP (2011), *Recycling of Laminated Packaging - Trials to optimise pilot plant for recycling of laminated packaging wastes*, September 2011, accessible at: http://www.wrap.org.uk/sites/files/wrap/Recycling%20of%20laminated%20packaging.pdf

3.3.2 Shortlisted Options

The options taken forward for more detailed consideration are:

- Deposit Return Scheme + Beverage Packaging Tax
- Beverage Packaging Tax
- Producer Responsibility Targets (including a litter target)

A deposit return scheme (DRS) for single-use beverage containers is a system that incentivises the return of the packaging after use to collection points, through the use of a returnable, or refundable, deposit. The consumer pays the deposit up front and receives it back when they return the empty beverage container to one of the designated collection points. If the consumer chooses not to return the empty bottle they lose the deposit. Collection is typically by 'return to retail'. The beverage containers are then recycled.[37]

The topic of whether or not to introduce a DRS within UK countries has been the subject of lively debate in recent years. While there was previously opposition from retailers and beverage companies in particular, much has changed. It is therefore important to consider the current political context. As of March 2018:

- Scotland will be implementing a DRS; [38]
- Coca Cola has changed its former position and as of February 2017 supports a 'well-designed deposit return system', with a strong preference for a UK-wide scheme; [39]
- Suez, a major waste management company, has also announced its support for a UK-wide scheme; [40]
- The National Federation of Retail Newsagents, representing the very smallest retailers, is supportive of DRS; [41]
- The retailers Tesco, Iceland and the Co-op have all announced their support for a DRS;
- The UK Government's Environment Secretary, Michael Gove, has indicated his personal enthusiasm for a DRS; [42]

[37] As what is being described here is a DRS for single-use beverage containers, or a 'one-way' DRS. The term given to a DRS involving refillables is a 'two-way' DRS.
[38] Announced by Nicola Sturgeon on 5th September 2017
[39] See https://ciwm-journal.co.uk/coca-cola-favour-well-designed-deposit-return-scheme/
[40] See https://resource.co/article/suez-defends-win-win-deposit-systems-after-defra-snub-11677
[41] See https://nfrnonline.com/homepage/independent-retailers-pledge-support-deposit-refund-scheme/
[42] See https://news.sky.com/story/michael-gove-calls-for-government-to-implement-plastic-bottle-deposit-scheme-10956300

- There is widespread media support for a DRS, with pro-DRS campaigns being led by Sky News and the Daily Mail, and a recent Times editorial calling for the introduction of DRS; [43]
- The Environmental Audit Committee has called (in December 2017) for the introduction of DRS; and [44]
- It has been reported that the Economic and Voluntary Measures Working Group, appointed by Defra to consider the evidence in respect of a DRS will recommend that it is implemented, citing evidence that it will increase recycling, reduce litter and improve the quality of material sent for recycling[45]

Accordingly, it seems increasingly likely that a decision to proceed with a DRS will be made by the Westminster government. Importantly, in a recent speech, the Scottish Cabinet Secretary for the Environment called upon Michael Gove to work together on introducing a deposit return scheme, saying:[46]

> *And so, I issue this challenge to Michael Gove: Let's do this. Let's work together. Let's deliver a deposit return scheme of which we can be proud. Scotland is ready, willing and able, to lead the UK on this important initiative.*

This strongly suggests willingness on the part of the Scottish Government to have a UK-wide deposit scheme, rather than different deposit schemes operating in UK countries. Accordingly, this section addresses the impacts of implementing a DRS in Wales and at least England and Scotland, rather than in Wales in isolation. In Section 3.3.9 the implications of the Welsh Government unilaterally implementing a DRS are considered.

A beverage packaging tax is considered alongside a DRS as this can avoid a situation whereby some beverage packaging types are not covered by a DRS, and this provides a financial incentive for fillers to 'migrate' towards this packaging type. Examples of beverage packaging types formats that are sometimes not included in a DRS include liquid paper board cartons (Tetrapaks) and flexible packaging.

3.3.3 Design of a DRS

The overall design of a generic DRS is summarised in Figure 3-1. This figure shows the deposit being passed through from one actor to the next through the supply chain and onto the consumer at the point of purchase. The deposit passes back to the consumer when the empty container is returned. The process of tracking the deposit through the system and recording when the deposit is returned to the consumer is called 'clearing'. Finally, financial transactions are made between different actors in order to ensure that the costs and revenues are distributed appropriately, for example, in line with the contribution made by different parties to the operation of the system. These financial

[43] See https://www.thetimes.co.uk/edition/news/experts-back-plastic-bottle-deposit-plan-fb0s9ktsh
[44] See https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/339/339.pdf
[45] See https://www.thetimes.co.uk/article/experts-back-plastic-bottle-deposit-plan-fb0s9ktsh
[46] See https://twitter.com/yougotthebottle/status/955531681003384832

transactions include a handling fee that is paid to retailers in order to compensate them for facilitating the collection (or take-back) infrastructure.

Figure 3-1: General Material and Financial Flows in a DRS

Source: Eunomia

There are a number of design elements within a DRS, the most important of which are outlined below:

- **Central System Operator**– The typical, and indeed preferable, format is that there is a single system operator, owned and funded by industry, and operated on a not-for-profit basis. The central system operator manages the flow of data and money. This organisation is charged with seeking continued efficiency improvements which will keep producer fees as low as possible.
- **Eligible containers** – i.e. what beverage packaging types are included within the scope of a DRS. Typically plastic bottles, aluminium and steel drinks cans, glass bottles are included. Some schemes include liquid paperboard cartons (Tetrapaks) and flexible packaging (drinks pouches).

- **Funding of the System** – The system is funded in part through material revenues, and also through unredeemed deposits (on the basis that not all beverage containers will be returned, albeit the system will be required or incentivised to reach a target return rate of 90%, meaning that the system operator cannot cover all its costs through achieving a lower return rate). These two sources, however, will not fund all costs, and the producers (i.e. the beverage fillers) will be required to pay producer fees to make up for the shortfall in funding. There would be no requirement for public money to cover the operation of the system.
- **Return infrastructure** – the key decision is whether to opt for a 'return to retail' or 'return to depot' approach. Generally return to retail is the preferred mechanism as this is most convenient for consumers and is associated with higher return rates. This is the approach taken in modern European schemes, whereas return to depot is found in older US schemes. It is up to the system operator to decide the level of handling fee to be paid to retailers for collecting beverage containers, and how these might vary by whether the retailer employs a manual return approach, or installs a compacting reverse vending machine (RVM) (see Appendix A.7.4 for further detail). On this basis, individual retailers will decide whether to opt for RVMs or manual handling. Typically, RVMs are more cost-effective than manual return in outlets accepting more than 500 to 600 containers per day, but this will obviously vary based on the individual circumstances of the store, the level of the handling fee, and the cost of the RVM, and whether it is purchased outright or leased.
- **Handling fee** – which is paid to retailers in order to cover the costs they bear in acting as return points for containers. System operators may also pay higher handling fees for every beverage container collected by compacting RVMs, as this delivers efficiencies in the transport logistics, contributing to lower overall system costs.
- **Measures to incentivise design for environment and scheme efficiency** – such as variations in the producer fee according to material types, cap colours, whether PET containers are clear or coloured (and which colour), and whether or not bottles have a sleeve, for example.
- **Deposit level** –The appropriate level of deposit depends in large part on the target return rate. It is preferable to design a system such that the deposit level can be varied flexibly by the system operator in order to ensure the target return rate is met. In some US states deposit levels can only be changed through amendment to legislation and this has led to declining return rates over time as the value of the deposit is eroded by inflation.

3.3.4 The Role of Government

The role of Government in deposit return schemes varies considerably across the globe. In some cases, the Government actually runs the scheme, whereas in others it simply identifies the performance requirements in terms of a required return rate, which will often be at circa 90%. In the UK context, Government could mandate that a DRS be implemented, or simply mandate or incentivise the target return rate that the DRS

should achieve, along with a requirement for independent auditing of the system operator's data in order to verify performance. In this case it would then be left to producers to set up and operate the DRS themselves. Mandating or incentivising a certain return rate can be achieved through one of the following:

- Setting a higher recycling target for beverage containers under existing producer responsibility legislation; or
- Implementing a beverage packaging tax, where the level of the tax per beverage container reduces as recycling rates increase, as described in Appendix A.7.1. This is the approach that is taken in Norway.

Of these two approaches, the beverage packaging tax arguably has more in its favour as a means of incentivising the industry-led uptake of a DRS, and would be the preferable means of bringing about a DRS on a UK-wide basis. As explained in more detail in Appendix A.7.1, the tax could be designed in such a way that in effect, only those beverage containers not collected for recycling pay the tax, which itself could be set at a level that means all costs associated with beverage containers not being returned can be covered.

3.3.5 Meeting Statutory Local Authority Recycling Targets

Welsh local authorities have statutory recycling targets, and under a DRS the majority of beverage containers would be removed from kerbside collections. It is also acknowledged that allowing third party reporting to count towards a local authority's statutory recycling target is not straightforward.

However, a DRS will deliver high quality data on the recycling rate, with independent auditing of the system operator's data being a requirement in order to verify performance. Accordingly, the beverage container recycling rate will be known by Government, and this information, along with knowledge of the 'household waste relevant proportion' can then be used by local authorities to count towards their recycling targets, in one of two ways:

- Firstly, the 'household waste relevant' proportion of beverage containers could be calculated (this would require a study to derive such a figure), and then be applied per local authority based on their relative overall household waste arisings; or
- Alternatively, on the basis of data gathered in the study, the statutory recycling rate targets for local authorities could be lowered, albeit there are reasons why this may be less preferred from a Welsh Government perspective.

3.3.6 Summary

Table 3-2 summarises the ability of each of the options discussed here to achieve the Welsh Government's desired strategic outcomes:

Table 3-2: Assessment against Desired Outcomes

Outcome	DRS + Beverage Tax	Beverage Tax	Producer Responsibility Targets
Producers bear 100% net cost	Yes	Yes	Potentially
Reduces waste and increases reuse, repair, remanufacture and recycling	Yes – increases recycling	Yes – increases recycling	Yes – increases recycling
Ensures the optimal 'low carbon' approach	Will deliver carbon savings relative to the BAU baseline	Will deliver carbon savings relative to the BAU baseline	Will deliver carbon savings relative to the BAU baseline
Differentiated fees – incentivising design for recyclability / recycled content	Yes – a well-designed DRS will include this	Yes - a well-designed DRS, likely to be implemented in this case, will include this	Potentially – depending on approach taken.
Tackles litter arising	Yes	Yes	Potentially – depending on how producers choose to meet the target
Engages the whole supply chain	Yes – while producer fees paid by fillers, the whole supply chain will engaged	Yes – on the assumption a DRS is implemented, while producer fees paid by fillers, the whole supply chain will engaged	Potentially – depends on how producers choose to respond. If a DRS, yes.
Maximises what's 'best for Wales' overall	Yes – it's comprehensive EPR. Cost shifted from citizen to consumer	Yes – it's comprehensive EPR. Costs shifted from citizen to consumer	Potentially
Increases consumer awareness	Yes	Yes	Potentially
Meets WFD Art 4 requirements	Yes – while not leading to waste prevention, it's increasing the quantity and quality of recycling	Yes – while not leading to waste prevention, it's increasing the quantity and quality of recycling	Yes – not preventing waste but increasing recycling rate
Meets new WFD Art 8a requirements	Yes	Yes	Potentially – depends upon design
Meets PPWD 94/62/EC requirements	Yes	Yes	Yes

Further details on the impacts of a DRS are provided in Appendix A.7.0. These include:

- Anticipated effects of a DRS on litter - expected to be at least a 90% reduction in littering of deposit bearing containers, leading to significant benefits in respect of reduced visual disamenity (A.7.2);
- Impacts on Producers – with a producer fee of, on average, 1 pence per container (A.7.3);
- Impacts on Retailers – with an explanation of the role of handling fees in compensating retailers (A.7.4);
- Impacts on Consumers – with details of a survey showing widespread support for a DRS across all levels of income (A.7.5);
- Impacts on Local Authorities – based on detailed modelling of some of the highest performing English local authorities that shows that they should not lose out financially, and indeed might be expected to make modest financial savings (A.7.6); and
- Employment Impacts – presenting research that indicates that a DRS will increase employment levels (A.7.7).

In the Welsh context, it was also requested that consideration be given to the potential for using kerbside collections as a means, and possibly *the* means of returning used beverage containers under a DRS. This is considered in Section 3.3.7. In addition, the way in which a DRS could operate alongside the existing PRN system is briefly described in Section 3.3.8, and the effects of unilaterally implementing a Welsh DRS are presented in Section 3.3.9. Finally, recommendations are made in Section 3.3.10 as to the best use of funding allocated for DRS trials.

3.3.7 Using Kerbside Collections as a Means of Returning Beverage Containers

The Welsh Government has long pursued policies based on kerbside collection of separately sorted materials from households, with the Collections Blueprint forming a key plank of the Welsh policy framework. Under a return-to-retail DRS, kerbside collection of glass, metals and plastics would of course continue. Glass jars, metal tins and non-beverage bottles (including milk bottles), along with pots, tubs and trays, will still need collection. In addition, consumers would be able to place their deposit-bearing beverage containers in the kerbside collection, although this would mean foregoing their deposit.

In theory there is nothing stopping local authorities from obtaining the full deposit value for containers collected at kerbside, or indeed from litter bins, as long as the container is not crushed, is not unduly contaminated and can therefore be read by RVMs or by automated counting machines (used by the system operator to verify manual returns from small retailers).

A slightly different approach is being adopted in the recently implemented New South Wales Container Deposit Scheme (CDS), as follows:[47]

> *Eligible containers in kerbside recycling will be able to be redeemed. The proposed scheme will allow material recovery facilities (MRFs) to use an EPA-approved method for accurately estimating the number of containers recovered in the facility and to claim the refund from the scheme coordinator. Under this proposed approach, an MRF would receive only the refund amount. It would not be able to claim a handling fee, but would also not need to separate out containers or substantially change its existing recovery processes. The proposed scheme would also provide a regulatory incentive for MRFs and local governments to share any benefits that may result from these arrangements.*

A submission on the proposed CDS from Local Government NSW notes that:[48]

> *For practical reasons it is not possible to return individual deposits to householders, however councils would use any refund value to offset waste service fees to ratepayers and/or expand waste and recycling services.*

If an approach were pursued whereby kerbside collected beverage containers were eligible for a refund based on *estimating* the number of collected containers rather than counting them, agreement would need to be reached between the DRS operator and local authority representatives as to:

- The methodology for estimating the number of collected containers; and
- The proportion of the initial deposit that will be returned for each container collected in this way.

In practice, it is likely that the DRS operator would not wish to refund the whole value of the deposit if containers collected and counted in this way were not actually returned into the DRS system for reprocessing. If local authorities instead looked to sell the materials themselves, in effect mixed with non-deposit bearing material, it would mean that the DRS operator would not obtain the material value, which is one of the three main sources of income for a DRS (alongside unredeemed deposits and producer fees). Accordingly, unless required to do so, they are likely to be reluctant to return all (or perhaps any) of the deposit for such containers and as such this would be an important consideration in scheme design.

If the Welsh Government sought to use existing kerbside collection as a channel for householders to return used beverage containers ***and*** to obtain the appropriate refund

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[47] New South Wales Environment Protection Authority (2017) Consultation Regulation Impact Assessment, New South Wales Container Deposit Scheme, May 2017, available at http://ris.pmc.gov.au/sites/default/files/posts/2017/06/ris_for_consultation_for_nsw_container_deposit_scheme.pdf

[48] Local Government NSW (2016) Draft Submission on NSW Container Deposit Scheme, February 2016, available at http://www.lgnsw.org.au/files/imce-uploads/127/lgnsw-final-draft-submission-on-cds-feb-2016.pdf

for doing so, there would be a number of possible ways to do this, although all would present practical challenges that would require innovative developments in DRS operation.

Firstly, in order to associate the used beverage container with the household, there would need to be some form of identification mechanism to link the used beverage containers with the household. This could be done in a number of ways:

- One approach would be to treat households in a similar way to small retailers in Norway. The householders (who wished to participate in this way) would need to register with the system operator, and they would then need to obtain sacks (for a fee) with identification tags that they could then use to return used beverage containers. They could place these tagged bags out for collection at kerbside. Once the beverage containers are counted at the counting centre, householder's bank account would be credited the refund by the system operator.
- Another would be for the beverage containers to be scanned at kerbside. This would require scanning technology on collection vehicles, and could either be done through a sack based approach, or potentially through bar code stickers, that identify the household, that the householder sticks to each used beverage container, so that this and the beverage container barcode can both be scanned. A perhaps simpler variant of this would be for a bar code sticker to be placed on the recycling container for each household. This could then be scanned prior to each individual beverage container within the recycling container being scanned at the vehicle.

Under the first approach, the used beverage containers would not be able to be crushed on the collection vehicle. This would reduce collection efficiencies relative to the current situation, where many households set out crushed cans and plastic bottles (and indeed relative to that achieved through compacting RVMs). However, assuming RVMs were used alongside kerbside collection in some way, overall volume constraints for beverage containers may not be adversely affected relative to today and there would be no delay at kerbside, as the tagged bags could be placed directly into the collection vehicle.

Under the second approach, there would be cost implications of setting up additional scanning equipment on all relevant collection vehicles, and there would be a time penalty at kerbside as scanning takes place, which might significantly constrain pass rates. However, compaction could take place on vehicles, assuming this was shown to make operational and financial sense. Requiring householders to affix stickers to beverage containers could be problematic if they are affixed in ways that obscure the beverage container barcode, or in ways that mean they can't be read by the scanners. Attaching stickers to the beverage containers also effectively introduces a contaminant. For this reason, the simpler variant of having a bar code sticker on the recycling container for each household might be preferable.

A more radical option would be to use kerbside as ***the primary*** take-back mechanism for beverage containers covered by a DRS. Under this approach, kerbside might be the only way to redeem used beverage containers. To do this in an efficient way based on current technology would likely require on vehicle scanning and perhaps compaction of used

beverage containers, while still linking the returned beverage container to the householder (which could be done via a bar code on the household recycling container) in order to obtain the refund. A complicating factor here could be houses with multiple occupants, where each occupant would need to register in order to get the refund, and linking collected containers back to the relevant occupant would be problematic Accordingly it might be sensible to have some other options for take-back such as RVMs at CA sites or other public locations. Additionally, there could be concerns about data collection on consumption habits by the system operator if redemptions were linked to the specific household.

A more efficient (from a collection point of view) approach might be for each household to scan the barcode of each container prior to setting it out for collection at the kerbside, perhaps using a smartphone app or a hand-held reader. Deposits could then be refunded to each householder via a registered bank account, potentially with cross-checking via householder scanning of a barcode printed on retail receipts each time deposit-bearing beverages are purchased. The primary barrier to this kind of approach would be the need for each beverage container to be uniquely identifiable, which would require a significant change to beverage packaging production processes.

A key design challenge that would have to be overcome in all approaches involving householders redeeming deposits via kerbside collection is susceptibility to fraud and theft at various points in the system. Some approaches are likely to be more susceptible than others, but all are likely to be more prone to such issues than RVM-based systems.

Finally, if kerbside were the sole means of returning used beverage containers, the DRS would be unlikely to have the same effect on litter reduction given the extra effort those consuming on the go in town/city centres or at major public events (eg. at music festivals) would have to incur to take used cans and bottles etc. back home rather than return them to a nearby store or other collection point. This drawback might be partly mitigated by developing a limited network of town centre RVMs (perhaps even on street), although balancing provision so as to primarily direct containers through kerbside collection whilst obtaining adequate litter avoidance benefits may be challenging.

Detailed modelling of these, and other options, was beyond the scope of the current study, and it should be noted that the ideas discussed above are largely untested elsewhere in the world. As such, the costs and benefits of using kerbside as a primary means of collecting DRS containers are at this stage speculative.

On the basis of Eunomia's current understanding of the operation of deposit systems around the world, and of their likely effect on local authority finances, we anticipate that a pure return-to retail approach, as is applied in Norway, would be a cost-effective approach that need not conflict with the Welsh Government's preferred approaches to kerbside collection. However, there would be merit in undertaking more detailed analysis of system design options in Wales, to more comprehensively determine the cost-effectiveness and wider impacts associated with options that involve kerbside collections to a greater or lesser extent.

It is therefore suggested that part of the £500,000 fund relating to deposit return schemes be used to support detailed modelling of a number of system design options, including, as a minimum:

- Return to retail
- Return to retail + return via kerbside
- Return primarily or only via kerbside

3.3.8 Relationship of a DRS to the Packaging Recovery Note System

A DRS would need to function alongside the existing Packaging Recovery Note (PRN) system of demonstrating compliance with packaging recycling targets (albeit the PRN system itself is likely to be either reformed or replaced in the relatively near future (see Appendix A.7.6.2). For the time being, the approach which we believe will be most straightforward is to maintain the existing obligations as they are, and treat the DRS much like a recycling collection scheme, which itself provides evidence of recycling of packaging.

3.3.9 Effects of Unilateral Implementation of a DRS in Wales

If a DRS were set up in Wales, but not England, a key challenge would be in terms of accurately labelling beverages sold in Wales (and thus bearing a deposit) and those sold just across the border in England (and not bearing a deposit). This would mean additional labelling and stock management costs for the beverage industry compared to the situation where a DRS were introduced UK-wide.

Distinct labelling would be required to prevent bottles sold in England being taken into Wales in order to redeem the deposit. The likelihood of this happening, in the absence of adequate preventative measures, is arguably greater than would be the case if Scotland alone proceeded with DRS. The Welsh border with England is much longer, and more 'porous' than the Scottish/English border, with many more people living in close proximity to the border.

While it would be possible to set up a Wales-only DRS it would likely be more costly, resulting in a higher producer fee per beverage container, than if it were part of a UK-wide DRS. The flow of beverage containers (once purchased) between Wales and England (and vice versa) would mean that return rates might be expected to be lower than would be the case under a UK-wide approach.

It is therefore recommended that the Welsh Government should seek, through engagement with counterparts in England and Scotland (at least), the implementation of at least a GB-wide, or ideally UK-wide DRS for beverage containers

If the Westminster Government decides against implementing a DRS or a beverage container tax, the Welsh Government could still proceed with a Wales-only DRS, with a number of options for initiating such a DRS:

- One possibility would be for the Welsh Government to require a 90% recycling rate for beverage containers under its existing powers relating to packaging waste. This would be expected to lead to the initiation of an industry-led DRS. Independent auditing would be required to verify the return rate.
- An alternative approach would be to seek to introduce a tax on all beverage containers placed on the market in Wales, with the size of the per-container tax being adjusted downwards as the recycling rate for the respective container type (e.g. plastic bottle, glass bottle, aluminium can etc.) increases. This would be expected to lead to the formation of an industry-led 'voluntary' DRS, as is the case in Norway, and individual fillers can choose whether or not to join the DRS. This could be designed such that, in effect only beverage containers that *aren't recycled* pay the tax. Again, independent auditing would be required to verify the return rate.
- Another possibility would be to legislate for a DRS, with the Welsh Government setting out the key performance parameters that the scheme operator would have to achieve, including the target recycling rate for beverage containers that must be met. This would include a requirement for independent auditing of the system operator's data on return rates in order to verify performance. If this approach were taken it would be sensible for a beverage container tax to be implemented alongside the DRS.

3.3.10 Funding for DRS Trials

It is understood that £500,000 is available within Wales to undertake pilot projects relating to a DRS. While the temptation might be to set up a local trial scheme, effectively a mock-up of a working DRS at a local level, this might not be the most useful approach. Such a trial would, of course be limited, both in terms of scale and effect, and it is not clear that the results would be representative of how a full-scale scheme would work.

Instead it is recommended that the £500,000 fund relating to deposit return schemes be used to support the following feasibility studies:

1) Detailed modelling to understand the relative cost-effectiveness, and other impacts, arising from using kerbside collections as a means, or potentially the primary means, of returning deposit-bearing beverage containers under a DRS;
2) Detailed modelling with each Welsh local authority to fully understand the operational changes they will need to make in order to maximise the savings realised once a DRS for beverage containers is implemented;
3) A comprehensive analysis of litter composition and prevalence, accounting for weight, volume and number of different items in order to establish a pre-DRS baseline against which the litter reduction effects of a DRS (and other

interventions such as a tax on single-use cups filled at the point of sale) can be subsequently measured; and

4) An investigation into the use of deposit-return mechanisms for items other than beverage containers. This should involve, in the first instance small scale trials of reusable cups and takeaway containers, in order to determine consumer and retailer acceptance, and explore the need for innovation (in terms of container type, delivery and return mechanism etc.) and potential for wider uptake.

3.4 Single-use Takeaway Cups

Single-use cups, which are filled at the point of sale, are a high-profile example of items that are not widely recycled, though a few dedicated facilities do exist for some specific material formats. In addition to problems relating to recyclability, a recent compositional analysis for the Welsh Government indicates that coffee cups accounted for 2.2% by weight of litter in litter bins, recycling on the go bins, and picked up by street cleansing teams via carts and manual sweeping, with the authors noting that: [49]

> *This is a lightweight material and the count of all the disposable coffee cups found during the analysis was 1,251 and would account for a considerable volume.*

Within this study the focus includes expanded polystyrene (EPS) cups, polyethylene (PE) coated card cups, and thermoformed PET/PP cups such as those used for milkshakes, smoothies and juices, and the lids and straws that are included with them at the point of sale.

Although both expanded polystyrene (EPS) cups and polyethylene (PE)-lined card cups are technically recyclable, they are not currently widely recycled. While much recent public focus has been on coffee cups, other types of cups, such as those used to serve smoothies or sodas, which frequently come with lids and straws, are also difficult to recycle, and are often observed in the litter stream.

Heightened public awareness of these issues has arisen from numerous media campaigns and led to initiatives to promote reusable options, with some outlets already offering discounts for those who bring a reusable mug – 25p in the case of Starbucks. Additionally, innovative approaches to encouraging a shift to reusables, such as the centrally-organised reusable cup subscription service start-up called CupClub are being trialled and have won recognition for their business model which sells a reuse service to multiple stakeholders. [50,51] This demonstrates that alternatives are clearly available to these single-use packaging types.

3.4.1 Current Levels of Consumption and Future Trends

Estimated levels of consumption are as follows:

- 237 million single-use coffee cups and 183 million coffee cup lids are consumed annually in Wales, representing around 2,500 tonnes of single-use coffee cups, and 550 tonnes of coffee cup lids.
- 320 million other single-use cups are consumed in Wales each year for drinks such as for smoothies, milkshakes, juices, etc. leading to waste arisings of 3,500 tonnes of other cups and 650 tonnes of associated lids in Wales.

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[49] Resource Futures for WRAP (2017), *Litter Composition Study – Wales,* March 2017
[50] CupClub (2017) available at: http://www.cup-club.co.uk/
[51] New Plastics Economy (2017) Innovation Prize Winners, available at https://newplasticseconomy.org/innovation-prize

Details of how these estimates were derived are presented in A.3.2.2. A summary of the estimated total waste generated and its fate are shown in Table 3-3.

Table 3-3: Estimated Cups and Lids breakdown for Wales (Tonnes)

	Estimated Total Waste Generated	Estimated Municipal Recycling	Estimated Municipal Residual	Estimated Litter (picked up from the ground each year)
Coffee Cups	2,600	6.5	2,400	200
Coffee Cup Lids	550	27	470	47
Straws	150	7.5	130	13
Other Cups	3500	60	3,200	300
Other Cup Lids	650	30	550	55
Total	7,500	130	6,700	600

High-level estimates of end-of-life management costs were derived. These are reported for Single-Use Cups, Lids and Straws in Table 3-4. It should be noted that these costs are arguably very conservative, especially for the litter costs, as they are calculated on the basis of weight alone, and do not account for the high volume of these items which is likely to have an effect of the costs of litter clearance. Furthermore, no account is taken of the disamenity costs associated with littered items, nor of the wider costs of such items that remain in the wider environment, either on land or in the sea.

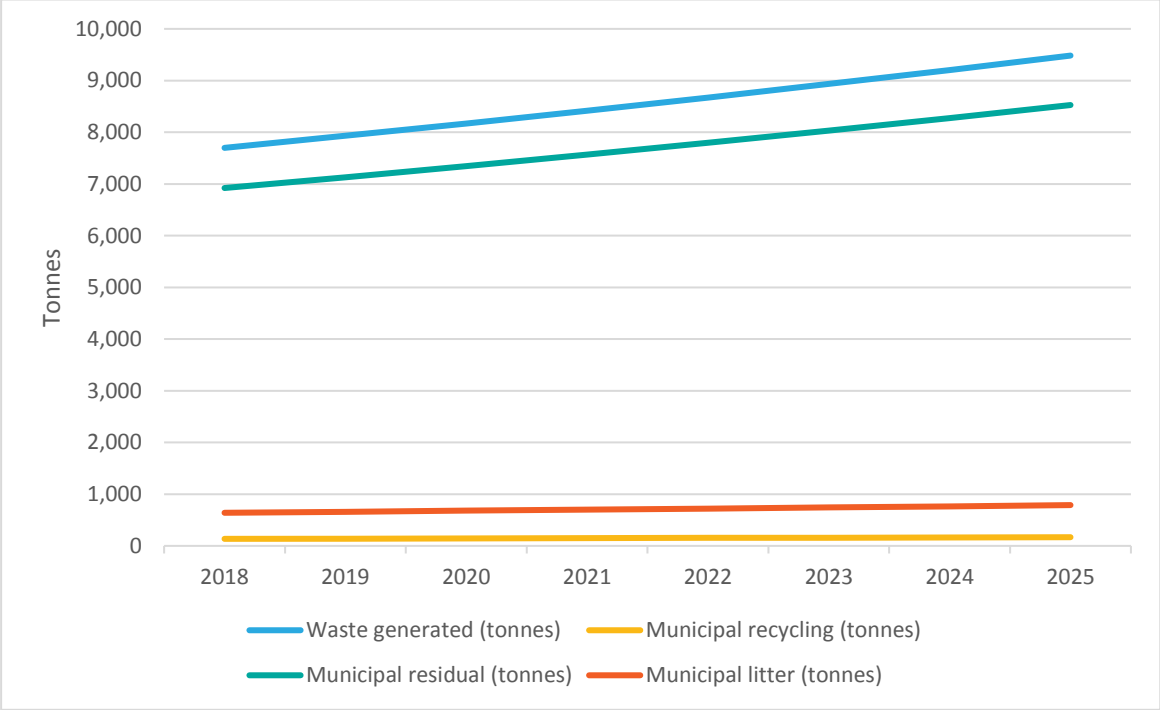
An explanation of the methodology can be found in Appendix A.9.0

Table 3-4: Indicative End of Life Costs

Item	Costs in Municipal Residual Waste	Cost in Municipal Recycling	Cost of Collecting Littered Items from the Ground
Cups (all disposable)	£970,000	£2,500	£1,150,000
Lids (all disposable)	£165,000	£4,800	£230,000
Straws	£20,000	£600	£30,000

Takeaway coffee is a market that continues to experience high levels of growth. As such, forecasts for coffee cups and lids were made based on market research that suggests an annual increase in consumption of 5.8% over the next five years, with consumption of other cups and lids forecast to increase by 1.15% per annum.[52,53] These figures were then apportioned based on each item's overall prevalence in the waste stream, resulting in an annual increase of 3.12% for the entire category. Tonnage forecasts were then calculated using this figure. Figure 3-2 shows the results of this analysis.

Figure 3-2: Tonnage Forecasts: Cups and Lids, Wales, 2018-2025



Source: Eunomia R&C

3.4.2 Shortlisted Options

The following options were shortlisted:

1) A consumer-facing financial incentive;
2) Mandatory provision of take back facilities for single-use cups in stores;
3) A ban on single-use cups as an eat-in option;
4) Mandatory use of reusables supported by DRS; and

[52] Mintel Research (2017) Grande Growth: UK coffee shop sales enjoy a growth high, 12th April 2017, http://www.mintel.com/press-centre/food-and-drink/uk-coffee-shop-sales-enjoy-a-growth-high
[53] Technavio (2015) Global Cups and Lids Market 2015 – 2019, February 2015, https://www.technavio.com/report/global-cups-and-lids-market-2015-2019

5) EPR for single-use cups.

Full consideration of the likely impacts on relevant stakeholders for each of these options is presented in Appendix A.8.1. In the sections below we describe the options, their anticipated effects in terms of waste prevention, litter prevention, and cost coverage, and discuss specific implementation considerations if the option were adopted.

3.4.2.1 Consumer Facing Financial Incentive

This would take the form of a payment at the point of sale for the use of a single-use cup and lid, with reusable containers being available as alternative. This could be in the form of a charge, much like the plastic bag charge, with funds initially going to industry but potentially ultimately being directed to charity, or a tax, with revenue accruing to central government. The Welsh Government could implement either a charge or a tax, as the intention would be to prevent waste, and by extension litter, through incentivising consumers to shift towards the use of reusable cups in order to avoid the tax/charge.

It is difficult to estimate the extent to which a reduction in use of disposable coffee cups might be achieved. It would be unlikely that such a dramatic reduction as that seen with carrier bags would be achieved. In the case of carrier bags, the charge of 5p was applied to something that was usually given away 'for free'. However, with cups used to serve beverages, the increase in cost will proportionally smaller (perhaps 25p on top of circa £2 cup of for a takeaway coffee). However, reductions in the order of 30% - perhaps not immediately, but over time - do not feel wildly wide of the mark.[54] The extent of consumer uptake of reusables where discounts by individual chains are offered (with uptake typically being very low – circa 1-2%) is not indicative of the likely magnitude of change if a Wales-wide tax or charge were to be implemented. For the consumer, it is currently a confusing 'landscape', with different retailers offering different incentives, and some offering no incentive. Furthermore, there is no guarantee to consumers that even the incentives offered at present will endure.

By contrast, a tax or charge on all single-use cups filled at the point of sale, for hot and cold beverages, and applied to all retailers, will give consumers certainty that investing in a reusable cup will pay for itself after a certain number of uses. Uptake of reusables will thus be greater than currently witnessed.

While the primary aim of a tax or charge would be waste prevention, it's also important to consider the amount of money that would be raised. This depends on both the level of the tax or charge, and the level of reduction achieved. A range of possible outcomes and associated revenues are shown in Table 3-5. By way of example, if a tax of 25 pence

[54] Eunomia Research & Consulting (2017) Environmental Audit Committee Inquiry: Disposable Packaging: Coffee Cups and Plastic Bottles – Written Evidence from Eunomia Research & Consulting Ltd, available at http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/packaging/written/70645.pdf

led to a reduction in consumption of 30%, the gross revenue raised would be £97.5 million per annum.

Table 3-5: Revenues (£m per annum) from a Tax on All Single-use Takeaway Cups: Varying Level of tax and % Reduction

Reduction	Level of Tax (Pence)				
	5	10	15	20	25
10%	25.1	50.1	75.2	100.3	125.3
20%	22.3	44.6	66.9	89.1	111.4
30%	19.5	39.0	58.5	78.0	97.5
40%	16.7	33.4	50.1	66.9	83.6
50%	13.9	27.9	41.8	55.7	69.6
60%	11.1	22.3	33.4	44.6	55.7
70%	8.4	16.7	25.1	33.4	41.8
80%	5.6	11.1	16.7	22.3	27.9

It has been suggested by some stakeholders that money raised should be used to fund collection infrastructure for coffee cup recycling. However, this would mean undermining the principle of extended producer responsibility, whereby producers should bear the full end of life costs for management of their waste, including that which is littered. The income raised from a measure designed to change consumer behaviour, and reduce consumption, and thus littering of specific single-use plastic items should not be used to cover costs that producers should themselves bear. Such costs should instead be covered under an EPR scheme.

While the waste prevention effects of a tax or a charge would be the same, a tax would seem preferable. A tax would avoid the risks – that could occur with a charge – that funds disbursed by retailers displace CSR spending, and lead to undue influence over recipients, who themselves might become overly dependent upon the proceeds of the charge, potentially limiting their support for high ambition in respect of waste and litter prevention.

There would be merit in the tax applying to all retail outlets, with no exemptions for smaller retailers.[55] One reason for this is that small coffee shops, for example, are likely to be paying more at present for the purchase of single-use cups in which to serve their drinks than the larger retailers who will benefit from bulk purchasing. All retailers will avoid the cost of supplying a cup when customers use reusables. Another reason for not

[55] While there may be an administrative impact, this is likely to be small. However, retailers could be permitted to deduct a reasonable administrative cost from the gross proceeds of the tax before passing on net tax to Welsh Government.

having exemptions is to maximise the intended shift in preference for reusables through creation of a social norm.

Provision would need to be made for single-use takeaway cups and associated drinks supplied via automatic dispensing machines. Consideration would need to be given to the way in which the tax would be applied, and whether customers could use their own cups. It might be that it is not possible for customers to use their own cup in such cases, and if so a tax would have to be applied to every beverage consumed from such machines. However, given sufficient notice of an impending tax, companies selling coffee and other beverages via such machines would need to make the commercial decision as to whether or not to adapt the machines to accept customers' reusable cups and allow them to avoid the tax.

The level of the tax would need some consideration. All things being equal the higher the tax, the greater the waste prevention effect. A level of 25 pence might be appropriate as a starting point, as this represents the discount that major coffee chains currently offer. It would be important that the implementing legislation allowed for future revisions to the level of the tax in order to:

- Maintain the effectiveness of the tax when account is taken of inflation; and/or
- To increase the level of the tax in order to stimulate further waste prevention

3.4.2.2 Mandatory Provision of Take Back Facilities

This would involve retailers who sell beverages in single-use cups and lids having to accept consumers returning any single-use cup and lid to their stores regardless of where it had been purchased, in effect creating a network of return points. This is the policy that Costa Coffee currently implements.

The intention of this measure is that it will encourage industry to build upon the good work of those engaging voluntarily with schemes such as Simply Cups which offer a collection service for plastic-lined paper cups for transportation to one of a few dedicated recycling facilities around the country.[56] Industry representatives at the November Workshop suggested that this option might be combined with a recyclability requirement so that a certain quality of returned cup is maintained. Of course such a requirement for recyclability could be introduced under an EPR scheme for single-use cups.

Exemptions would have to be considered for small retailers, especially those in areas of high footfall who would otherwise be likely to have a very large number of cups and lids returned to them.

This measure would not lead to waste prevention, but could lead to a reduction in littering if consumers see returning the cup to a store as easier than littering it (albeit there would be no positive financial incentive to return the cup).

[56] Simply Cups (2016), available at http://www.simplycups.co.uk/

3.4.2.3 A Ban on Single-use Cups for Drinks Consumed on the Premises

This option would require anyone serving beverages to be consumed on the premises to serve them in reusable cups. The extent to which this option would result in waste prevention would depend on the number of stores currently offering single-use cups for beverages consumed on the premises, for which there is not, at present, robust data.

However, as a number of the largest retailers run on a business model of offering only single-use for eat-in, such as McDonald's, it is likely this could result in a substantial reduction in waste. It is possible that there could be an unintended consequence for littering if consumers shifted instead to takeaway in preference to consumption on the premises, however this seems an unlikely scenario.

Notwithstanding these considerations, it is understood that the Welsh Government may not actually have the legal powers to implement such a ban for all premises.[57]

An alternative would be to use existing powers under the Waste (England and Wales) Regulations 2011.[58] As per Regulation 12 every business must, as part of its Waste Transfer Note, confirm that it has properly applied the hierarchy to its waste. Waste prevention would be achieved, for example, by using reusable cups for beverages consumed on the premises.

Applying the hierarchy is a duty on businesses that produce or handle waste, and Natural Resources Wales has the duty to enforce compliance in Wales. However, the awareness of this requirement on the part of businesses seems to be very low. Increasing awareness would seem to offer the potential for bringing about waste prevention, not just in respect of single-use cups, but also for other items where reusable alternatives are available.

3.4.2.4 Mandatory Use of Reusables Supported by DRS

This would involve the complete phase out of single-use cups and lids for beverages to be replaced by the use of reusable cups only. A deposit on such reusable cups (higher than the value of cup itself) would incentivise high levels of return. Consumers would still be allowed to bring their own reusable cups to retailers.

A system similar to this has recently been trialled in London by the company Cup Club, which was one of the winners of the New Plastics Economy Innovation Prize.[59]

This option might best be considered after one or more of the other options have been implemented, and have already delivered some shift towards reusables. This option

[57] However, the Welsh Government could mandate that in all government buildings single-use food and drink packaging is not offered in eat-in contexts such as cafeterias.
[58] See http://www.legislation.gov.uk/uksi/2011/988/regulation/12/made
[59] New Plastics Economy (2017) Innovation Prize Winners, available at https://newplasticseconomy.org/innovation-prize

could therefore be the final step in a phased path towards 100% use of reusable containers, once use of reusables has been increased through other measures.

It might be advisable to run one or more pilots in environments such as markets or shopping centres hosting a number of beverage retailers. These could be used to uncover important lessons about implementation, and gauge public appetite for such a scheme.

3.4.2.5 EPR for Single-use Cups and Lids

Measures such as a tax on single-use cups will lead to waste prevention through reducing consumption. For the single-use cups that continue to be used, in line with EPR principles, the full net end of life costs should be covered by producers. An outline indication of the end of life costs associated with single-use cups in Wales was given in Table 3-4. However, this is a very conservative estimate of the actual costs, as it is based on apportioning overall costs of litter by weight, whereas the number of items, and the overall volume of items (number of items x unit volume) is likely to be an important influencing factor on costs.

It is suggested that rather than seek to implement EPR just for single-use cups, the Welsh Government should work with the other UK administrations to develop a reformed UK-wide system of EPR for *all* packaging. This should make use of fee modulation to incentivise design for recyclability and the incorporation of recycled content. The Welsh Government should therefore, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across all packaging types. However, if the Welsh Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious the Welsh Government could introduce its own EPR scheme for packaging.

3.4.3 Summary

Table 3-6 summarises the estimated ability of each of the options discussed here to achieve the Welsh Government's desired strategic outcomes.

Table 3-6: Assessment against Desired Outcomes

Outcome	Consumer-facing financial incentive	Mandatory provision of take back facilities in stores	Ban on single use cups as an eat-in option	Mandatory use of reusables supported by DRS	Modulated EPR (for all packaging types)
Producers bear 100% net cost	No – this would not be EPR, but a mechanism to bring about waste prevention (which is something that EPR alone couldn't do)	No – as such a scheme would only cover the costs of managing the cups returned to such facilities, and not those in litter, or other waste streams	No	Not applicable in this instance as no single-use packaging would be used	Yes – can be designed to ensure this
Reduces waste and increases reuse, repair, remanufacture and recycling	Yes – would bring about waste prevention. The extent to which this would occur will depend in large part on the level of the financial incentive (i.e. tax or charge)	Could be expected to increase recycling of cups. The extent to which this would happen will depend on consumer use of these take back facilities (for which no financial incentive to do so would be anticipated).	Yes – it would prevent waste through requiring the use of reusables for consumption on the premises	Yes – would prevent waste	Partially – can be designed to incentivise design for recyclability
Increases recycled content of packaging	No – this would not incentivise recycled content	No	No	The reusables may incorporate recycled content but this measure would not incentivise this	Yes – can be designed to incentivise this
Ensures the optimal 'low carbon' approach	While the Welsh Government can't be sure how many times those who purchase reusables will use	Not necessarily – while an increase in recycling would be welcome, prevention would be preferable.	As it will lead to high levels of reuse for consumption on premises it can be	With high levels of reuse this should lead to carbon savings	Yes – if designed with this in mind

Outcome	Consumer-facing financial incentive	Mandatory provision of take back facilities in stores	Ban on single use cups as an eat-in option	Mandatory use of reusables supported by DRS	Modulated EPR (for all packaging types)
	them in place of single-use cups, a universal, and consistently applied, financial incentive makes more reuse, and thus carbon savings, more likely.		expected to reduce carbon for consumption in such locations		
Tackles litter arising	Yes – reducing the use of disposable cups would be expected to reduce the amount that end up in litter bins (freeing up bin space), or littered directly on the ground.	Potentially – if use of the facility displaced littering, or the placement of cups in litter bins (thus freeing up space in the bins)	Potentially in a limited way, if it means consumers stay on the premises to finish their drink, rather than take it away with them	Yes – would completely avoid litter from takeaway cups	Not directly – albeit financial responsibility for the littered fraction of cups may lead to anti-litter interventions
Engages the whole supply chain	To the extent that overall levels of consumption would decline, yes the whole supply chain would be engaged/affected. Likely to stimulate the supply chain for reusable cups	Potentially – but would depend on how it were funded	No	No – in the absence of any single-use cups the packaging supply chain would not be involved	Yes – if so designed, the financial signals will carry up the supply chain and influence the design stage accordingly.
Maximises what's 'best for Wales' overall	Yes – in preventing waste (the primary aim) and at the same time raising revenue that can be allocated as required within Wales. In	Would not lead to waste prevention, and wouldn't amount to full cost-coverage, so no.	Would not be as effective in this regard as other options	This would significantly reduce littering of takeaway cups, and would prevent waste.	Yes – in particular the overall financial burden will shift away from

Outcome	Consumer-facing financial incentive	Mandatory provision of take back facilities in stores	Ban on single use cups as an eat-in option	Mandatory use of reusables supported by DRS	Modulated EPR (for all packaging types)
	this respect a tax is preferable to a charge.			However, it would be sensible to test the approach as a small scale pilot in the first instance.	citizens/taxpayers towards consumers/producers
Increases consumer awareness	Yes – a universally applied tax or charge, with no exemptions, would lead to very high levels of consumer awareness	Yes	Yes	Yes	Yes – and it will be in the direct financial interest of producers to increase consumer awareness as to what can be recycled.
Meets WFD Art 4 requirements	Yes – would lead to waste prevention, which is top of the waste hierarchy	Could lead to more recycling as opposed to recovery/disposal, but would not lead to waste prevention	Yes – in preventing waste (which is readily avoidable)	Yes – would bring about waste prevention	Yes – full cost coverage and modulated fees should shift materials up the hierarchy from recovery/disposal to recycling. However, EPR alone will not lead to waste prevention.

Outcome	Consumer-facing financial incentive	Mandatory provision of take back facilities in stores	Ban on single use cups as an eat-in option	Mandatory use of reusables supported by DRS	Modulated EPR (for all packaging types)
Meets new WFD Art 8a requirements	This would not be EPR, but would reduce the amount of packaging waste that would need to be paid for under an EPR scheme. Would thus work well alongside a comprehensive EPR scheme.	No – wouldn't on its own lead to full cost coverage. Costs would only be covered for the fraction returned to stores	No	Would not be relevant in this case as single-use packaging would not be used for take-away beverages	Yes – if designed to ensure full cost coverage
Meets PPWD 94/62/EC requirements	Yes – will be preventing packaging waste	Would help to increase recycling	Would potentially be subject to challenge. Understood to not be within the direct legal powers of the Welsh Government	Would not be relevant in this case as single-use packaging would not be used for take-away beverages	Yes

3.5 Takeaway Food Packaging (filled at the point of sale)

Takeaway food packaging - filled at the point of sale - including clamshells made of Expanded Polystyrene EPS, lined/waxed paper, and other rigid plastics are common due to their low cost, light weight, durability and insulating properties.

Even if disposed of correctly, high amounts of food contamination, particularly for such food packaging types as pizza boxes and chip wrapping, make such items technically difficult to recycle. Although increased awareness amongst brands of the negative public perception of EPS has prompted a switch to PE-coated card and paper composites, usually packaged together with plastic films, adoption of these materials does not address the issues of litter and recyclability associated with takeaway packaging.

Alternatives exist to single-use takeaway in the form of reusable takeaway container schemes such as the sustainable tiffin scheme currently operated by the Thali chain of restaurants. Notably, the Asian Catering Federation (ACF) has announced plans for introduction of a nationwide Tiffin Club which will allow ACF's 35,000 members to purchase reusable tiffin sets which they then provide to customers in return for a refundable £20 deposit, a £5 membership fee and an £5 donation to a partner charity targeting marine plastic such as the Marine Conservation Society. It should be noted that these figures are still being finalised and are subject to change.

3.5.1 Current Levels of Consumption and Future Trends

While data is poor, it is estimated that 949 tonnes of takeaway food packaging waste are generated in Wales each year, of which we estimate that only 8.5% is recycled.

It is estimated that takeaway food packaging waste accounts for 1.6% by weight of litter on the ground and in litter bins, but accounts for a larger proportion overall by volume. The prevalence of EPS in litter, and associated concern over its impacts on the marine environment, has prompted calls for a ban on its use for takeaway packaging in Wales.[60]

The estimated tonnages and fates are shown in Table 3-7. An explanation of the methodology for calculating the estimates can be found in AppendixA.3.2.3.

[60] National Assembly for Wales website, Petition no. P-04-547 - Ban Polystyrene(EPS) Fast Food and Drinks Packaging, accessible at: http://senedd.assembly.wales/mgIssueHistoryHome.aspx?IId=9628&Opt=0

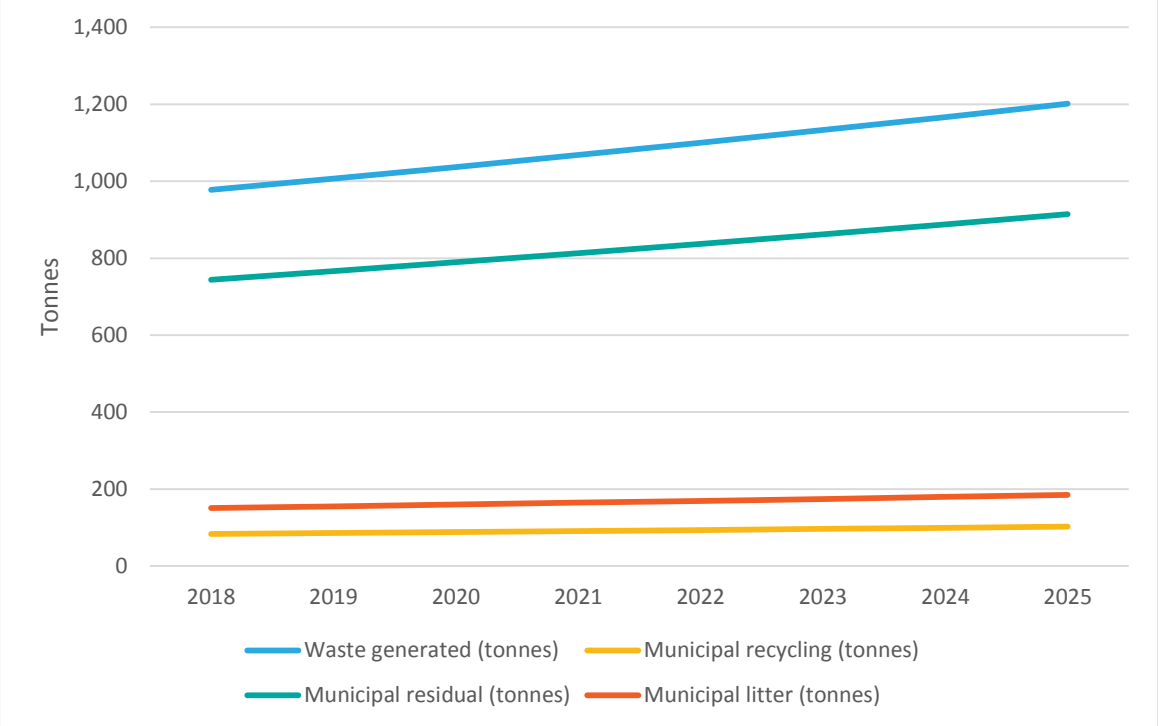
Table 3-7: Estimated Takeaway Packaging breakdown for Wales (tonnes)

	Estimated Waste Generated	Estimated Municipal Recycling	Estimated Municipal Residual	Estimated Litter (picked up from the ground each year)
Takeaway Food Packaging	950	80	700	150

Note: In the absence of waste specific data, tonnage is assumed to be the equivalent to all items put onto the market.

Consumption is expected to increase at circa 3% each year, and in the absence of any policy intervention, fates are anticipated to be as shown in Figure 3-3.

Figure 3-3: Tonnage Forecasts, Takeaway Packaging, Wales, 2018 - 2025



Source: Eunomia R&C

3.5.2 Shortlisted Options

The following options were shortlisted:

1) A consumer-facing financial incentive;
2) A ban on single-use packaging for food consumed on the premises; and
3) EPR for takeaway food packaging.

Full consideration of the likely impacts on relevant stakeholders for each of these options is presented in Appendix A.8.2. In the sections below we describe the options, their anticipated effects in terms of waste prevention, litter prevention, and cost coverage, and discuss specific implementation considerations if the option were adopted.

3.5.2.1 Consumer Facing Financial Incentive

From the consumer perspective this would take the form of a visible fee payable at the point of sale for takeaway single-use food packaging filled at the point of sale. The fee could be avoided if reusable containers were used. This could be in the form of a charge, much like the plastic bag charge, with funds initially going to industry but potentially ultimately being directed to charity, or a tax, with revenue accruing to central government. The intention would be to prevent waste, and by extension litter, through incentivising consumers to shift towards the use of reusable takeaway food packaging in order to avoid the tax/charge, and thus bringing about waste prevention.

However, while reusable packaging for takeaway food already exists in some markets segments (such as in the tiffin scheme), with a certain level of consumer acceptance, such alternatives have not yet been trialled in other segments of the market.

In addition, concerns were raised by industry representatives at the stakeholder workshops regarding hygiene and liability if retailers were required to accept a customer's reusable container. Although these concerns are understandable, they could potentially be solved by allowing retailers to set criteria for those containers that they will accept such as:

- Rigidity of material;
- Size;
- Having a secure lid; and
- Cleanliness.

The right to set such criteria is currently exercised by Costa Coffee in their terms and conditions for the acceptance of reusable cups.[61]

Given these concerns, it would seem sensible in the first instance to undertake trials of reusable take-away packaging, perhaps within specific areas such as covered, permanent markets, in order to better understand consumer and retailer acceptance. Once likely

[61] Costa Coffee (2017) Our cups, available at: https://www.costa.co.uk/terms#reusable

consumer acceptance, and the concerns about hygiene, are better understood as a result of the trials, the Welsh Government should explore the merit of a tax at the point of sale on single-use takeaway food packaging where viable reusable alternatives have been shown to exist.

3.5.2.2 A Ban on Single-Use Food Packaging for Food Consumed on the Premises

This option would require anyone serving food to be consumed on the premises to use alternatives to single-use packaging, such as ceramic crockery, and metal cutlery. The extent to which this option would result in waste prevention would depend on the number of stores currently offering single-use packaging for food consumed on the premises, for which there is not, at present, robust data.

However, as a number of the largest retailers run on a business model of offering only single-use packaging for eat-in, such as McDonald's, it is likely this could result in a substantial reduction in waste. It is possible that there could be an unintended consequence for littering if consumers shifted instead to takeaway in preference to consumption on the premises, however this seems an unlikely scenario.

Notwithstanding these considerations, it is understood that the Welsh Government may not actually have the legal powers to implement such a ban for all premises.[62]

An alternative would be to use existing powers under the Waste (England and Wales) Regulations 2011.[63] As per Regulation 12 every business must, as part of its Waste Transfer Note, confirm that it has properly applied the hierarchy to its waste. Waste prevention would be achieved, for example, by using ceramic crockery and metal cutlery for food consumed on the premises.

Applying the hierarchy is a duty on businesses that produce or handle waste, and Natural Resources Wales has the duty to enforce compliance in Wales. However, the awareness of this requirement on the part of businesses seems to be very low. Increasing awareness would seem to offer the potential for bringing about waste prevention.

3.5.2.3 EPR for Takeaway Food Packaging Filled at the Point of Sale

An outline indication of the end of life costs associated with takeaway food packaging filled at the point of sale in Wales is shown in Appendix A.9.0. However, this is a very conservative estimate of the actual costs, as it is based on apportioning overall costs of litter by weight, whereas the number of items, and the overall volume of items (number of items x unit volume) is likely to be an important influencing factor on costs.

It is suggested that rather than seek to implement EPR just for takeaway food packaging filled at the point of sale, the Welsh Government should work with the other UK

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[62] However, the Welsh Government could mandate that in all government buildings single-use food and drink packaging is not offered in eat-in contexts such as cafeterias.
[63] See http://www.legislation.gov.uk/uksi/2011/988/regulation/12/made

administrations to develop a reformed UK-wide system of EPR for *all* packaging. This should make use of fee modulation to incentivise design for recyclability and the incorporation of recycled content. The Welsh Government should therefore, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across all packaging types. However, if the Welsh Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious the Welsh Government could introduce its own EPR scheme for packaging.

There is a large variety in takeaway food packaging and the contexts within which it is used, which results in a wide variety of litter and waste management impacts. Important distinctions can be made, for example, between;

1) Takeaway meal types which are more likely to be eaten out and those which are more likely to be taken home e.g. Chinese takeaway as opposed to kebabs; and
2) The EPS and lined/waxed paper and card, foil and card containers and reusable plastic tubs traditionally used by takeaway small businesses, such as independently-owned chip shops, kebab houses and so on, versus the own-branded packaging made from recyclable paper and card, typically used by large fast-food chains such as McDonalds, Subway and KFC.

Modulation of an EPR fee (as part of a wider EPR scheme for all packaging) could potentially take into account these variations, albeit variations in material type might be easier to account for in an EPR scheme than the context, with the latter potentially subject to some uncertainty.

3.5.3 Summary

Table 3-8 summarises the estimated ability of each of the options discussed here to achieve the Welsh Government's desired strategic outcomes.

Table 3-8: Assessment against Desired Outcomes

Outcome	Consumer-facing financial incentive	Ban on single use food packaging for consumption on the premises	Modulated EPR (for all packaging types)
Producers bear 100% net cost	No - this would not be EPR, but a mechanism to bring about waste prevention (which is something that EPR alone couldn't do)	No	Yes – can be designed to ensure this
Reduces waste and increases reuse, repair, remanufacture and recycling	Yes – would bring about waste prevention. The extent to which this would occur would depend in part on the level of the financial incentive (i.e. tax or charge) and the availability and public acceptance of reusable alternatives	Yes – it would prevent waste through requiring the use of reusables, such as ceramic crockery and metal cutlery for consumption of food on the premises	Partially – can be designed to incentivise design for recyclability
Increases recycled content of packaging	No – recycled content wouldn't be incentivised	No	Yes – can be designed to incentivise this
Ensures the optimal 'low carbon' approach	Potentially – depending on the level of uptake of the reusable alternatives, and the nature of the materials from which they are made	As it will lead to high levels of reuse for consumption on premises it can be expected to reduce carbon for consumption in such locations	Yes – if designed with this in mind
Tackles litter arising	Yes - reducing the use of single-use takeaway food packaging would be expected to reduce the amount that	Potentially in a limited way, if it means consumers stay on the premises to finish their food,	Not directly – albeit financial responsibility for the littered fraction of takeaway food packaging filled at

Outcome	Consumer-facing financial incentive	Ban on single use food packaging for consumption on the premises	Modulated EPR (for all packaging types)
	end up in litter bins (freeing up bin space), or littered directly on the ground.	rather than be tempted to take it away with them to finish, which might happen at present	the point of sale may lead to anti-litter interventions
Engages the whole supply chain	To the extent that overall levels of consumption would decline, yes the whole supply chain would be engaged/affected. Likely to stimulate the supply chain for reusable alternatives	No	Yes – if so designed, the financial signals will carry up the supply chain and influence the design stage accordingly.
Maximises what's 'best for Wales' overall	Yes – in preventing waste (the primary aim) and at the same time raising revenue that can be allocated as required within Wales. In this respect a tax is preferable to a charge.	Would not be as effective in this regard as other options.	Yes – in particular the overall financial burden will shift away from citizens/taxpayers towards consumers/producers
Increases consumer awareness	Yes – a universally applied tax or charge, with no exemptions, would lead to very high levels of consumer awareness. However, alternatives have to be readily available, concerns about hygiene addressed, and consumer acceptance of reusables better understood	Yes	Yes – and it will be in the direct financial interest of producers to increase consumer awareness as to what can be recycled.

Outcome	Consumer-facing financial incentive	Ban on single use food packaging for consumption on the premises	Modulated EPR (for all packaging types)
Meets WFD Art 4 requirements	Yes – would be expected to lead to waste prevention, which is top of the waste hierarchy	Yes - in preventing waste	Yes – full cost coverage and modulated fees should shift materials up the hierarchy from recovery/disposal to recycling. However, EPR alone will not lead to waste prevention.
Meets new WFD Art 8a requirements	This would not be EPR, but would reduce the amount of packaging waste that would need to be paid for under an EPR scheme. Would thus potentially work well alongside a comprehensive EPR scheme.	No	Yes – if designed to ensure full cost coverage
Meets PPWD 94/62/EC requirements	Yes – will be preventing packaging waste	Would potentially be subject to challenge. Understood to not be within the direct legal powers of the Welsh Government	Yes

3.6 Single Portion Sachets, Pots, etc.

This category of food packaging includes small, single-use, individual portion packs of condiments, conserves, and instant beverages, packaged in sachets, mini-pots, sticks etc. Such packaging is usually made of either multi-layer flexible materials or laminates, such as polyethylene coated paper, plastic coated foils, and so on, or of several materials, e.g. plastic pots with a foil/ plastic peel-back top. They are usually consumed on the go, or at cafes and restaurants, and are difficult to rinse, separate, and recycle. As a result, they usually end up in the residual stream, or littered – sometimes being blown away from terraces or other locations where customers are outside.

Due to their small size and large surface area relative to their volume, they tend to be a highly contaminated (including through remnants of the product they contained) and dispersed waste stream, which would be expensive to separately collect, sort, and wash, even if technically recyclable. They can also lead to contamination of separate food waste when incorrectly disposed of – a problem that is sometimes exacerbated by the design of such items, with tear-able strips, seals and caps that become separated from the main body of the packaging, which makes them difficult to detect and separate from food waste. Finally, even when they are disposed of and collected correctly, they pose problems for sorting technology as they often slip through trommel screens, or are too small and contaminated to be detected.

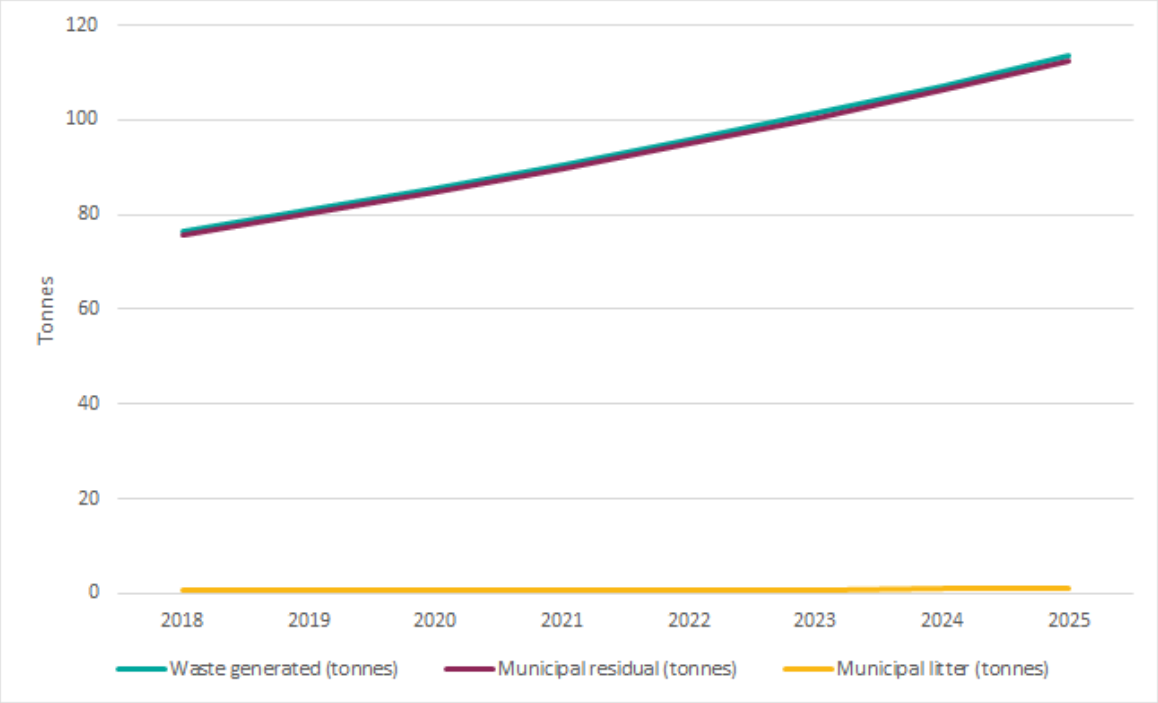
In terms of alternatives, single portion condiments are already available in range of formats, including either single material rigid or flexible plastics, a combination of the two, or simple paper alternatives (for dry goods like sugar, salt, etc.). While paper alternatives might appear attractive due to their ability to biodegrade and compost, they are clearly an unsuitable format for condiments like ketchup etc. Rigid plastic pots or mini-bottles with rigid plastic lids or caps might similarly appear attractive from the perspective of being potentially reusable though the likelihood of such items getting reused might well be limited in reality. In addition, such items tend to be disposed of in the residual stream, where they are too small and contaminated to be separated for recycling. As such, it is unlikely that a single packaging format will be suitable to address the issues of concern in this category, while simultaneously providing the functionality required of this pack format for various products. However, clear alternatives exist to the use of multi-layer packaging for single portion foods in the form of either switching to larger, re-usable dispensers for condiments, or to single material alternatives where they are unavoidable.

3.6.1 Current Levels of Consumption and Future Trends

While data is poor, it is estimated that approximately 72 tonnes of single serve sachets for food and drink packaging are consumed in Wales each year, of which we estimate that 71 tonnes ends up in residual waste, and 1 tonne is littered on the ground and subsequently picked up by local authorities. The assumptions upon which these figures are based are presented in Appendix A.3.2.4.

It is important to note that the lightweight nature of these items makes weight-based estimates of litter prevalence potentially misleading – a tonne of littered sachets is equivalent to around 1 million items. Growth in consumption is estimated to be 5.8% per annum, meaning a circa 64% increase over the period to 2025. Forecast consumption (deemed to be equivalent to waste generation) and anticipated fate of these sachets, in the absence of any interventions, are shown in Figure 3-4.

Figure 3-4: Tonnage Forecasts, Single Serve Sachets, Wales, 2018 - 2025



Source: Eunomia R&C

3.6.2 Shortlisted Options

The following options were shortlisted:

1) A consumer-facing financial incentive; and
2) EPR for single-portion sachets, pots etc.

Full consideration of the likely impacts on relevant stakeholders for each of these options is presented in Appendix A.8.4. In the sections below we describe the options, their anticipated effects in terms of waste prevention, litter prevention, and cost coverage, and discuss specific implementation considerations if the option were adopted.

3.6.2.1 A Consumer Facing Financial Incentive

This would take the form of a visible fee payable at the point of sale for single-portion sachets, pots etc. This could be in the form of a charge, much like the plastic bag charge, with funds initially going to industry but ultimately being directed to charity, or a tax,

with revenue accruing to central government. The Welsh Government, subject to the agreement of both Houses of Parliament and UK Government, has the power to implement either a charge or a tax, as the intention would be to prevent waste, and by extension litter, through incentivising consumers to reduce consumption of single-portion sachets and pots, and instead move towards the use of condiment dispensers.

However, if a tax or charge were implemented, the possible absence of alternatives at specific establishment implies that some consumers might feel unfairly penalised for a behaviour they have no choice but to adopt (if they want condiments). Therefore, this option further requires reusable alternatives (in the form of condiment dispensers, salt and pepper shakers, sugar cubes, etc.) to be made available at all establishments providing single portion packaging for such items.

The requirement to have reusable alternatives would seem to be feasible, given that such approaches are already used in numerous establishments. This is perhaps unsurprising given that purchasing sauces, for example, in bulk (i.e. in 1l or 4l recyclable plastic bottle or tub formats instead of boxes of 250x10ml sachets) can offer savings of 60% - 85%.[64] In some cases ketchup, mustard, brown sauce and vinegar from bottles or dispensers are provided for use free of charge, with a charge (as high as 35p reported for one shop) for sachets for either these condiments, or others like mayonnaise etc. [65]

However, it's clear that there is not necessarily a 'one-size-fits-all' approach to identifying the most suitable alternatives in every circumstance (as opposed to the case of single-use takeaway cups, where reusable cups are an obvious alternative). It may be that for more perishable condiments such as mayonnaise, tartare sauce etc., or for condiments that are less commonly used in specific establishments, exemptions may be required to ensure product integrity is maintained and that additional food waste is avoided. Some kiosks and other smaller locations may also seek an exemption based on lack of space.

Given these considerations, it may be more appropriate in the first instance to use existing powers under the Waste (England and Wales) Regulations 2011.[66] As per Regulation 12 every business must, as part of its Waste Transfer Note, confirm that it has properly applied the hierarchy to its waste. Waste prevention would be achieved, for example, by avoiding the use of single-serve sachets where this does not conflict with the prevention of food waste.

Applying the hierarchy is a duty on businesses that produce or handle waste, and Natural Resources Wales has the duty to enforce compliance in Wales. However, the awareness of this requirement on the part of businesses seems to be very low. Increasing awareness would seem to offer the potential for bringing about waste prevention in

[64] http://www.marfast.co.uk/ambient-food-products/sauces-relish.html
[65] http://www.telegraph.co.uk/news/2017/08/07/got-bottle-rick-stein-angers-locals-againby-charging-125-sauce/
[66] See http://www.legislation.gov.uk/uksi/2011/988/regulation/12/made

respect of single-portion sachets (as also suggested in respect of single-use cups and food packaging for items consumed on the premises).

Once this has been done, it may be worth revisiting the extent to which a financial incentive may lead to additional waste prevention.

3.6.2.2 EPR for Single-Portion Sachets, Pots etc.

An outline indication of the end of life costs associated with single portion sachets, pots etc. that would, in principle be covered under an EPR scheme is shown in Appendix A.9.0. However, this is a very conservative estimate of the actual costs, as it is based on apportioning overall costs of litter by weight, whereas the number of items, and the overall volume of items (number of items x unit volume) is likely to be an important influencing factor on costs.

It is suggested that rather than seek to implement EPR just for single portion sachets, pots etc., the Welsh Government should work with the other UK administrations to develop a reformed UK-wide system of EPR for *all* packaging. This should make use of fee modulation to incentivise design for recyclability and the incorporation of recycled content. The Welsh Government should therefore, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across all packaging types. However, if the Welsh Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious the Welsh Government could introduce its own EPR scheme for packaging.

3.6.3 Summary

Table 3-9 summarises the estimated ability of each of the options discussed here to achieve the Welsh Government's desired strategic outcomes.

Table 3-9: Assessment against Desired Outcomes

Outcome	Consumer facing financial incentive	Modulated EPR for all packaging types
Producers bear 100% net cost	No – this would not be EPR, but a mechanism to bring about waste prevention (which is something that EPR alone couldn't do)	Yes – can be designed to ensure this
Reduces waste and increases reuse, repair, remanufacture and recycling	Yes – would bring about waste prevention (for packaging waste at least). The extent to which this would occur will depend on the ready availability of resuable dispensers and also on the level of the financial incentive (i.e. tax or charge)	Partially – can be designed to incentivise design for recyclability, which is currently a challenge for single-portion sachets, pots etc.

Outcome	Consumer facing financial incentive	Modulated EPR for all packaging types
Increases recycled content of packaging	No – this would not incentivise recycled content	Yes – can be designed to incentivise this
Ensures the optimal 'low carbon' approach	Potentially – would depend on the trade-off between packaging waste avoided and any additional food waste created	Yes – if designed with this in mind, albeit noting the potential trade-off with food waste
Tackles litter arisings	Yes – reducing the use of single-portion sachets and pots would be expected to reduce the amount that end up littered directly on the ground.	Not directly – albeit financial responsibility for the littered fraction of single-portion sachets and pots may lead to anti-litter interventions
Engages the whole supply chain	To the extent that overall levels of consumption of such sachets would decline, yes the whole supply chain would be engaged/affected. Likely to stimulate increased use of refillable containers and recyclable bottles	Yes – if so designed, the financial signals will carry up the supply chain and influence the design stage accordingly.
Maximises what's 'best for Wales' overall	Potentially - in preventing packaging waste (albeit there are possible negative effects in respect of food waste). At the same time it will raise revenue that can be allocated as required within Wales. In this respect a tax is preferable to a charge	Yes – in particular the overall financial burden will shift away from citizens/taxpayers towards consumers/producers
Increases consumer awareness	Yes – consumer awareness would increase	Yes – and it will be in the direct financial interest of producers to increase consumer awareness as to what can be recycled.
Meets WFD Art 4 requirements	Potentially - would depend on the trade-off between packaging waste avoided and any additional food waste created	Yes – full cost coverage and modulated fees should shift materials up the hierarchy from recovery/disposal to recycling. However, EPR alone will not lead to waste prevention.

Outcome	Consumer facing financial incentive	Modulated EPR for all packaging types
Meets new WFD Art 8a requirements	This would not be EPR, but would reduce the amount of packaging waste that would need to be paid for under an EPR scheme. Would thus work well alongside a comprehensive EPR scheme.	Yes – if designed to ensure full cost coverage
Meets PPWD 94/62/EC requirements	Yes - will be preventing packaging waste	Yes

Source: Eunomia R&C

3.7 Black Plastic Food Packaging

The problems associated with recycling black plastics, particularly Crystalline Polyethylene Terephthalate (CPET) coated with the carbon black pigment, are well studied, and have been highlighted by the media on several occasions. While the material is technically recyclable, and is not known to contribute significantly to litter, the main issue lies in the current inability of near-infrared (NIR) technology to effectively identify the carbon black pigment and sort this material from others in a materials recycling facility (MRF).Accordingly, WRAP's current Recycling Guidelines for local authorities states: [67]

> *Black plastic – sorting equipment cannot detect the colour black and therefore it is not recycled.*

The issue of non-sortability of black plastics also has repercussions on the quality of recyclate being processed at MRFs - without separating black PET from black PP for example, the material becomes low value and hard to use. China has been a huge market for UK mixed plastic, but is closing the door to low quality material. That makes effective separation of polymers and colours of increasing importance.

Despite successful trials delivered by WRAP and others to demonstrate the viability of alternative, sortable pigments, as well as sorting processes, uptake of these solutions has been slow, with almost no progress in the last 7 years due to concerns over competitiveness among retailers. This has been a source of frustration for waste management companies and councils for years – not in the least due the fact that there are very few absolutely compelling practical reasons to use black plastic, the main one being to completely protect products from UV deterioration due to exposure to light. For

[67] WRAP (2017), Recycling Guidelines, May 2017, accessible at: http://www.wrap.org.uk/sites/files/wrap/Recycling%20guidelines%20briefing%20doc%20v1.6.pdf

the most part, the reasons why it is used are aesthetic; for example often as a signifier of high quality ranges.

It has also been suggested in some quarters that black plastic used purely for aesthetic food packaging should simply be banned in favour of readily available recyclable alternatives. This is due to the fact that even if alternative pigments were used to make the material sortable, the end markets for recycled black plastic are currently underdeveloped. Additionally, the uses for skeletal black plastic waste in the manufacturing process for such materials may be difficult to adapt to alternative sortable pigments, which may not have the same masking properties as the carbon black pigment.

3.7.1 Current Levels of Consumption and Future Trends

The total arisings of black plastic food containers for Wales are estimated at approximately 2,100 tonnes per annum, all of which is assumed to end up in the residual waste stream. Details of the assumptions behind these estimates are presented in Appendix A.3.2.5. Consumption growth of 2% a year is forecast out to 2025. A high-level estimate of costs of end-of-life management of black plastic food packaging can be found in Appendix A.9.0

3.7.2 Shortlisted Options

The following options were shortlisted:

1) Ban on certain uses accompanied by NIR sortability requirements; and
2) EPR for plastic food packaging.

Full consideration of the likely impacts on relevant stakeholders for each of these options is presented in Appendix A.8.3. In the sections below we describe the options, their anticipated effects in terms of waste prevention, litter prevention, and cost coverage, and discuss specific implementation considerations if the option were adopted.

3.7.2.1 Ban on Certain Uses Accompanied by NIR Sortability Requirements

This option would see a ban on the use of black plastic pots, tubs and trays for food packaging when used for purely aesthetic purposes, i.e. to make a product look better rather than to enhance functional properties such as UV barriers or allow the use of mixed recyclate. Producers would be able to apply for derogations, with the burden of proof being on producers to demonstrate that the carbon black pigment is functionally necessary.

During the workshops, representatives from Natural Resources Wales and SEPA highlighted that this measure would require the conditions of the ban and the requirements for derogations to be outlined very clearly, so that environmental regulators could clearly assess applications and monitor the system. In addition, INCPEN noted that the new requirement could be incorporated within the existing vehicle of the

Essential Requirements for Packaging, albeit it was noted that the Essential Requirements are rarely enforced, and there have only been a very small number of associated prosecutions.

Where derogations are granted, to ensure proper end of life management of this stream, producers would be required to ensure that the polymers used in the black packaging are easily detectable using existing NIR technology. There are already solutions in the form of alternative black pigments that are NIR detectable (demonstrated through trials in 2007), although these add a little cost, which WRAP estimated to be in the region of £70 - £140 (£0.075 - £0.35 per tray) at the time.[68] Other estimates suggest the cost is lower still, especially when set against the additional cost that retailers are already willing to pay for black trays over clear alternatives.[69] The authors of the WRAP study also further qualified their cost estimate, stating:

> *"…these indicative cost ranges are based on preliminary prices and it can be expected that if the supply chain wishes to implement alternative black pigments that commercial prices would be negotiated on the basis of large volumes, and therefore could be significantly lower."*

Additionally, some supermarkets are already using dark grey, blue or green plastics that can deliver much the same aesthetic benefits and are compatible with NIR sorting. It is noted, however, that not all packaging in these alternative colours is recyclable, since the carbon black pigment is also used in their manufacture, implying that tackling black plastic food packaging alone is not the solution.[70]

A variant of this approach would simply be to require the use of alternative pigments in *all* black plastics used in food packaging. However, there was still concern among workshop participants that a lack of end markets for some black plastics would remain a difficulty even if their polymer type could be detected. It was further noted that some opaque and semi-opaque plastics, that are often cheaper than clear plastics, can also be difficult to recycle, and thus placing restrictions on black plastic, in the absence of wider EPR reform, may simply mean the problem is to an extent displaced rather than eliminated.

3.7.2.2 EPR for Plastic Food Packaging

An EPR scheme could readily be designed to provide incentives for producers to move away from black plastics, and to shift towards the use of clear polymers. This already occurs in France, where the French Producer Responsibility Organisation (PRO) Citeo (formerly Eco-Emballages) charges a 'penalty' fee to producers who put 'disruptive'

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[68] WRAP (2011), Development of NIR Detectable Black Plastic Packaging, September 2011

[69] See https://www.plastikmedia.co.uk/black-plastic-food-trays-are-just-the-tip-of-the-iceberg-warns-colour-tone/

[70] See https://www.plastikmedia.co.uk/black-plastic-food-trays-are-just-the-tip-of-the-iceberg-warns-colour-tone/

packaging on the market, including packaging containing carbon black. Citeo also offers an 8% reduction in the fee to packaging producers who remove black carbon dye from their products.[71]

For plastic packaging, fees could be modulated in order to encourage the use of plastics that are more readily recycled and have a higher value at end of life. This could include setting requirements in terms of sortability under existing NIR technology. In such a way an EPR scheme with modulated fees could tackle a wide range of issues associated with plastic packaging (beyond those associated with colour). Tackling the challenge of black plastic food packaging within a revised EPR scheme thus has much to recommend it over simply seeking to ban black plastic food packaging.

It is suggested that rather than seek to implement EPR just for black plastic food packaging, the Welsh Government should in the first instance work with the other UK administrations to develop a reformed UK-wide system of EPR for *all* packaging. However, the Welsh Government could, if it so desired, set up its own form of EPR for packaging if it was felt that this would be required in order to achieve its ambitious aspirations. The Welsh Government should therefore, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across all packaging types. However, if the Welsh Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious the Welsh Government could introduce its own EPR scheme for packaging.

3.7.3 Summary

Table 3-10 summarises the estimated ability of each of the options discussed here to achieve the Welsh Government's desired strategic outcomes:

Table 3-10: Assessment against Desired Outcomes

Outcome	Ban on black plastic for certain uses and NIR sortability requirements	Modulated EPR for all packaging types
Producers bear 100% net cost	No – this would not be EPR, but simply a restriction in the use of black plastics for aesthetic purposes	Yes – can be designed to ensure this
Reduces waste and increases reuse, repair, remanufacture and recycling	Will not prevent waste but would increase the amount of more readily	Would not lead to waste prevention, but could be designed to

[71] https://ieep.eu/uploads/articles/attachments/47856bb4-4af9-47a6-a710-7af0fe8b3518/Policy%20options%20brief%20EPR%20price%20modulation%20IEEP%20Nov%202017%20final.pdf?v=63677462325

Outcome	Ban on black plastic for certain uses and NIR sortability requirements	Modulated EPR for all packaging types
	recyclable plastic packaging	incentivise design for recyclability and thus a shift away from black plastics
Increases recycled content of packaging	No – on its own it would not lead to an increase in recycled content	Could be designed to do so
Ensures the optimal 'low carbon' approach	If it leads to more recycling this will reduce carbon emissions	Yes - if designed with this in mind
Tackles litter arising	No	Not directly – albeit financial responsibility for the littered fraction of packaging placed on the market may lead to anti-litter interventions
Engages the whole supply chain	The whole supply chain would be affected by any such requirements	Yes – if so designed, the financial signals will carry up the supply chain and influence the design stage accordingly.
Maximises what's 'best for Wales' overall	Yes – in that it should lead to increased recycling overall (reducing costs to taxpayers) and any slight increase in packaging cost would be borne by producers/consumers	Yes – in particular the overall financial burden will shift away from citizens/taxpayers towards consumers/producers
Increases consumer awareness	It would depend on the specifics of the option. If removing almost all black plastics, increased awareness would not be necessary, but if specific black plastic packaging could be	Yes – and it will be in the direct financial interest of producers to increase consumer awareness as to what can be recycled.

Outcome	Ban on black plastic for certain uses and NIR sortability requirements	Modulated EPR for all packaging types
	placed in recycling, then consumers would need to be made aware.	
Meets WFD Art 4 requirements	Yes – while not leading to waste prevention it would increase the likelihood of recycling over residual treatment or disposal	Yes – full cost coverage and modulated fees should shift materials up the hierarchy from recovery/disposal to recycling. However, EPR alone will not lead to waste prevention.
Meets new WFD Art 8a requirements	This would not be EPR	Yes – if designed to ensure full cost coverage
Meets PPWD 94/62/EC requirements	Yes	Yes

3.8 Metallised Film for Crisps, Confectionery, etc.

Packaging for crisps, sweets and chocolate is most commonly made from metallised plastic film (usually PET or PP), which is not currently recycled. Metallised plastic film is the preferred material for such applications due to its light weight (and therefore low cost of shipping), graphics-friendly format (allowing a range of branding and messaging), and grease and gas barrier properties that keep the product fresh.

While metallised plastic film is now used for a much wider variety of items than just crisps and confectionery (e.g. packets of tea bags and other dry goods), in this study the focus is on crisps and confectionary packaging (in metallised plastic film), due to their prevalence in the litter stream.

In terms of potential alternatives, 100% compostable crisps bags were trialled by Frito Lay for their Sun chips range in 2010 and attempts have been made to amend crisp packaging design, such as in the Boxercrisp range, which claims its cardboard boxes are recyclable, and the Stax range by Lays/ Walkers which used a rigid plastic, or coated card tube, in place of the Pringles-style coated board – plastic – metal composite design. However, the practical recyclability of these alternatives has been questioned, and none of the designs achieved wider market presence.

While no apparent alternatives appear to be currently available for crisp packaging, some items of confectionary are packaged in paper wrappers with grease barrier

properties.[72] Thus the key challenge in respect of these items is to reduce the prevalence in the litter stream, with stimulation of innovation in respect of recyclable alternatives a secondary consideration.

3.8.1 Current Levels of Consumption and Future Trends

While the available data for metallised films used for crisps and confectionary is limited, it is estimated that around 500 tonnes of such packaging are placed on the market in Wales each year. Based on the assumed pack sizes, this equates to 1.23 billion of such items in Wales each year. An explanation of the assumptions and available data is presented in Appendix A.3.2.6.

Post-consumer metallised films are not a targeted material and as such are not collected or recycled in the UK outside of manufacturer specific schemes, albeit they may inadvertently be collected in recycling streams leading to contamination. The litter compositional data indicates that metallised films account for around 0.9% by weight of the total Welsh litter stream, meaning around 80 tonnes of such material is littered on the ground and picked up by Welsh local authorities each year. [73] The remainder, around 400 tonnes, is assumed to be in the residual waste stream. While only 0.9% of the litter stream by weight, crisp and confectionary packets are likely to account for a much higher proportion of litter when considered by item count (or indeed in terms of volume, or 'visibility'). While there is no available Welsh study detailing the relative proportion of different types of littered items on a 'count' basis, a Scottish study from 2014 indicates that (excluding chewing gum and cigarette ends) confectionary packaging and snack packaging together account for 17.3% of all littered items.[74] In Keep Wales Tidy's recent study, which focused on the ubiquity of littered items (rather than the proportion accounted for by specific items), confectionary litter was reported in 58.7% of streets surveyed.[75]

In the absence, at present, of viable alternatives to metallised films for crisps and confectionery packaging, we model an annual growth in consumption of circa 3%. The resulting forecasted tonnage is shown in Figure 3-5. This suggests there will be 290 million more units consumed per year in Wales by 2025.

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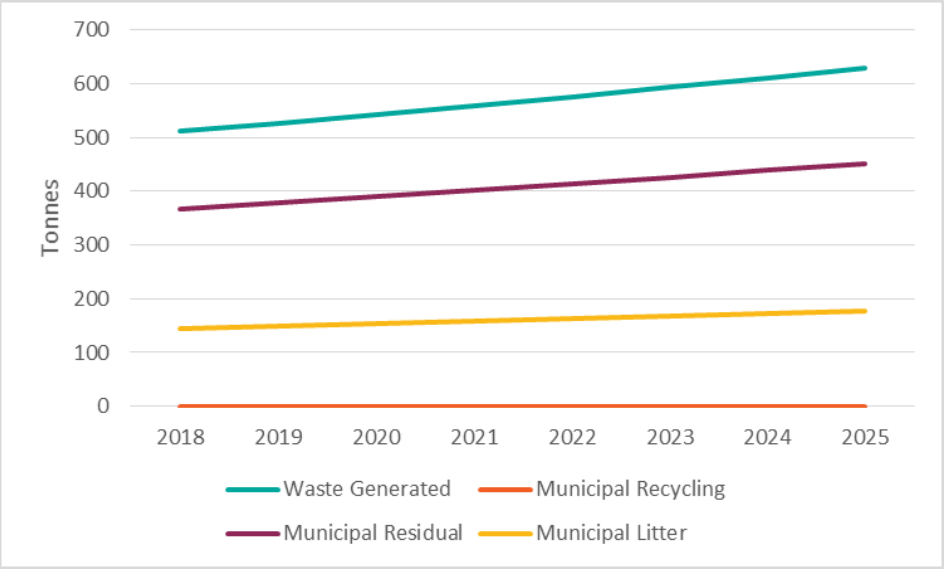
[72] It's of note that laminated packaging provided a key technological advance that enabled a significant increase in the shelf-life of crisps. See https://www.telegraph.co.uk/foodanddrink/healthyeating/10223786/Crisps-from-special-treat-to-standby-snack.html

[73] Resource Futures (2017), *Litter Composition Study – Wales,* Report for WRAP, March 2017

[74] Keep Scotland Beautiful (2014) Composition of Litter in Scotland, available at http://www.incpen.org/docs/CompositionOfLitterInScotlaand.pdf

[75] Keep Wales Tidy (2016), *All Wales Local Environmental Audit and Management System Report 2015-16*, accessible at: https://www.keepwalestidy.cymru/Handlers/Download.ashx?IDMF=82300fb7-b6f5-4b4b-8d09-3f146e69d167

Figure 3-5: Tonnage Forecasts, Metallised Films, Wales, 2018 - 2025



Source: Eunomia R&C

3.8.2 Shortlisted Options

The following options were shortlisted:

1) Takeback requirement / DRS mechanism for metallised films for crisps and confectionary; and
2) EPR for metallised films for crisps and confectionary

Full consideration of the likely impacts on relevant stakeholders for each of these options is presented in Appendix A.8.5. In the sections below we describe the options, their anticipated effects in terms of waste prevention, litter prevention, and cost coverage, and discuss specific implementation considerations if the option were adopted.

3.8.2.1 Takeback Requirement / DRS Mechanism

This option would involve an industry-funded scheme whereby consumers are incentivised to take back crisp and confectionary packaging to retailers or other collection points. The intention would be to achieve high levels of return of used packaging, in order to:

1) Significantly reduce littering of these items;
2) Ensure that financial and operational responsibility of the returned packaging lies with producers; and
3) In giving producers this financial responsibility, along with a concentrated and relatively uncontaminated stream of used packaging, an incentive to innovate (either the packaging, or recycling process, or both) in order to make such packaging widely recyclable.

The incentive to consumers could take a number of forms, but the most effective is likely to be a deposit-refund mechanism, whereby consumers pay an additional deposit on

purchase, which is returned when the used packaging is returned to a collection point such as a retailer. In principle, the typically short timespan between purchase of a packet of crisps and the crisps being eaten, means that deposits can be refunded relatively quickly. Alternatively, if consumers wished to save a number of empty crisp packets before returning them, given that little space will be required to store them, this should not present too many practical difficulties.

There are a number of challenges associated with such a measure, including the potential for fraudulent redemption of crisp packets on which the deposit has not been paid. Another is the fact that material revenue will not provide an income to any scheme operator, as would be the case in a DRS for beverage containers. The initial response from industry stakeholders in the workshops was, perhaps unsurprisingly, negative. However, in the absence of reusable alternatives, and given the prominence of crisp and confectionary packets in litter, an incentive of this kind would seem to have considerable potential to make a meaningful difference. Accordingly, it is recommended that this kind of approach be explored further as part of an investigation into the use of deposit-return mechanisms for items other than beverage containers (see Section 5.0).

3.8.2.2 EPR for Metallised Films for Crisps and Confectionary

EPR for metallised films for crisps and confectionary would need to cover the full end of life costs. This would require, in particular, a better understanding of the full costs of managing litter in Wales and the proportion of these that can be attributed to crisps and confectionary packaging. While such packaging may account for only 0.9% of litter by weight, Scottish research suggests that it might account for something like 17% by number of items. For litter on the ground that may be picked up manually, the number of individual items that need to be picked or swept up is likely to be a significant driver of costs.

It is suggested that rather than seek to implement EPR just for metallised films for crisps and confectionary, the Welsh Government should, in the first instance, work with the other UK administrations to develop a reformed UK-wide system of EPR for *all* packaging. This should make use of fee modulation to incentivise design for recyclability and the incorporation of recycled content, and ensure that the costs of managing litter are adequately covered. The Welsh Government should therefore, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across all packaging types. However, if the Welsh Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious the Welsh Government could introduce its own EPR scheme for packaging.

3.8.3 Summary

Table 3-11 summarises the estimated ability of each of the options discussed here to achieve the Welsh Government's desired strategic outcomes:

Table 3-11: Assessment against Desired Outcomes

Outcome	Takeback Mechanism	Modulated EPR for all packaging types
Producers bear 100% net cost	No – costs would only be covered for those used packages that are returned to collection points such as at retailers	Yes – can be designed to ensure this
Reduces waste and increases reuse, repair, remanufacture and recycling	Could potentially incentivise innovation to increase the recycling of such packaging	Partially – can be designed to incentivise design for recyclability, which is currently a challenge for metallised films used for crisps and confectionary packaging.
Increases recycled content of packaging	This would not be incentivised through the mechanism, but could be an outcome over time as a result of innovation	Potentially - can be designed to incentivise this
Ensures the optimal 'low carbon' approach	Potentially, if the mechanism does indeed lead to increased recycling of such packaging	Potentially – if modulated fees under EPR were able to incentivise increased recycling of such metallised films
Tackles litter arising	Yes – this would be expected to be the most immediate effect of such an incentive	Not directly – albeit financial responsibility for the littered fraction of metallised films used for crisp packets and confectionary packaging may lead to anti-litter interventions
Engages the whole supply chain	Yes – with further engagement at the design stage if this mechanism encouraged innovation in design	Yes – if so designed, the financial signals will carry up the supply chain and influence the design stage accordingly.
Maximises what's 'best for Wales' overall	Yes, in that it will be tackling a highly visible fraction of litter, and shifting a proportion of end of life costs away from taxpayers towards consumers/producers	Yes – in particular the overall financial burden will shift away from citizens/taxpayers towards consumers/producers

Outcome	Takeback Mechanism	Modulated EPR for all packaging types
Increases consumer awareness	Yes – consumer awareness would be an essential component of a successful takeback mechanism	Yes – and it will be in the direct financial interest of producers to increase consumer awareness as to what can be recycled.
Meets WFD Art 4 requirements	Would not be preventing waste, but would increase the likelihood of recycling	In part – full cost coverage and modulated fees should shift materials up the hierarchy from recovery/disposal to recycling. However, EPR alone will not lead to waste prevention.
Meets new WFD Art 8a requirements	Would not on its own represent full cost coverage	Yes – if designed to ensure full cost coverage
Meets PPWD 94/62/EC requirements	Yes	Yes

4.0 Summary of Findings

The key findings are as follows:

- Beverage containers
  - The Welsh Government has a number of options through which it could bring about a DRS for beverage containers in order to drive up recycling rates to levels in excess of 90%, and reduce littering of beverage containers by approximately 90%.
  - One possibility would be for the Welsh Government to require a 90% recycling rate for beverage containers under its existing powers relating to packaging waste (under an amendment for Wales of the Producer Responsibility (Packaging Waste) Regulations). This would be expected to lead to the initiation of a 'voluntary', industry-led DRS in order to achieve the required return rate. Independent auditing would be required to verify the return rate.
  - An alternative approach would be to introduce a tax on all beverage containers placed on the market in Wales, with the size of the per-container tax being adjusted downwards as the recycling rate for the respective container type (e.g. plastic bottle, glass bottle, aluminium can etc.) increases. This would be expected to lead to the formation of an industry-led 'voluntary' DRS, as is the case in Norway, and individual fillers

can choose whether or not to join the DRS. This could be designed such that, in effect only beverage containers that *aren't recycled* pay the tax. Again, independent auditing would be required to verify the return rate.

- Another possibility would be to legislate for a DRS, with the Welsh Government setting out the key performance parameters that the scheme operator would have to achieve, including the target recycling rate for beverage containers that must be met. This would include a requirement for independent auditing of the system operator's data on return rates in order to verify performance. If this approach were taken it would be sensible for a beverage container tax to be implemented alongside the DRS.
- While Wales could act alone in this regard, it would be preferable for the Welsh Government to work together with other UK countries in order to bring about a single DRS for beverage containers. This would avoid a number of issues that would be associated with a Wales-only DRS, such as:
  - The requirement for Wales-specific labelling in order to reduce the risk of fraudulent redemptions, and the associated cost of such separate labelling to producers; and
  - The flow of beverage containers (once purchased) between Wales and England (and vice versa) meaning that return rates might be expected to be lower than would be the case under a UK-wide approach.
- While Welsh local authority kerbside collections would lose material and associated revenue once a DRS is implemented, they would also make savings in other areas such as reduced disposal costs, and potentially through re-optimisation of collection rounds. Detailed modelling of a number of the highest performing English local authorities has shown that modest savings can be achieved (even before potential street scene savings are accounted for), and it is anticipated that the same will be found in Wales.[76]
- A DRS will deliver high quality data on the recycling rate, with independent auditing of the system operator's data being a requirement in order to verify performance. Accordingly, the beverage container recycling rate will be known by Government, and this information can then be used by local authorities to count towards their recycling targets. It is acknowledged that allowing third party reporting to count towards a local authority's statutory recycling target is not straightforward. However this could be addressed in two possible ways:

[76] Eunomia Research & Consulting Ltd (2017) Impacts of a Deposit Refund System on Local Authority Waste Services, available at http://www.eunomia.co.uk/reports-tools/impacts-of-a-deposit-refund-system-for-one-way-beverage-packaging-on-local-authority-waste-services/

        - Firstly, the 'household waste relevant' proportion of beverage containers could be calculated (this would require a study to derive such a figure), and then be applied per local authority based on their relative overall household waste arisings; or
        - On the basis of data gathered in the study, the statutory recycling rate targets for local authorities could be lowered, albeit there are reasons why this may be less preferred from a Welsh Government perspective.
- Single-use cups and lids
    - The Welsh Government could introduce a consumer facing fee (tax or charge) on all single-use cups filled at the point of sale, for hot and cold beverages to bring about waste prevention and reduce litter. Applied to all retailers, this would create a level playing field (compared with the current patchwork of discounts for the use of reusables) and give consumers certainty that investing in a reusable cup will pay for itself after a certain number of uses.
    - In addition to a tax on all single-use cups to encourage reusable alternatives, Welsh Government could introduce comprehensive EPR to cover all end-of-life costs of those that continue to be placed on the market, and incentivise the development of more readily recyclable alternatives. However, it would be preferable for this not be a standalone EPR scheme for single-use cups, but a wider reform of EPR for all packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life.
    - As explained in a recent submission to the UK Parliament's Environmental Audit Committee, it is difficult to estimate the extent to which a reduction in use of disposable coffee cups might be achieved, but reductions in the order of 30% - perhaps not immediately, but over time - do not feel wildly wide of the mark.[77] This is perhaps a conservative estimate given recent indications from Starbucks that their own research suggests that 48% of customers would carry their own reusable cup to avoid a charge.[78]
    - The amount which would be raised from such a tax depends on both the level of the tax, and the level of reduction achieved. A range of possible outcomes and associated revenues are shown in Table 4-1.

[77] Eunomia Research & Consulting (2017) Environmental Audit Committee Inquiry: Disposable Packaging: Coffee Cups and Plastic Bottles – Written Evidence from Eunomia Research & Consulting Ltd, available at http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/packaging/written/70645.pdf

[78] Starbucks (2018) News item: Starbucks UK tests first-ever paper cup charge, 26th February 2018, available at https://www.starbucks.co.uk/promo/5pcup

Table 4-1: Revenues (£m per annum) from a Tax on All Single-use Takeaway Cups: Varying Level of tax and % Reduction

Reduction	Level of Tax (Pence)				
	5	10	15	20	25
10%	25.1	50.1	75.2	100.3	125.3
20%	22.3	44.6	66.9	89.1	111.4
30%	19.5	39.0	58.5	78.0	97.5
40%	16.7	33.4	50.1	66.9	83.6
50%	13.9	27.9	41.8	55.7	69.6
60%	11.1	22.3	33.4	44.6	55.7
70%	8.4	16.7	25.1	33.4	41.8
80%	5.6	11.1	16.7	22.3	27.9

- Takeaway food packaging
  - Welsh Government could introduce comprehensive EPR for *all* packaging, including takeaway food packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life including the costs of dealing with the fraction that is littered.
  - In order to bring about waste prevention in quick service restaurants and other establishments serving food in single-use packaging (for both consumption on the premises and takeaway), the Welsh Government could use existing regulations combined with the development of new guidance.
    - Applying the waste hierarchy is already a duty on businesses that produce or handle waste. This includes all businesses that serve food, including in takeaway food packaging. Regulation 12 of the Waste (England and Wales) Regulations 2011, requires that every business must, as part of its Waste Transfer Note, confirm that it has properly applied the hierarchy to its waste, and Natural Resources Wales has the duty to enforce compliance. [79] The hierarchy has the potential to support Welsh Government policy and prevent waste (and boost recycling) in Wales, particularly if its implications can be made clear to business.
  - As an alternative to EPR, in order to cover the costs of cleaning up littered takeaway packaging, the Welsh Government could introduce a tax on each item of takeaway packaging used. This could, in due course be

[79] See http://www.legislation.gov.uk/uksi/2011/988/regulation/12/made

modulated to incentivise redesign of takeaway packaging towards packaging types that have a lower environmental impact when littered. It could also stimulate the further development of, and uptake of reusable alternatives.

- Single portion sachets and pots
  - As previously noted, Welsh Government could introduce comprehensive EPR for *all* packaging, including single portion sachets and pots, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life including the costs of dealing with the fraction that is littered.
  - Using existing regulations combined with the development of new guidance on the responsibilities of cafes and restaurants in respect of waste prevention, could also lead to a reduction in the use of single-serve sachets, with establishments instead using refillable dispensers.
  - The Welsh Government could also introduce a tax, payable at the point of sale, on all single serve sachets and pots in order to prevent waste (by ensuring that consumers only take as many as they need), while also stimulating uptake of reusables where appropriate.
- Black plastic food packaging
  - As previously noted, the Welsh Government could introduce comprehensive EPR for *all* packaging, including black plastic food packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life.
  - The Welsh Government could alternatively introduce a tax on black plastic packaging, in order to cover the additional costs of end of life management. This may need to be applied at the level of the retailer, and thus a *de minimus* threshold could be appropriate, such that the smallest stores would be exempt.
- Metallised films for crisps and confectionary packaging
  - As previously noted, the Welsh Government could introduce comprehensive EPR for *all* packaging, for crisps and confectionery packaging, with fees modulated for different material and item types to reflect, to the extent possible, the actual costs of dealing with them at the end of life.
  - The Welsh Government could, as an alternative, introduce a tax on each item of crisp and confectionery packaging used. This could, in due course be modulated to incentivise redesign of takeaway packaging towards packaging types that have a lower environmental impact when littered.

5.0 Recommendations to the Welsh Government

The following recommendations result from the research.

- Beverage containers
  - In order to increase recycling and reduce litter, the Welsh Government should seek, through engagement with counterparts in England and Scotland (at least), the implementation of at least a GB-wide, or ideally UK-wide DRS for beverage containers.
  - If the Westminster Government decides *against* implementing a DRS or a beverage container tax, as noted in E.4.0, the Welsh Government could still bring about a Wales-only DRS, with a number of options for initiating such a DRS. These are:
    - Requiring a 90% recycling rate for beverage containers under its existing powers relating to packaging waste (under an amendment for Wales of the Producer Responsibility (Packaging Waste) Regulations). This would be expected to lead to the formation of a 'voluntary', industry-led DRS in order to reach the recycling target. Independent auditing would be required to verify the return rate.
    - Introducing a tax on all beverage containers placed on the market in Wales, with the size of the per-container tax being adjusted downwards as the recycling rate for the respective container type (e.g. plastic bottle, glass bottle, aluminium can etc.) increases. This would be expected to lead to the formation of an industry-led 'voluntary' DRS, as is the case in Norway, and individual fillers can choose whether or not to join the DRS. This could be designed such that, in effect only beverage containers that *aren't recycled* pay the tax. Again, independent auditing would be required to verify the return rate.
    - Legislating for a DRS, with the Welsh Government setting out the key performance parameters that the scheme operator would have to achieve, including the target recycling rate for beverage containers that must be met. This would include a requirement for independent auditing of the system operator's data on return rates in order to verify performance. If this approach were taken, a beverage container tax should be implemented alongside the DRS.
- Single-use cups filled at the point of sale
  - To prevent waste by incentivising reuse, the Welsh Government should implement a consumer facing fee (tax, levy or charge) on all single-use cups filled at the point of sale, payable by the consumer at the point of sale, in order to encourage the uptake of reusable alternatives. This fee

should apply to cups used for both hot and cold beverages, and should cover all retail outlets, with no exemptions for smaller retailers.
    - The level of the fee needs some consideration. All things being equal the higher the level, the greater the waste prevention effect. A level of 25 pence would seem appropriate as a starting point, as this represents the discount that major coffee chains currently offer. It is important that the implementing legislation allows for future revisions to the level of the fee in order to:
        - Maintain its effectiveness when account is taken of inflation; and/or
        - To increase the level in order to stimulate further waste prevention if the initial results prove to be limited.
    - While the waste prevention effects of a tax, a levy or a charge would be the same, a tax or levy would be preferable. Either of these would avoid the risks – that could occur with a charge – that funds disbursed by retailers displace CSR spending, and lead to undue influence over recipients, who themselves might become overly dependent upon the proceeds of the charge, potentially limiting their support for higher ambition in respect of waste and litter prevention.
    - Importantly, money raised by the fee should not be used to cover costs associated with waste management. It has been suggested by some stakeholders that money raised should be used to fund collection infrastructure for coffee cup recycling. To do so would mean undermining the principle of extended producer responsibility, whereby producers should bear the full end of life costs for management of their waste, including that which is littered.[80] The income raised from a measure designed to change consumer behaviour, and reduce consumption, and thus littering of specific single-use plastic items should not be used to cover costs that producers should themselves bear.
    - Longer term, the Welsh Government should reflect on whether there is a case for the mandatory use of reusable cups in Wales, incorporating the use of a deposit-return mechanism. We recommend that such an approach should be trialled as part of the suggested investigation into the use of deposit-return mechanisms for items other than beverage containers.
- Broader reform of EPR for packaging in Wales
    - The Welsh Government should, in the first instance, work together with the other UK Governments to seek to develop comprehensive UK-wide EPR for packaging across *all* packaging types. However, if the Welsh

[80] OECD (2016), *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management,* OECD Publishing, Paris, 2016. Accessible at http://www.oecd.org/env/extended-producer-responsibility-9789264256385-en.htm

Government were to decide that the subsequent proposed approach to UK-wide EPR were not sufficiently ambitious, the Welsh Government could develop its own approach.

- The use of existing regulations to incentivise waste prevention
    - The Welsh Government should develop, and promote, guidance for businesses on their duty in respect of applying the waste hierarchy, identifying best practice examples that should be followed. Natural Resources Wales should subsequently begin to verify compliance, and undertake enforcement actions if required.
- Refillable alternatives and take-back mechanisms
    - The Welsh Government should explore the potential for take-back schemes, potentially involving a deposit-return mechanism, for metallised films for crisps and confectionary packaging to both reduce litter and increase the incentive for design for recyclability. We recommend that such an approach should be explored as part of the suggested investigation into the use of deposit-return mechanisms for items other than beverage containers.
    - The Welsh Government should conduct trials of reusable take-away packaging, perhaps within specific areas such as covered, permanent markets in the first instance, in order to better understand consumer acceptance. Examples already exist of reusable tiffins for some food types, and innovation, and expanded uptake should be encouraged in this area across the whole range of takeaway food types.
    - Once likely consumer acceptance, and concerns about hygiene, are better understood as a result of the trials, and where viable reusable alternatives have been shown to exist, the Welsh Government should explore the merit of implementing incentives for the use of reusable takeaway food packaging, such as a consumer facing tax on non-reusable takeaway packaging.
- Alternatives to EPR
    - If the Welsh Government chose not to develop its own comprehensive approach to EPR, if the reformed EPR scheme of which Wales were a part were not sufficiently ambitious in some areas, it should consider alternative approaches that could be used to bring about some of the same effects. These would include:
        - A tax on takeaway food packaging, crisps and confectionary packaging, and single-serve sachets in order to cover the costs of litter clean-up associated with these items (if these were not already adequately covered by the EPR scheme).
        - A tax on black plastic packaging to cover the additional end of life costs (if not already adequately covered by the EPR scheme).

It is recommended that the £500,000 fund relating to deposit return schemes be used to support the following:

- Detailed modelling to understand the relative cost-effectiveness, and other impacts, arising from using kerbside collections as a means, or potentially the primary means, of returning deposit-bearing beverage containers under a DRS
- Detailed modelling with each Welsh local authority to fully understand the operational changes they will need to make in order to maximise the savings realised once a DRS for beverage containers is implemented, and to accommodate for any losses in income from the sales of recyclate that they will not now be collecting through loss via a DRS. This work also needs to examine the impacts on Local Authorities meeting their statutory recycling targets, and how this might be mitigated. This could involve the study suggested to determine the 'household waste relevant' fraction of beverage containers;
- A comprehensive analysis of litter composition and prevalence, accounting for weight, volume and number of different items in order to establish a pre-DRS baseline against which the litter reduction effects of a DRS (and other interventions such as a tax on single-use cups filled at the point of sale) can be subsequently measured;
- An investigation into the use of deposit-return mechanisms for items other than beverage containers. This should involve, in the first instance small scale trials of reusable cups and takeaway containers, in order to determine consumer and retailer acceptance, and explore the need for innovation (in terms of container type, delivery and return mechanism etc.) and potential for wider uptake.

APPENDICES

A.1.0 Long List of Packaging Types

Table A-1-5-1: Longlist of Food and Drink Packaging Types

No.	Category	Assessment Criteria				Shortlisted
		Prevalence in litter stream	Low recycling rate	Availability of alternatives	Political/ public concern	
1	Beverage containers	✓	Varies by container type	X	✓	**Yes**
2	Single use cups and lids	✓	✓	✓	✓	**Yes**
3	Takeaway food packaging	✓	✓	✓	✓	**Yes**
4	Single portion sachets, pots, etc.	Insufficient data	✓	✓	Somewhat	**Yes**
5	Black plastic food containers	X	✓	✓	✓	**Yes**
6	Plasticised Films for Crisps, Confectionary etc.	✓	✓	✓	✓	**Yes**
7	Plastic egg boxes	X	Insufficient data	✓	X	**No**
8	Synthetic tea bags	X	Somewhat	✓	X	**No**
9	Plastic netting for food	X	✓	✓	X	**No**

10	Coffee capsules	X	✓	X	X	**No**
11	Metal tubes (e.g. tomato puree)	X	✓	X	X	**No**

A.2.0 Long List of Policy Options

Table A-2- 1: Long List of Policy Options

Caption	Summary	Rationale
Beverage Containers (including cartons and pouches)		
DRS + beverage packaging tax	DRS for plastic, glass, alu/steel, with an accompanying tax on other materials to encourage recycling/ reuse/ recyclability	Provides an incentive to reduce litter as well as encouraging recycling.
Beverage packaging Tax	e.g. such as in Norway (sliding scale based on the recycling rate by packaging type)	Can encourage a range of behaviours – exemptions/ lower tax rates act as an incentive.
Producer responsibility targets	Higher targets for individual beverage containers (based on recycling/ recycled content/ recyclability) for producers.	Allows producers flexibility to determine how to meet targets.
Industry-funded infrastructure enhancements	Increased no. of bins (including on the go recycling) and litter clean up contributions funded by industry – water fountains	Reactive rather than prescriptive – does nothing to address issues of recyclability and does not adhere to waste hierarchy principle.
Industry-funded awareness campaigns	Enhanced communications campaign – boosting existing use of kerbside schemes, better labelling etc.	Likely to make consumers aware of issues without providing any alternatives/ incentives for behaviour change.
Increased littering fines	FPNs currently max £150, court fine max £2,500	Not EPR – enough issues with FPNs already, doesn't address recyclability issue.
Single Use Cups and Lids		

Caption	Summary	Rationale
Mandatory charge per item	Per item levied on customers at point of sale	Encourages reusables more effectively than a discount
Ban on single use cups as an eat-in option	Drinks for consumption on the premises should not be sold in disposable containers.	A form of waste prevention (highest tier in the waste hierarchy) – quick fix to reduce waste stream, litter.
Mandatory take back of cups	Anyone who sells them must also take back (regardless of brand) – effectively providing a network of return points. Can potentially be combined with a mandatory recyclability requirement – practical, not just technical - for cups sold	Should reduce litter, puts onus of collection and subsequent disposal on retailers rather than council. If well designed, could result in switch to reusables.
Mandatory use of reusables supported by DRS	Make reusables mandatory, with deposit attached e.g. CupClub – like a bike rental for cups (winner of Ellen MacArthur Circular Design Challenge award)	Addresses issues of litter and recyclability as well as providing a sustainable funding stream.
Make compostable/ biodegradable alternatives mandatory	Self-explanatory	Problematic if not closed loop (often the case) – technically biodegradable/ compostable does not mean it will do so in natural conditions (I.e. if littered)
Mandatory discount for customers who reuse	Make 25p discount mandatory across all chains	Complex to implement – would end up being passed to consumer, not as effective as a charge. Would also initially be difficult for small businesses.
Voluntary agreements	With industry to increase recycling rate and incentivise reusables (industry funded) e.g. What's currently happening with Starbucks and Costa, Simply Cups recycling scheme	Confusing for consumers because these tend not to be uniform across the board – inefficient and litter remains

Caption	Summary	Rationale
Industry funded awareness/ infrastructure investments	(e.g. Manchester #1moreshot campaign)[81]	Reactive rather than prescriptive – does not address issue of recyclability and does not adhere to waste hierarchy principle.
Takeaway Food Packaging (filled at point of sale)		
Mandatory acceptance of reusables	Must allow consumers to bring their own containers regardless of branding (could be coupled with mandated sale of reusable options)	Will encourage "take home" rather than takeaway and throw away culture, though likely to have more impact on neighbourhood rather than high street takeaways
Ban on single use materials for eat-in options	Food for consumption on the premises should not be sold in disposable containers.	A form of waste prevention (highest tier in the waste hierarchy) – quick fix to reduce waste stream, litter.
Explicit charge at point of sale	To encourage reusables/ bring your own boxes. Could vary based on end of life cost of material.	Will encourage "take home" rather than takeaway and throw away culture, though likely to have more impact on neighbourhood rather than high street takeaways.
Voluntary agreements	With industry to increase recycling rate and incentivise reusables (industry funded) e.g. Thali tiffin scheme	Confusing for consumers because these tend not to be uniform across the board – inefficient and litter remains
Ban on certain materials	Such as the EPS ban previously proposed in Oxford.	Issues with "technical" vs. "practical" recyclability of materials
Industry charge	Not a visible charge, levied on suppliers and used to fund clean-up costs. Could be based on weight placed on the mkt/ waste management costs.	Likely to be passed on to consumer, less transparent than a point of sale charge.

[81] http://www.bbc.co.uk/news/uk-england-manchester-37622695

Caption	Summary	Rationale
Single Portion Sachets, Pots, etc.		
Industry charge per item	This could be based on the end of life management costs of the material	Would shift the burden of managing waste stream on to producers, encourage move to reusable alternatives.
Explicit charge at point of sale	To encourage use of dispensers/ discourage wasteful use of disposables. Could vary based on material.	Visible to consumers, thereby raising awareness of the issue and prompting attitude change.
Requirement to have dispensers for certain types	This could be accompanied by a requirement not to offer single use options unless asked	There will be hygiene concerns related to dispensers for some products
Voluntary agreement with vendors	E.g. To move towards more reusable/ recyclable dispensers – agree not to offer unless asked (like straws)	Inadequate level of political/ public pressure at the moment, would take time to implement and likely result in less efficient outcomes than other options.
Black Plastic Food Containers		
Installation of new sorting technology (industry funded)	Industry funds installation of new sorting technology at all plants – this is already available and should be undertaken by the new industry group that has just been formed.	As producers start to avoid the cost of doing this by switching to recyclable alternatives, the cost for other producers will get hjgher – ultimately should prompt switch to recyclables but giving the producers an option to keep using black if they're willing to pay for its management.
Producers required to use tracer pigments / additives	In theory, will allow sorting and thus enhance recyclability	Prevents the need for a sorting technology retrofit, but still addresses issue of recyclability associated with this material with onus on producer.
Ban when used purely for aesthetics	Unless for "practical" purposes, with a high bar set for standard of proof for derogations	Shifts burden of proof onto producers and encourages use of recyclable alternatives which are easily available.

Caption	Summary	Rationale
Industry charge based on the end-of-life value of materials	Should reflect the full cost of managing the waste and externalities across the lifecycle of the material	Estimating this is going to be difficult, and likely that the charge will be untenably high. Would effectively be a ban – more palatable to encourage payment for waste management infrastructure.
Voluntary agreement – supply chain approach	e.g. industry groups committing to find solutions	Confusing for consumers because these tend not to be uniform across the board – solutions already exist, inefficient and litter remains
Explicit charge at point of sale	That varies by colour (or even binary).	Black plastics are required in some cases – this places an unfair burden on those using them when there's no other alternative.
Metallised Films for Crisps, Confectionary etc.		
Industry charge on non-recyclable films	Industry pre-consumer fee for litter clean-up potentially modulated by: a. Recyclability of material e.g. If chocolate bars go back to having separate paper and foil layers to packaging. b. Industry funding of their own litter prevention methods (recognising best practice).	Encourages recycling and litter prevention, with burden on producers.
Takeback/ DRS mechanism	Terracycle type agreements, especially for litter – making takeback fun (e.g. prize scheme/ freebie for every ten brought back)	Prevents litter as there is an incentive to bring back, makes producer responsible for managing the stream.
Voluntary agreement – using campaigns	Scan and return to supermarket for a prize , M&S approach (reduce air bubble in bags)	Confusing for consumers because these tend not to be uniform across the board, lack of visibility –inefficient and litter remains

Caption	Summary	Rationale
Explicit charge at point of sale	With funds used to cover litter cleanup costs	A key problem with this packaging type is the lack of alternative materials that don't unacceptably compromise product quality – would leave consumers with no choice

A.3.0 Baseline Modelling Methodology

A.3.1 Overview

This section provides an overview of the methodology used to estimate baseline waste arisings within the six determined food and drink packaging categories. It also broadly identifies the fate of the arisings, be it residual waste, recycling or littered on the ground and subsequently collected. However, estimates for end destinations, such as what proportion of residual waste goes to incineration or to landfill, have not been included. A more detailed explanation of each element discussed here is available in Appendix A.3.2

The baseline estimates for beverage containers have been compiled using published waste data. This data was not available for the other types of packaging, and therefore estimates have been derived from a range of other sources, including industry, consumption, and other market data.

Calculations have also been made for estimates of litter arisings for each category, as the packaging types being studied are estimated to make up over a quarter of the Welsh litter stream, by weight, based on a recent Wales specific litter composition study of litter collected by Local Authorities in litter bins and through street cleansing.[82]This is likely to be much higher in volumetric terms. For example, a Eunomia report for Zero Waste Scotland estimated that beverage containers alone made up around 40% of litter by volume in Scotland (of both litter on the ground, and in bins) which was an arguably conservative figure compared to studies of a similar nature. [83] Assuming that consumption patterns in Scotland and Wales are similar, therefore, it is likely that the six packaging types under study account for at least 50% of Welsh litter, by volume.

Given that data is available from Scotland on the cost to local authorities of clearing up litter that has been dropped on the ground (i.e. excluding litter that is correctly discarded in bins), and the tonnage of such 'genuinely littered' items, we draw out estimates of this for Wales. In the absence of data for the tonnage of litter on the ground in Wales, we have used available data relating to litter in Scotland (assuming that littering behaviour in Scotland is not significantly different to the rest of the UK), and prorated it by Welsh population figures.[84] This suggests that about 9,000 tonnes of litter

[82] Resource Futures (2017) *Litter Composition Study – Wales,* Report for WRAP, March 2017 (note this does not cover uncleared litter).
[83] Eunomia Research & Consulting (2015) A Scottish Deposit Refund Scheme, Final Report to Zero Waste Scotland, available at http://www.eunomia.co.uk/reports-tools/a-scottish-deposit-refund-system/
[84] Scottish population – 5,404,700, Office for National Statistics (2017) Population Estimates for UK, England and Wales, Scotland and Northern Ireland, 22nd June 2017,

on the ground is cleared up each year by Welsh local authorities, of which about 2,400 tonnes is from the packaging items considered in this study. [85]Full details on the calculations of litter cleared from the ground are provided in Appendix A.3.3, and details of the associated costs are provided in Appendix A.9.3.

This section also provides a brief explanation of high level forecasting that has been calculated to establish the Business as Usual (BAU) scenario, using the baseline figures and a variety of assumptions from sources relating to population, market growth, consumption and waste arisings projections. For each category, we have modelled a forecast based on a BAU scenario where it is assumed that no policy interventions have been introduced, and that no significant behaviour change occurs that might divert a higher or lower proportion of waste to recycling streams, so that arisings increase in line with assumed current consumption and / or population increases. In the absence of data that covers the entire eight years following the 2017 baseline, it has been assumed that annual projected increases are likely to apply consistently up until 2025.

Finally, in Appendix A.9.0, high level estimations for end of life management costs have also been made for categories where an average item weight is known, which includes cups and lids, single portion sachets, takeaway food packaging and metallised films. Using data pertaining to the cost of waste collections and disposal, as well as information relating to the cost of litter, we have been able to estimate the average cost per tonne, the average cost per item and the overall annual cost for these categories. This provides an overview of the financial impact of such waste streams, and suggests what an EPR charge per item might look like.

It is noted that throughout this analysis, with the exception of local authority data used for the beverage container calculations, it is generally the case that data specific to Wales has not been available. Where this is true, either UK data or manufacturers' data has been used and then apportioned to the Welsh market. To account for this,

https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

[85] Zero Waste Scotland (2013) Scotland's Litter Problem: Quantifying the scale and cost of litter and flytipping, Report, 2013

corresponding UK[86] and global[87] population data has been used to scale the available figures to one that is representative of the Welsh population.[88]

A.3.2 Packaging Mass Flows in Wales

This section sets out the approach taken to estimate waste arisings and treatment destinations for the range of packaging materials included in this study. For beverage containers these estimates were compiled based on published waste data. This data was not available for the other packaging types, and as such, waste arisings and treatment destination estimates were compiled from a range of sources, including industry estimates and consumption and other market data.

When referring to treatment destinations or similar terminology, it should be noted that for the purposes of this study this refers to whether the waste enters the residual or recycling stream, or is littered on the ground and subsequently collected by local authorities. It does not specifically consider any further breakdown by destination for these categories. For example, residual waste could be sent for incineration or to landfill, but is all captured under the overarching term of residual waste here. Of course, some litter inevitably remains in the environment, either on land or entering the aquatic environment. Data on this is poor, but in an as yet unpublished study for the European Commission, Eunomia estimated that of all items littered on the ground, 12% are never collected. Of these it is further estimated that half remains on land, and half enters the aquatic environment. Due to such data limitations as described above, many of these estimates incorporate a significant amount of uncertainty, especially those outside of the beverage container category (albeit the data on beverage containers is also subject to some uncertainty). For example, estimates for the UK are commonly scaled to Wales using population data, and the correct unit of weight to be applied for each packaging type was often not clear. We therefore advise caution when using this data for further

[86] UK population – 65,648,100, Office for National Statistics (2017) Population Estimates for UK, England and Wales, Scotland and Northern Ireland, 22nd June 2017, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

[87] Global population – 6,958,169,159, Worldometers (2017) World Population by Year - 2010, http://www.worldometers.info/world-population/world-population-by-year/ (where 2010 global data has been used, 2010 Welsh data has also been used – 3,063,758, StatsWales (2017) Mid-year 2011: National level population estimates by year, age and UK country, https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Estimates/nationallevelpopulationestimates-by-year-age-ukcountry)

[88] Welsh population – 3,113,200, Office for National Statistics (2017) Population Estimates for UK, England and Wales, Scotland and Northern Ireland, 22nd June 2017, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

studies, or for other presentations, and that, if the data is used, it should be caveated with a description of the modelling assumptions used as described in this section.

A.3.2.1 Beverage Containers

For the purposes of this study, beverage containers include conventional materials such as plastics, glass and metals, cartons made from liquid board like Tetrapaks, and laminated pouches, bags and sacks such as those used for concentrates, juices, cocktails, infant formula and so on.

In order to estimate beverage container packaging waste flows in Wales, an overall collected waste mass flow baseline for all local authorities in Wales was first compiled, in as much detail as permitted by the available data. Estimates of the proportion of beverage containers in various material streams from other published data were then used to refine these mass flows and estimate the quantity of beverage containers collected. Finally, sorting and reprocessor losses were applied to estimate the quantity of beverage containers that actually get recycled.

Municipal waste data includes household waste as well as commercial waste collected by local authorities. Other commercial waste, which is collected by private contractors, and industrial waste were not included in the scope of this analysis. This is because of the poor quality of available waste data.

Whilst published waste data covers plastics, metals, glass and cartons, this is not the case for laminated pouches. As such, waste arisings for this material type were calculated in a separate analysis.

Collected Waste Mass Flows

The first step in our approach was to understand the quantity of recycling and residual waste (in categories pertaining to materials used for beverage containers) collected by each local authority in Wales. Recycling data reported through the WasteDataFlow (WDF) portal for 2016/17 was sourced directly from StatsWales, which provides a breakdown of collected recycling by material. Waste compositions for each local authority published by WRAP in 2016 were then applied to this data. This study reports waste compositions for kerbside residual waste, HWRC residual waste, trade waste, co-mingled dry recycling and a limited set of data for other minor waste streams (such as street sweepings). Two sets of data were reported, phase 1 from compositional analyses conducted in summer 2015, and phase 2 from winter 2015. Where both sets of data were available for a given local authority, we have taken the average of these two datasets. For any authorities with missing data (for example, not all local authorities have published trade waste compositional estimates), we have used the average composition from those authorities that have published data.

Recycling tonnages were calculated by first disaggregating co-mingled dry recycling tonnages reported by StatsWales into individual material streams using this compositional data. Separately collected recycling tonnages published by StatsWales were then mapped across to the compositional categories used in the WRAP

compositional study. For most materials, it was only possible to do this at a more aggregated level (e.g. for 'dense plastic' only rather than subcategories). Where a more detailed composition was required we assumed that the proportion of each subcategory in the parent category was the same as for co-mingled recycling. For example, we assumed that the proportion of the parent category 'dense plastic' that is 'plastic bottles' is the same for co-mingled and separately collected recycling.

A similar approach was taken, as discussed above for recycling, to estimate the quantity of residual waste collected. Residual waste tonnages for each material stream were estimated separately for household kerbside, HWRC and trade waste by applying residual compositions for these waste streams from the 2016 WRAP study. Residual waste tonnage data for other WDF categories (bulky waste, asbestos, gully, healthcare, other, grounds and C&D) was excluded from our analysis as beverage containers make up only a tiny fraction of these waste streams. The WDF residual waste categories relating to street cleansing, highways, beaches and fly-tipping are accounted for in our litter estimates (see Appendix A.3.3).

Beverage Container Mass Flows

The next step in our calculations was to estimate the quantity of beverage containers collected by applying data published regarding the proportion of beverage containers in each material category. For steel and aluminium cans, and plastic bottles, a 2014 feasibility study of Scottish Packaging Recovery Notes published by Valpak was used.[89] For glass beverage containers, the Valpak data was applied to a 2010/11 waste composition study of local authority collected waste and recycling in England, reported by Resource Futures for Defra, in order to first estimate the proportion of mixed glass that is glass bottles, and then the proportion of these glass bottles that are glass beverage containers specifically. [90]

Our preference would be for data specific to Wales, and more recent data if possible, however our review of the literature showed that these reports were the most up to date and relevant to this study.

It is noted, however, that the rest of the analysis presented here is sensitive to this assumption regarding the proportion of beverage containers in wider material streams. The final estimates must therefore be treated with caution, and cannot be reported with confidence. For plastic beverage containers in particular, a more detailed sensitivity analysis has been provided at the end of this section.

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[89] Valpak for Zero Waste Scotland (2015), *Scottish Packaging Recovery Note Feasibility Study*, pg. 15, May 2015, accessible at https://www.zerowastescotland.org.uk/sites/default/files/SPRN_0.pdf

[90] Resource Futures for Defra (2012), Annex tables - *EV0801 National compositional estimates for local authority collected waste and recycling in England, 2010/11*, accessible at http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=18237#RelatedDocuments

The assumptions for the proportion of beverage containers in each material category are provided in Table A-3 1.

Table A-3 1: Assumptions for Proportion of Beverage Containers

Material category	% of beverage containers in material category
Glass bottles (recycling stream)	63%
Glass bottles (residual stream)	54%
Plastic bottles	75%[1]
Ferrous cans	14%[1]
Aluminium cans	93%[1]

Notes:

1. *These assumptions are provided for recycled material only. We have assumed that the same proportion also applies to material sent to residual waste disposal.*

Final Recycling

The actual amount of recycling of beverage containers depends on the losses that take place between the point of collection and final recycling. There are two types of losses from the waste management system which are modelled:

- Sorting rejects – any authorities collecting co-mingled material send this to a materials recovery facility (MRF) for sorting into separate material streams. Sorting rejects are materials that cannot be sorted into recyclable material streams by the MRF and are rejected and thus treated as residual waste;
- Contamination – this refers to items found in material accepted at re-processors that are not the target material for that process, and as such are contrary. This could either be in the form of, for example, plastic in a metal stream, or it could be in the form of liquid or food waste remnants from the original product.

In both cases, the rejected or contamination materials can include both non-target (i.e. material not desired by the facility but which still has the capacity to be recycled) and non-recyclable material.

Sorting Rejects

The proportion of material rejected at MRFs, known as sorting reject rates, were estimated based on data from all Welsh authorities included within question 100 of WDF. The rates used in the modelling are an average based on rejects specific to beverage containers, and have been set as 12% for single stream co-mingled material, and 5.4% for twin stream material. Pembrokeshire are the only authority in Wales

employing the latter system for household recycling collections. These assumptions were applied to the co-mingled collected material streams.

Post-sorting Contamination

Once materials have been sorted, whether through kerbside collection or at a MRF, they are sent on to reprocessors where some post sorting contamination will occur and subsequently be rejected. Table A-3 2 shows the end destination of various materials post sorting. The recycled percentage is applied to the tonnage, after sorting reject rates have been applied, to reflect the actual amount of collected tonnage that is ultimately recycled. These assumptions are based on contamination estimates derived from three different reports, two by WRAP[91] [92] and one by ENVIROS[93], for which an average figure for each material stream has been calculated then applied to the post sorting tonnages. Additionally, metal contamination in the plastics and glass recyclate streams will typically be retrieved and sent for recycling for the most part, and so assumptions on the proportion of material sent to reprocessors which is recycled have also been applied.

Table A-3 2: Assumptions for End Destinations

		Plastic bottles	Glass bottles	Ferrous cans	Aluminium cans	Beverage cartons
Kerbside Sort	Recycled	91%	99%	98%	98%	74%
	Aluminium Recycling	0%	0%	0%	0%	0%
	Steel Recycling	0%	1%	0%	1%	0%
	Other (Residual)	9%	0%	2%	1%	26%
Co-mingled	Recycled	84%	91%	95%	94%	74%
	Aluminium Recycling	1%	1%	0%	0%	0%
	Steel Recycling	1%	1%	0%	1%	0%
	Other (Residual)	14%	7%	5%	5%	26%

Used beverage cartons will always contain some contamination (i.e. unwanted materials). Contamination can be both from liquids and waste food (from the products

[91] Eunomia Research & Consulting, Resource Futures, and HCW Consultants (2011) *Kerbside Collections Options: Wales, Report for WRAP*, January 2011, www.wrapcymru.org.uk/content/kerbside-collection-options-wales

[92] Eunomia Research & Consulting (2016) The Climate Change Impacts of Recycling Services in Wales, final report for WRAP

[93] ENVIROS (2009) *MRF Quality Assessment Study,* Report for WRAP, www.wrap.org.uk/sites/files/wrap/MRF%20Quality%20Assessment%20Study.pdf

packaged in the beverage cartons) and from other waste streams. Beverage carton contamination rates were based on data from the most recent and comprehensive study on this topic, published in 2013.[94] This study reported that an average moisture and dirt content in used beverage cartons varying from 19% to 64% depending on the type of product. The median contamination rate was reported as 26%, which was used as an assumption for modelling. It should be noted that this rate is somewhat generous, as it assumes that all recyclable material will go to recycling, which is not always the case. Beverage carton recycling is still very much in development in the UK, and cartons sent to paper mills using a continuous process may not be recycled and instead screened out of the process and sent to landfill or incineration.[95]

Laminated Packaging Estimates

Laminated packaging waste flows were estimated using a similar method as described in a 2012 report on the recovery of laminated packaging from black bag waste published by WRAP.[96] The report quotes data from Alupro, the Aluminium Packaging Recycling Organisation, which indicates that the amount of aluminium used in laminated packaging was 16,000 tonnes in 2010, of which 4,000 tonnes were used in plastic laminates (such as those used for pouches, bags and sacks). Alupro also provided the assumption that aluminium represents just under 10% of the total mass of a laminated package. The total amount of laminated packaging (of the type considered in this study) entering the waste stream in the UK is therefore estimated at 41,000 tonnes, or 0.13% of all local authority collected waste (LACW).[97,98] Total arisings of laminated packaging in Wales based on 2015/16 municipal waste arisings are estimated at 2,121 tonnes based on this waste composition.

Estimates of the quantity of specific laminate materials which would be expected in laminated packaging waste have been made previously in a 2011 report published by

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[94] Wageningen UR Food & Biobased Research (2013) *Pilot Beverage Cartons Extended Technical Report*, December 20th 2013, https://www.kidv.nl/1667/wur-aachen-pilot-beverage-cartons-extended-technical-report.pdf

[95] WRAP (2017) *Collection of Food and Drink Cartons at the Kerbside*, October 2017, http://www.wrap.org.uk/sites/files/wrap/WRAP_2923_Collection-food-drink-cartons-kerbside-guidance.pdf

[96] URS (2012) *Recovery of Laminated Packaging from Black Bag Waste*, Report for WRAP, June 2012, http://www.wrap.org.uk/sites/files/wrap/Recovery%20of%20laminated%20packaging%20from%20black%20bag%20waste.pdf

[97] Defra (2011) *Quarterly local authority collected waste statistics incorporating April to June 2011*, 2nd February 2012, http://webarchive.nationalarchives.gov.uk/20130123162956/http:/www.defra.gov.uk/statistics/files/2011-12-Quarter-1-publication_WITHOUTLINKS_v2.xls

[98] StatsWales (2011) *Waste generated (tonnes) by source and year*, https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Waste-Management/Local-Authority-Municipal-Waste/Annual/wastegenerated-by-source-year

WRAP[99]. Based on samples from an MBT plant, it was estimated that 17.4% of laminated packaging was beverage containers, in the form of drinks pouches, with the remainder made up of pet food pouches, coffee pouches and toothpaste tubes. Applying this proportion to our waste estimates gives a total figure of 370 tonnes of laminated packaging beverage containers within Wales per annum.

As discussed for sachets, these materials are not generally recycled in the UK and so we have assumed that all waste is sent to residual waste.

Summary of Beverage Container Mass Flows

Overall waste arisings were calculated by adding together recycling and residual waste arisings for all beverage containers and the tonnage of waste littered (litter estimates are discussed separately in Appendix A.3.3). A breakdown of estimated waste arisings and treatment destinations is provided in Table A-3 3. Overall waste arisings for the range of beverage container packaging materials are estimated at ~105 thousand tonnes, with an overall 71% recycling rate. **It is noted that these overall figures include the litter estimates provided in Appendix A.3.3.**

Table A-3 3: Modelled estimated Waste Flows for Beverage Containers

Container	Waste generated (tonnes)	Recycled (tonnes)	Residual (tonnes)	Estimated Recycling rate
Glass Bottles	63,477	48,905	13,731	77.0%
Plastic Bottles	29,629	19,211	10,034	64.8%
Steel Cans	2,446	1,570	803	64.2%
Aluminium Cans	5,891	3,885	1,724	65.9%
Beverage Cartons	2,744	808	1,909	29.4%
Laminated Plastic Pouches, Bags, Sacks	370	0	367	0.0%
Total	**104,557**	**74,379**	**28,567**	**71.14%**

Note: Litter waste flows are not included in this table, but "waste generated" does include litter tonnage so as to demonstrate the overall recycling rate of all beverage container arisings.

[99] See Table 2 in Oakdene Hollins Ltd (2011) *Recycling of Laminated Packaging*, Report for WRAP, September 2011, http://www.wrap.org.uk/sites/files/wrap/Recycling%20of%20laminated%20packaging.pdf

Sensitivity Analysis for Plastic Beverage Container Estimates

Previous analyses by WRAP and Recoup have suggested a recycling rate of 75% and 74% respectively for plastic bottles in Wales. However, the analysis involved in these studies is not comparable to our analysis for the following reasons:

1) Both the WRAP and Recoup analyses relate to *all* plastic bottles, including both beverage, and non-beverage containers, with no further breakdown into these sub-categories. For this study, we interested in plastic ***beverage*** containers only; and
2) Neither WRAP nor Recoup's analysis take into account what happens after the materials are collected, so essentially the 75% and 74% figures respectively represent a collection rate, rather than a final recycling rate. Our calculated *collection* rate for plastic beverage containers is 79%. As described previously in this section, however, our analysis takes into account contamination and sorting rejects, which means that not all collected material will go on to actually be recycled (as is implicitly assumed in WRAP/ Recoup's estimates).

However, this is not to say that the estimates in Table A-3 3 are associated with a high level of confidence. A key assumption in our estimates is that of the proportion of all bottles in the waste stream that are beverage containers. As no Wales-specific data is available to inform this assumption, the figures presented in Table A-3 3 cannot be stated with certainty, and must be treated with caution.

We have apportioned this using data from Valpak that states 75% of all recycled plastic bottles in Scotland are beverage containers. Additional calculations were done to test the sensitivity in this figure, as Valpak estimates vary up to around 90%. In this instance there is less than half a percentage point difference in the overall recycling rate that we have calculated to consider contamination and rejects. However, in the absence of any underlying data or information pertaining to Valpak's estimate in Scotland, we cannot conclusively accept their assumption as representative in the Welsh context.

We have therefore also calculated the plastic beverage container estimates using data from Defra, which suggests that 35% of all dense plastics in kerbside recycling, and 62% of all plastic bottles in LA collected comingled recycling consisted of plastic beverage containers.[100] Applying these figures to the Stats Wales arisings data, we arrived at a 77% collection for recycling rate, and a 67% final recycling rate for plastic bottles, as opposed to the 79% collection rate and 65% final recycling rate using the existing assumptions. However, given that the assumption used in this estimate is supported by

[100] See http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=18237#RelatedDocuments

data that is 7 years old, and relevant to the English, rather than Welsh context, this estimate is also uncertain.

A.3.2.2 Single Use Cups and Lids

Single-use cups, which are filled at the point of sale, are a high profile example of items that cannot readily be recycled. This includes expanded polystyrene cups (EPS), polyethylene (PE) coated card cups, thermoformed PET/ PP cups (such as those used for milkshakes, smoothies and juices), and lids and straws that are included with them at the point of sale.

Waste Arisings

Different approaches were used to estimate waste arisings for three distinct single use cup subcategories: coffee cups (and lids), straws, and other disposable cups (and lids). These are described separately within this section.

Coffee Cups and Lids

It is widely reported that annual consumption of single-use coffee cups in the UK is circa 2.5 billion. However, this figure, from 2014, is now considered by an industry expert to be an underestimate. In a recent article, the founder of single-use coffee cup collection and recycling company Simply Cups stated that:[101]

> *When we started Simply Cups in 2014, we conservatively estimated that 2.5 billion cups were being used each year. Three years in, we now believe the true figure is closer to twice this amount and, when you add in plastic cups which also suffer the same fate, the overall size of the problem is likely to be over 10 billion cups per annum, and is set to grow further.*

For this analysis we have assumed that 5 billion coffee cups are consumed each year in the UK. This estimate was checked by calculating per capita consumption for the UK population aged 15 and over. At a national consumption rate of 2.5 billion cups, UK residents would on average be drinking 92 cups of takeaway coffee per year, at an average rate of a cup every four days. This seems sensible, given that many people will not be consuming any takeaway coffees. The annual number of coffee cups consumed in Wales is estimated at 237 million, pro-rated from the UK figure based on population estimates.[102]

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[101] Edie.net (2016) *To keep the momentum of circular economy brimming, we need to battle for the cup - The Simply Cups blog*, Accessed 8 March 2017, http://www.edie.net/blog/To-keep-the-momentum-of-circular-economy-brimming-we-need-to-battle-for-the-cup/6098093

[102] Office for National Statistics (2017) *Population Estimates for UK, England and Wales, Scotland and Northern Ireland*, 22nd June 2017, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

Unfortunately, no data on the consumption of coffee cups lids was found to be available. While undoubtedly a high percentage of cups are served with lids, there is no way of fixing this percentage with any certainty. One approach is to make an assumption about the types of coffee outlets likely to provide lids, and use this to set a conservative lower limit. In the UK, the three largest coffee shops account for around 77% of the market, and these large retailers customarily provide lids as a matter of course.[103] Many of the shops comprising the remaining 23% will also provide lids, but of course there will also be cups given out without lids on both sides. Therefore, a 77% limit on the number of cups provided with lids may be reasonable. Using this approach resulted in a figure of 183 million lids per year in Wales.

These consumption estimates were converted into packaging weights using data from KeepCup.[104] This approach gave a total weight figure for Wales of 2,608 tonnes per annum of coffee cups, and 548 tonnes of coffee cup lids.

Straws

The consumption estimate for single-use plastic drinking straws is based on an estimate of the number of straws provided by McDonalds in the UK made by the campaign group Straw Wars, which claims 3.5 million straws per day[105]. This is the equivalent of 1.28 billion in the UK annually.

Supplementary data on fast food market share figures for McDonald's in the UK were sourced from market research company Euromonitor.[106] Working on the assumption that other businesses in the fast food sector distribute straws in the same manner as McDonalds, this could then be scaled up to represent the total numbers of straws provided across the fast food sector annually. This figure was then pro-rated to Wales based on population estimates, giving a total of 404 million straws consumed annually. This is equivalent to waste arisings of approximately 150 tonnes of material.[107]

Other Cups and Lids

Within this study, the term 'other disposable cups' covers all disposable cups (and lids) that are not specifically used to serve coffee, and that are filled at the point of sale. This

[103] Bloomberg (2016) *Starbucks Trails Costa in Booming U.K. Coffee-Shop Market*, Accessed 22 March 2017, https://www.bloomberg.com/news/articles/2016-02-04/starbucks-trails-costa-in-booming-u-k-coffee-shop-market-chart

[104] KeepCup (2010) *Environmental Footprint: Calculator Considerations*, June 2010, http://www.keepcup.com/userfiles/files/KeepCup%20Calculator%20Considerations.pdf

[105] *Straw Wars*, accessed 22 March 2017, http://strawwars.org/

[106] Euromonitor (2017) *Fast food restaurant industry market research, trends, statistics*, Accessed 22 March 2017, http://www.euromonitor.com/fast-food

[107] Amazon (2017) sourcingmap® 35 Pcs 8" Long White Soft Plastic Flexible Drinking Straws for Party, Accessed 20th October 2017, https://www.amazon.co.uk/sourcingmap%C2%AE-Plastic-Flexible-Drinking-Straws/dp/B008LT423S

includes cups used for drinks such as milkshakes, smoothies, juices and sodas made from expanded polystyrene (EPS), polyethylene (PE) coated card and thermoformed PET/ PP.

The statement from Simply Cups, quoted above, suggests that approximately the same quantity of disposable cups are consumed as for coffee cups, which is circa 237 million cups per year in Wales. For comparison, an estimate was made using the numbers for drinking straws discussed above. This equals 404 million cups, based on the assumption that customers are provided with one straw per disposable cup consumed at a fast-food restaurant. No other data specific to other disposable cups or the associated lids was available. It is reasonable to assume that these two figures are indicative of the low and high range of possible values. For this analysis we have taken the midpoint of these two values, which totals 320 million cups per year in Wales.

While some of these cups will be provided without lids, there is no way of reaching an estimate on this point. Therefore, we have simply made a conservative assumption that two thirds, around 214 million, are provided with lids, based on a figure slightly below that reached for coffee cup lids.

In the absence of appropriate data pertaining to the weight of items in this category, we have assumed similar weights to disposable coffee cups and lids in order to calculate the overall waste arisings by weight. This results in 3,525 tonnes of disposable cups, and 641 tonnes of lids per year per year.

Recycling Rate

Very little recycling of these products takes place, and there is very little quantitative data on which to base recycling rate estimates. For the purposes of this analysis, we have made some reasonable estimates of recycling rates which are described here.

The results of research conducted by ICM Unlimited on behalf of Frugalpac concluded that only 1 in 400 coffee cups in the UK are actually recycled, equivalent to a 0.25% recycling rate[108], which totals 6.5 tonnes when apportioned to the Welsh population. It is difficult to separate the plastic coating of coffee cups from the card, and the only cups recycled are through specialist store schemes or other recycling schemes such as Simply Cups, and require specialist recycling technology.

Other disposable cups are constructed either of paper and plastic, as for coffee cups, EPS, or less commonly, rigid plastic. It is reasonable to assume that one third of these cups are constructed from rigid plastic, of which 5% are recycled, equivalent to an overall recycling rate of 1.7%, or 58.8 tonnes in Wales per annum.

Disposable cup (including coffee cup) lids are constructed from a single plastic polymer, and are easily recyclable, however little separation of these items takes place, and in general they will be disposed of as residual waste along with disposable cups. We have

[108] CIWM (2017) *Coffee Cup Recycling Bins "Have Little Impact", Research Suggests*, 6th April 2017, http://ciwm-journal.co.uk/coffee-cup-recycling-bins-little-impact-research-finds/

made an assumption of 5% recycling for these products, totalling 32 tonnes in Wales per annum, assuming that some disposable lids will be sorted for recycling by householders.

Drinking straws are typically constructed from polypropylene, which is recyclable, however very little separation of these items for recycling takes place. Without further data we have made the assumption that the recycling rates for these products is similar to that for disposable cups at 5%, and therefore 7.5 tonnes of straws are recycled per annum in Wales.

We assume that all non-recycled material is disposed of as residual waste, or is littered (see Appendix A.3.3 for litter estimates).

A.3.2.3 Takeaway Food Packaging

This category relates to takeaway packaging specific to food. The packaging is filled at the point of sale and has a diverse materials mix, which includes clamshells, boxes, pots and lids made of expanded polystyrene (EPS), lined/waxed paper, and other rigid plastics (HDPE and PP).

Waste Arisings

A report from Cancer Research puts the number of fast food meals and takeaways consumed in the UK every week at 22 million, equivalent to annual consumption of 1.14 billion.[109] When scaled to Wales, based on population estimates, it is estimated that 54.3 million fast food meals and takeaways are provided per year in Wales.

Data on the weight of takeaway packaging was sourced from advertised values for clamshell containers and rigid plastic containers. [110,111] As data was not available on the exact mix of takeaway packaging, it was estimated that around two thirds of packaging would be of clamshell size, and that the remaining third would be of the smaller plastic container size. This was used to estimate takeaway packaging waste arisings in Wales, which totalled 949 tonnes per annum.

Recycling Rate

There is no published data on recycling of takeaway packaging. EPS is not recycled and is recommend by WRAP to be put in the general rubbish. [112] The proportion of non-recyclable (e.g. EPS) takeaway packaging was estimated on the assumption that this kind of packaging is primarily provided by small fast food businesses. The big players on the

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[109] Cancer Research (2015) *A Weighty Issue*, March 2017, https://www.cancerresearchuk.org/sites/default/files/a_weighty_issue_full_report.pdf

[110] DrinkStuff (2017) *Biodegradable Sugarcane Clamshell Takeaway Box 7 x 5inch*, Accessed 19th October 2017, http://www.drinkstuff.com/products/product.asp?ID=19316

[111] DrinkStuff (2017) *Disposable Hinged Salad Container*, Accessed 19th October 2017, http://www.drinkstuff.com/products/product.asp?ID=19692

[112] WRAP (2017) *Recycling Guidelines*, May 2017, http://www.wrap.org.uk/sites/files/wrap/Recycling%20guidelines%20briefing%20doc%20v1.6_0.pdf

European fast food market (McDonalds, Subway, KFC) and similar large businesses typically do not provide their food in plastic packaging, but instead use branded packaging made of paper and card. The kinds of businesses responsible for providing plastic takeaway packaging are rather the small and independent business such as kebab houses, chip shops, and other takeaways serving global cuisines to go.

Data on small and medium sized enterprises (SMEs) was used to estimate the percentage of these fast food meals and takeaways provided by small takeaway businesses.[113] This was done by calculating the percentage of UK restaurant turnover for 2009 accounted for by businesses with between one and nine employees (29.3%). It should be noted, however, that the standard industrial classification (SIC) code under which restaurants are grouped in UK Government data also includes hotels, and there is unfortunately no way of separating out the two sectors in the data. However, simply based on the size of staff, utilising the SME grouping would rule out a large number of such establishments.

The remaining material (approx. 70%) is potentially recyclable, however the vast majority of this material will be disposed of as residual waste, whether in litter bins or household waste. Some littering of takeaway food packaging has also been modelled, as discussed further in Section A.3.3.

A.3.2.4 Single Portion Sachets, Pots, etc.

This category includes small, single-use, individual portion packs of condiments, conserves, and instant beverages, packaged in sachets, mini-pots, sticks, and so on. Such packaging is usually made of either multi-layer flexible materials or laminates, such as polyethylene coated paper, plastic coated foils, and so on, or of several materials, e.g. plastic pots with a foil/plastic peel-back top.

Waste Arisings

There is no publically available quantitative data on waste arisings of single portion containers, and as such, estimates were made based on market data. It was reported in 2010 that Heinz sells 11 billion single portion sachets of ketchup worldwide every year.[114] Market data from 2008, for single use sachets, which states that Heinz have a 6.7% share of this market, was used to scale up this figure and produce an estimate of the total worldwide consumption of single use sachets. This comes to 164 billion, which

[113] Office for National Statistics (2017) *UK Business - activity, size and location*, Accessed 19th October 2017, https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation

[114] The Telegraph (2010) *Heinz launches new 'cleaner use' ketchup sachet design*, Feb 2010, http://www.telegraph.co.uk/foodanddrink/foodanddrinknews/7169287/Heinz-launches-new-cleaner-use-ketchup-sachet-design.html

is consistent with claims by Unilever that hundreds of billions of plastic sachets are thrown away globally each year.[115]

Scaled to Wales, based on population estimates, this figure comes to 72 million sachets consumed per year. Assuming an average weight of 1 gram per sachet, this is equivalent to waste arisings of 72 tonnes. It should be noted that this figure is based entirely on data pertaining to laminated sachets, as this was the only data available sufficient enough to make this estimate. It does not represent consumption of single portion pots or other types of single serve packets, as we were unable to source any waste data or other market data on which to estimate the consumption of single portion pots, and as such no estimate has been made for this study.

Recycling Rate

The various materials that sachets are constructed from (primarily metallised films and other multilayer laminates) are not targeted materials and are not generally recycled in the UK according to WRAP.[116,117] We have therefore assumed that all material is either disposed of in the residual waste stream or is littered (see Appendix A.3.3 for litter estimates).

A.3.2.5 Black Plastic Food Containers

Plastic coloured with a carbon black pigment is used widely in the food industry for the packaging of a variety of foods, most notably as trays for meat products and for microwaveable ready meals.

Waste Arisings

There is no official source of waste data for black plastic food containers. A report written by Nextek for WRAP states that conservative industry estimates for waste arisings in the UK are around 26,000 - 30,000 tonnes per annum and estimates from other industry sources suggest that waste arisings could be as high as 60,000 tonnes per annum. [118] For this analysis we have taken the average of these two estimates, 44,000 tonnes per annum, and scaled this figure to Wales based on population estimates. The total arisings of black plastic food containers for Wales are thus estimated at 2,087 tonnes per annum. It should be noted that some of these waste arisings may be double

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[115] Unilever (2017) *Unilever develops new technology to tackle the global issue of plastic sachet waste,* 11th Mat 2017, https://www.unilever.com/news/Press-releases/2017/Unilever-develops-new-technology-to-tackle-the-global-issue-of-plastic-sachet-waste.html

[116] WRAP Cymru (2017) *Recycling of Aluminium Plastic Laminated Tubes and Pouches*, Accessed 19th October 2017, http://www.wrapcymru.org.uk/content/recycling-aluminium-plastic-laminated-tubes-and-pouches

[117] Oakdene Hollins Ltd (2011) *Recycling of Laminated Packaging*, Report for WRAP, September 2011, http://www.wrap.org.uk/sites/files/wrap/Recycling%20of%20laminated%20packaging.pdf

[118] Nextek Ltd (2011) Development of NIR Detectable Black Plastic Packaging, Report for WRAP, September 2011, http://www.wrap.org.uk/sites/files/wrap/Recyclability%20of%20black%20plastic%20packaging.pdf

counting arisings that also fall under the other waste categories in this analysis. However, without further data we are unable to understand the extent of double counting. Any error that is introduced will be minimal as the quantity of black plastic is small compared to the overall arisings for the range of packaging materials considered in this study.

Recycling Rate

Most black plastic is not recyclable, as sorting equipment cannot detect the colour black. While a detectable pigment can be added to black plastic to enable sorting, there has been very little take up of this (due to the small cost involved in adding the pigment), and WRAP recommends to Councils that residents should put black plastic with their general rubbish.[119,120]

There is no litter data on black plastic, and as black plastic is generally used in trays for ready meals and other fresh food consumed at home it is unlikely to be littered. A report for WRAP estimated that around 30,000 tonnes of plastic are either landfilled or incinerated in the UK each year. [121] Considering the estimated UK average of 44,000 tonnes, this would suggest that around 32% of black plastic goes elsewhere. However, as we know that none of this tonnage will be recycled, it is unlikely that 32% of black plastic, which would equal 522 tonnes each year in Wales alone, is littered. In the absence of further data or information, we can assume that a small proportion of this tonnage may be littered, but that it most likely reaches residual streams, although we cannot be entirely sure. Therefore we have assumed that all black plastic is disposed of as residual waste.

A.3.2.6 Metallised Films for Crisps, Confectionary, etc.

This category includes metallised plastic films, usually made from PET or PP, that are used mainly for packaging crisps and similar savoury snacks, as well as confectionery items such as chocolate bars. The calculations have been based on such items, although there are likely to be other products that also use such packaging.

Waste Arisings

Waste arisings estimates for metallised films are based on consumption data for the main products that this packaging is used for, mainly savoury snacks and chocolate confectionary. According to the National Diet and Nutrition Survey, men eat, on average, approximately 9g of crisps and savoury snacks per day, whilst women eat, on average,

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[119] LetsRecycle (2017) *WRAP tells councils to view black trays as 'rubbish'*, 9th March 2017, https://www.letsrecycle.com/news/latest-news/wrap-tells-councils-to-view-black-trays-as-rubbish/

[120] WRAP (2017) *Recycling Guidelines*, May 2017, http://www.wrap.org.uk/sites/files/wrap/Recycling%20guidelines%20briefing%20doc%20v1.6_0.pdf

[121] WRAP (2013) In-market trial to prove recycling process for black CPET trays, 2013, http://www.wrap.org.uk/sites/files/wrap/In_market_trial_to_prove_recycling_process_for_black_CPET_trays_case_study.pdf

just 6g per day, the equivalent of between 2 to 3 packets of snacks a week.[122] Based on this data, the estimated total consumption in Wales is 404 million snack packets per year. Annual consumption of chocolate in the UK is estimated at 11.2 kg, or the equivalent of 266 Mars Bars per person, which totals 828 million items annually across the Welsh population. [123]

These consumption estimates were converted into packaging weights using data on the unit weight of metallised film and estimates of the size of each snack packet and chocolate product (for savoury snacks, we assumed a size slightly smaller than a crisp packet, to account for smaller snacks such as nuts, and a Mars Bar wrapper size for chocolate confectionery).[124] Total arisings per year of metallised films within Wales are estimated at 497 tonnes, of which 330 tonnes are from savoury snacks, and 166 tonnes from chocolate confectionery. This should be considered a conservative estimate, as we have not included metallised film packaging from other products, such as sweet wrappers.

Recycling Rate

Metallised film is not currently collected for recycling in the UK, although some private schemes exist.[125] The aluminium coating is extremely thin and bonded closely to the base material, and it is not currently economically viable to separate and recover these two material layers.[126] For modelling, we have assumed that none of this material is recycled. We have assumed that all non-metallised films is disposed of as residual waste, or is littered (see Appendix A.3.3 for litter estimates).

A.3.3 Litter Modelling

The range of packaging materials included in this study form a significant component of litter. Estimates for the percentage of each packaging type in litter were sourced from a recent litter composition study for Wales.[127] 'Recyclable drinks-related litter' was found to make up 17.3% of the average composition of litter (in litter bins, recycling on the go bins, and picked up by street cleansing teams via carts and manual sweeping) by weight. Additionally, drinks cartons (liquid packaging board) were found to make up 0.3% of litter by weight.

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[122] The Snack, Nut and Crisp Manufacturers Association (2017) *History and Fun Facts*, 1st August 2017, http://www.snacma.org.uk/wp-content/uploads/2016/04/SNACMA_History_Fun_Facts_010817.pdf

[123] https://www.standard.co.uk/news/brits-are-biggest-chocoholics-7283556.html

[124] Rhyeco (2017) *Metalized CPP Film*, Accessed 20th October 2017, http://www.rhyeco.com/metalized.html

[125] Terracycle website, McVitie's® Biscuit Wrapper Recycling Programme, accessible at: https://www.terracycle.co.uk/en-UK/brigades/mcvities-biscuit-wrapper-brigade#how-it-works

[126] Oakdene Hollins Ltd (2011) *Recycling of Laminated Packaging*, Report for WRAP, September 2011, http://www.wrap.org.uk/sites/files/wrap/Recycling%20of%20laminated%20packaging.pdf

[127] Resource Futures (2017), *Litter Composition Study – Wales,* Report for WRAP, March 2017

Takeaway food packaging and single use cups and lids is included under the category of 'easily identifiable takeaway packaging', which was found to constitute 7.7% of the average litter composition by weight in Wales, although this included coffee cups, which made up approximately a quarter of the 7.7%. This equates to roughly 5.6% of the average litter composition without coffee cups.

We assume that the amount of littering relative to total arisings is similar for other single use categories (coffee cup lids, straws, other disposable cups, and other disposable cup lids) and apportion this 5.6% figure accordingly. A similar approach was taken to estimating litter from multilayer packaging, including pouches, which is reported to make up 0.2% of litter. This was apportioned between sachets and other laminated packaging. There was not a litter category for metallised films, however, it is reasonable to assume that a relatively high proportion of the reported 3.6% of litter which is plastic films is metallised film, as this type of packaging is commonly littered. For this analysis we have assumed 25% of this figure, so 0.9% of all litter, is metallised films by weight. These assumptions are summarised in Table A-3 4.

Table A-3 4: Litter Composition Assumptions

Material	% of Litter Composition by Weight
Beverage Containers	
Glass Bottles	9.2%
Plastic Bottles	4.2%
Steel Cans	0.8%
Aluminium Cans	3.1%
Beverage Cartons	0.3%
Laminated Plastic Pouches, Bags, Sacks	0.03%
Single Use Cups and Lids	
Coffee cups	2.2%
Coffee cup lids	0.5%
Straws	0.1%
Other disposable cups	3.3%
Other disposable cup lids	0.6%
Takeaway Food Packaging	1.6%

Material	% of Litter Composition by Weight
Single Portion Sachets, Pots, etc.	0.01%
Black Plastic	-
Metallised Film	0.9%

The authors of the 2017 litter composition study comment that:[128]

> *It would be interesting to carry out some further litter analysis including both volume and weight measurements. Volume is a key consideration for litter bin provision and collection frequency.*

To this we would add that overall volume (i.e. the number of items multiplied by their volume) is likely to be more closely related to the disamenity impact of litter than is the weight. It's worth noting that Eunomia's 2015 DRS Feasibility Study for Zero Waste Scotland identified that the average proportion of beverage containers in litter from four studies in Estonia, Czech Republic, Slovakia and Luxembourg was 46% by volume.[129] This is consistent with a recent study from New South Wales that noted that total beverage container litter accounted for 49% by volume.[130,131] For the DRS Feasibility study itself, it was (arguably conservatively) assumed that beverage containers accounted for 40% of litter by volume.

In a separate study, which focused on the ubiquity of littered items (rather than the proportion accounted for by specific items), an increasing trend in drinks-related litter, including cartons and coffee cups, was identified, with material found to be present in 44.7% of streets in Wales. Cans and plastic bottles were found to be the most ubiquitous of these litter items, found in 15.4% and 13.5% of streets, respectively, while cartons (1.9%) and glass bottles (2.1%) were the least widespread receptacles recorded. [132]

There is no data on the annual tonnage of litter dropped and cleaned up by local authorities in Wales (i.e. litter that is improperly discarded, rather than put in bins). However, it is possible, using available data on the annual tonnages of litter dropped and cleaned up by local authorities in Scotland, and prorating by the population in Wales (assuming that littering behaviour of Scottish consumers is not significantly different to

[128] Resource Futures for WRAP (2017), *Litter Composition Study – Wales,* March 2017
[129] Eunomia Research & Consulting (2015) A Scottish Deposit Refund Scheme, Final Report to Zero Waste Scotland, available at http://www.eunomia.co.uk/reports-tools/a-scottish-deposit-refund-system/
[130] New South Wales Environment Protection Authority (2016) 2015–16 National Litter Index Results for New South Wales, available at http://www.epa.nsw.gov.au/resources/litter/nsw-national-litter-index-results-160513.pdf
[131] Beverage containers due to be included in the proposed DRS accounted for 43% of the total volume.
[132] Keep Wales Tidy (2016), *All Wales Local Environmental Audit and Management System Report 2015-16*, accessible at: https://www.keepwalestidy.cymru/Handlers/Download.ashx?IDMF=82300fb7-b6f5-4b4b-8d09-3f146e69d167

that of consumers in other UK nations), to estimate that approximately 9,139 tonnes of litter is dropped on the ground and cleared each year in Wales.[133] Table A-3 5 presents estimates for the tonnages of each packaging type littered in Wales per year based on the litter proportions by weight as discussed above.

Table A-3 5: Estimated Qty of Litter Dropped on the Ground in Wales p.a.

Material	Quantity of litter dropped on the ground (tonnes)
Beverage Containers	
Glass Bottles	841
Plastic Bottles	384
Steel Cans	73
Aluminium Cans	283
Beverage Cartons	27
Laminated Plastic Pouches, Bags, Sacks	3
Single Use Cups and Lids	
Coffee cups	201
Coffee cup lids	47
Straws	13
Other disposable cups	305
Other disposable cup lids	55
Takeaway Food Packaging	146
Single Portion Sachets, Pots, etc.	1
Black Plastic	-
Metallised Film	82
Total Litter	2,462

A.3.4 Summary of Modelled Waste Flows

A summary of estimated waste arisings and treatment destinations for the range of packaging materials included in this study is provided in Table A-3 6.

[133] Zero Waste Scotland (2013) *Scotland's Litter Problem: Quantifying the scale and cost of litter and flytipping*, 2013

Table A-3 6: Summary of Packaging Waste Flows

Material	Waste generated	Recycling	Residual	Litter (dropped on the ground and then cleared)	Recycling rate
Beverage Containers	104,557	74,379	28,567	1,612	71.14%
Single Use Cups and Lids	7,472	132	6,719	622	1.8%
Takeaway Food Packaging	949	81	723	146	8.5%
Single Portion Sachets, Pots, etc.	72	0	72	1	0.0%
Black Plastic	2,087	0	2,087	0	0.0%
Metallised Film	497	0	415	82	0.0%

A.4.0 BAU Forecasting Methodology

This section sets out the approach taken to forecasting projected tonnage and recycling estimates based on a business as usual scenario for each packaging category. As can be seen in Appendix A.3.0, besides beverage containers, arisings and consumption data is relatively limited for each category, and this has been no different for data available for projections. As such, two approaches have been taken for each category, a population based forecast (Appendix A.4.1), and a consumption based forecast (Appendix A.4.2).

A.4.1 Population-based Forecasting

This approach assumes a business as usual scenario whereby all factors are constant, except for population growth. As such, it assumes that consumption of items, and thus generation of waste, will remain at the same rate, and that people's behaviours towards waste disposal, i.e. how much recycling and littering occurs, does not change significantly. It also assumes that no policy interventions will take place that may affect residual and recycling generation during this time.

Data for population projections for Wales was taken from the most up to date data currently available, which is Office of National Statistics data from 2016.[134] The baseline year is taken to be 2017, with a population of 3,126,220. For the purposes of this study, projections have been made up until 2025. The ONS data provides specific annual Welsh population projections for the next 100 years, and this data up until 2025 has been used for forecasting, by calculating the annual population growth as a percentage and applying this to the respective material tonnage baselines. Between 2017 and 2025 the population is forecast to grow at an average rate of 0.31% (varying between from 0.23% to 0.42%).

As the projected population growth within Wales is so low, this method resulted in significantly lower projected tonnages than those produced by market data forecasts, and it was concluded that population based forecasts seemed relatively unfeasible in comparison.

[134] Office for National Statistics (2017) Z4 – Zipped population projections data files, Wales, 26th October 2016, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/z4zippedpopulationprojectionsdatafileswales

A.4.2 Consumption-based Forecasting

This approach also assumes a business as usual scenario, except that consumption of products will increase above current rates. It has been assumed that the split of residual, recycling and litter will remain at the same proportion for each of the items as at present. Market forecast projections are also assumed to take account of population growth and, where appropriate, to make considerations in respect of light weighting of packaging and other relevant market innovations.

With categories that contain different packaging or product types, such as beverage containers, single use cups and metallised films, forecast assumptions have been used for each relevant item and then aggregated to total one overall forecast percentage. This has then been used as within the other categories, by applying this percentage on a year on year basis to demonstrate the increase in tonnage year on year until 2025. In this method, unlike the population forecast which varies slightly by year, the annual percentage increase is constant. The percentage increase for each category is shown in Table A-4 1.

Table A-4 1: Annual Percentage Increases

	Annual Increase
Beverage Containers (Total)	3.86%
Glass Bottles	4.90%
Plastic bottles	2.00%
Steel Cans	4.50%
Aluminium Cans	2.44%
Beverage Cartons	5.50%
Laminated Pouches	4.60%
Single Use Cups and Lids (Total)	3.12%
Coffee Cups	5.80%
Coffee Lids	5.80%
Straws	1.40%
Other Cups	1.15%
Other Lids	1.15%

Takeaway Food Packaging	2.99%
Black Plastic	2.00%
Sachets	5.80%
Metallised Films (Total)	2.99%
Snacks	3.60%
Confectionery	1.78%

The majority of forecasts having been made using data pertaining to market and consumption growth, although where possible waste specific data has been used. In this instance, this includes:

- Within beverage containers, plastic bottle arisings have been forecast using data from WRAP specific to plastic waste projections.[135]
- The same WRAP data has been used to forecast increases in black plastics.
- The remaining categories have used data from market sources, and where projections do not go as far as 2025, it has been assumed that the annual average increase remains at a similar level until this point.
- Data from Future Market Insights gives the expected average annual rate of growth for the global glass bottles market over the period from 2017 to 2022.[136]
- Data specific to the steel cans market was not available, so instead data from Research and Markets pertaining to the annual increase in the global food and beverage metal cans market over the period between 2018 and 2025 was used.[137]
- The aluminium cans market forecast is based on data from Expert Market Research that shows an average annual increase over the period between 2017 and 2022.[138]
- Data was used from Persistence Market Researchwhich shows an average annual increase in the global liquid packaging market over the period between 2016 and 2024.[139]

[135] WRAP (2013) PlasFlow Report 2017, January 2013, http://www.wrap.org.uk/sites/files/wrap/PlasFlow%202017%20Report.pdf
[136] Future Market Insights (2017) Glass Bottles Market, 4th October 2017, https://www.futuremarketinsights.com/reports/glass-bottles-market
[137] Research and Markets (2017) Global Food & Beverage Metal Cans Market Analysis & Trends – Industry Forecast to 2025, April 2017, https://www.researchandmarkets.com/research/m35fm8/global_food_and
[138] Expert Market Research (2017) Aluminium Cans Market Report and Forecast 2017 – 2022, 2017, http://www.expertmarketresearch.com/reports/aluminium-cans-market
[139] Persistence Market Research (2016) Global Market Study on Liquid Packaging Cartons, July 2016, https://www.persistencemarketresearch.com/market-research/liquid-packaging-cartons-market.asp

- Data was used from Smithers Pira which shows an average annual increase in global pouch packaging consumption during the period between 2016 and 2021.[140]
- The increase in coffee cups and lids is based on projections from Mintel for increases in takeaway coffee consumption over the period from 2018 to 2023, which totals 29% over the period and has been averaged out to result in an annual increase. As it is assumed that the majority of takeaway coffees are served in a cup with a lid, the same rate has been applied to both categories.[141]
- Data pertaining to straws is very limited, and this is equally true for forecast data. An increase of 7% over the five year period between 2015 and 2020 has been used, averaged for an annual figure, but this comes from data by Technavio that pertains only to the broad category of global disposable foodservice manufacturing.[142] Whilst straws are included, it is a particularly broad category, but represents the best data available.
- Data from Technavio shows that the global cups and lids manufacturing industry is predicted to increase by 5.75% in total over the five years between 2016 and 2021, which has been averaged to produce an annual figure.[143] As the coffee industry is expected to experience a particular boost over the next five years, a much lower percentage seems a reasonable assumption when considering other uses for disposable cups and lids which are likely to grow at a much slower rate.
- Ibis World data was used that shows an average annual increase in the takeaway food market in the UK over the five year period between 2013 and 2018.[144]
- Data was used from Future Market Insights which shows an annual expected increase in the global sachet packaging market, which is forecasted between 2017 and 2027.[145]
- Data from Mintel has been used to forecast savoury snack consumption increases, which projected between 2016 and 2021.[146]

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[140] Smithers Pira (2016) The Future of Pouch Packaging to 2021, 20th September 2016, https://www.smitherspira.com/industry-market-reports/packaging/the-future-of-pouch-packaging-to-2021

[141] Mintel Research (2017) Grande Growth: UK coffee shop sales enjoy a growth high, 12th April 2017, http://www.mintel.com/press-centre/food-and-drink/uk-coffee-shop-sales-enjoy-a-growth-high

[142] Technavio (2016) Global Foodservice Disposables Market 2016 – 2020, January 2016, https://www.technavio.com/report/global-packaging-foodservice-disposables-market

[143] Technavio (2015) Global Cups and Lids Market 2015 – 2019, February 2015, https://www.technavio.com/report/global-cups-and-lids-market-2015-2019

[144] Ibis World (2017) Takeaway & Fast-Food Restaurants in the UK: Market Research Report, November 2017, https://www.ibisworld.co.uk/industry-trends/market-research-reports/accommodation-food-service-activities/takeaway-fast-food-restaurants.html

[145] Future Market Insights (2017) Sachet Packaging Market, July 2017, https://www.futuremarketinsights.com/reports/sachet-packaging-market

[146] Mintel Research (2017) Crisps, Savoury Snacks and Nuts – UK, January 2017, http://reports.mintel.com/display/792263/

- Confectionery consumption projections from Key Note have been based on a total growth of 8.9% over the five year period up until 2019, which has been averaged out across the period.[147]

[147] Key Note (2015) Confectionery, 2015, https://www.keynote.co.uk/market-report/food/confectionery

A.5.0 Stakeholders and Nature of Engagement

Table A-5-1: Contact Log

Organisation	Contact Name	Designation	Input Received?
Aldi	Victoria Pearse	Corporate Responsibility Manager	No
Alupro	Rick Hindley	Executive Director	No
Asian Catering Federation	George Shaw	Marketing and PR Consultant	phonecall
Association of Convenience Stores (ACS)	Edward Woodall	Head of Policy and Public Affairs	No
Association of Convenience Stores (ACS)	Julie Byers	Public Affairs Manager	workshop 1, 2
Ball Packaging (Beverage Packaging Europe)	Matthew Rowland-Jones	European Sustainability Manager	workshop 1
Benders Paper Cups	Adrian Pratt	Marketing Manager	No
British Glass	Vallishree Murthy	Recycling Advisor	workshop 1
British Plastics Federation (BPF)/ Packaging and Films Association (PAFA)	Barry Turner	Director BPF, CEO PAFA	phonecall
British Plastics Federation (BPF)/ Packaging and Films Association (PAFA)	Helen Jordan	Sustainability Issues Executive	No
British Plastics Federation (BPF)/ Packaging and Films Association (PAFA)	Rowena Schoo	Industrial Issues Executive	No
British Soft Drinks Association (BSDA)	Gavin Partington	Director General	workshop 1
BSDA	Oliver Strudwick	Public Affairs Manager	No
Caerphilly CBC - Directorate of Environment	Rhodri Lloyd	Special Projects Officer	workshop 3
Cardiff Uni, Dept of Env Sciences	Wouter Poortinga	Professor of Environmental Psychology	No

Organisation	Contact Name	Designation	Input Received?
Closed Loop Recycling / Simply Cups	Peter Goodwin	Director	phonecall
Coca Cola GB	Nick Brown	Head of Sustainability, Coca-Cola European Partners, Great Britain	workshop 1, 2
Coffee #1	Sarah Hill	Brand Marketing Manager	No
Co-operative Food	Iain Ferguson	Environment Manager	phonecall
Costa Coffee	Olly Rosevear	Energy & Environment Manager	phonecall
DAERA	Owen Lyttle	Environmental Policy Division	No
Defra	Colette Wrigglesworth	Producer Responsibility and Carrier Bags Lead	No
Defra	Isabel Sloman	Policy Advisor	workshop 1, 2
Environmental Services Association	Jakob Rindegren	Recycling Policy Adviser	phonecall
Federation of Independent Retailers (NFRN)	Mark Dudden	District President, Wales	No
Foodservice Packaging Association	Martin Kersh	Executive Director	workshop 2
Friends of the Earth Wales	Julian Kirby	Environmental Justice Campaigner; multi-issue at Friends of the Earth England, Wales and Northern Ireland	No
Friends of the Earth Wales/ Surfers against Sewage	Ffion Matthews	Communications Officer	workshop 2, 3
Greenpeace	Luke Massey	Press & Comms Officer	No
Greggs	Paul Rhodes	Group Safety H&E Manager	No
Greggs	Lynne Bell	Environment Manager	workshop 2
Industry Council for Research on Packaging & the Environment (INCPEN)	Paul Vanston	Chief Executive	workshop 1, 2, 3
Keep Wales Tidy (KWT)	Louise Tambini	Operations Director	No
Keep Wales Tidy (KWT)	Richard Phipps	Regional Manager Central East	workshop 1, 2

Organisation	Contact Name	Designation	Input Received?
Keep Wales Tidy (KWT)	Hanna Jones	Policy and Research Officer	workshop 3
Keep Wales Tidy (KWT)	Jemma Bere	Policy & Research Manager	No
LARAC Wales	Paul Quayle	Wales Representative	No
Lichfields	Tesco - Mark Caul Booker - Guy Farrant	Technical Manager - Packaging at Tesco, COO of Booker Wholesale	No
LINPAC	Lubna Edwards	Head of Sustainability	No
Llangattock Litter Pickers	Michael Butterfield		workshop 1
Lucozade Ribena Suntory	Arun Thomas	Packaging Technologist	No
Marine Conservation Society (MCS)	Sue Kinsey	Senior Policy Officer	workshop 1, 2, 3
Marks & Spencer	Kevin Vyse	Senior Packaging Technologist	No
McDonalds	Helen McFarlane	Environment Consultant	No
McDonalds	Chantal Beaudoin	Sustainability Consultant	No
Natural Resources Wales	Rebecca.Favager	Waste and Resources Manager	No
Natural Resources Wales	Michelle Griffiths		workshop 3
Natural Resources Wales	John Davies	Producer Responsibility	workshop 1, 2, 3
Nestle	Bruce Funnel	Head of Packaging	No
Nestle	Andrew Griffiths	Head of Sustainability	workshop 3
Plastipak Europe	Kinza Sutton	| Head of Marketing & Public Affairs - Europe	workshop 1
Recoup	Stuart Foster	CEO	No
Recoup	Glyn Staines	Consultant to Recoup	workshop 2, 3
Scottish Government	Tim Chant	Policy Officer	No
SEPA	Rebecca Walker	Waste and Landfill Tax Manager	No
SEPA	Lorna Walker	Senior Policy Officer - Waste Prevention	No

Organisation	Contact Name	Designation	Input Received?
SEPA	Christopher Garvie	Environment Protection Officer - Producer Compliance and Waste Shipment Unit, Circular Economy Portfolio	workshop 1, 2, 3
Starbucks	Simon Redfern	VP Corporate Affairs	No
Starbucks	Jaz Rabadia	Senior Manager of energy and Initiatives	No
Subway (EIPC)	Abbie Gregory	Director of CSR, Product Management and Franchisee Support	No
Subway (EIPC)	Richard Moorby	Director of Purchasing - Food, Drink and Packaging	No
Surfers against Sewage	Hugo Tagholm	Chief Executive	No
Sustainable Restaurant Association	Pete Hemingway	Community Manager	No
The Packaging Federation	Dick Searle	Chief Executive	workshop 1, 2
Welsh Gov	Gary Douch	Marine & Fisheries Directorate	No
Welsh Gov	Sarah Storey	Natural resource policy directorate	No
Welsh Gov	David Lloyd-Thomas	Food Directorate	No
Welsh Gov	Richard Clark	People and Envt Directorate	No
Welsh Government	Benedict Clifford	Work placement	workshop 2
Welsh Government	Dan Stevenson		workshop 1, 2
Welsh Government	Sarah Bonwick	Project Manager	workshop 1, 2, 3
Welsh Government	Andy Rees	Head of Waste Strategy	workshop 1, 2, 3
Welsh Government	Jennet Holmes	Water, Waste, Resource Efficiency & Flood Division	workshop 1, 2, 3
Welsh Retail Consortium	Sara Jones	WRC Head	workshop 1, 2
Welsh Treasury	Laura Fox	Tax Strategy, Policy and Engagement Division	workshop 1, 2

Organisation	Contact Name	Designation	Input Received?
WLGA	Jonathan Roberts	Improvement Officer - Waste, Welsh Local Government Association	workshop 1
WRAP	Sarah Gray	Research Analyst	phonecall
WRAP Cymru	Susan Jay	Sector Specialist Circular Economy	workshop 3
WRAP Cymru	Huw Lloyd	Business Account Manager- Hospitality & Food Sectors at WRAP	workshop 1, 2
WRAP UK	Bernard Chase	Sector Specialist Plastics	workshop 3
WWF Wales	Ann Meikle	Head of WWF Cymru	No
Zero Waste Scotland	Andy Dick	Policy Programme Manager	No
Zerotofive Food Industry Centre; Cardiff Metropolitan University	Helen Taylor	Technical Director, Operations and Technical Manager	No

A.6.0 Rationale for Rejection of Long-listed Options

A.6.1 Beverage Containers

The rejected options are:

- Industry-funded infrastructure enhancements as this is captured by assigning producers responsibility targets and setting requirements for demonstration of success.
- Industry-funded communication/ awareness campaigns – as above.
- Increased littering fines as this would not be consistent with EPR principles as the onus is on the public sector to enforce.

A.6.2 Single Use Cups and Lids

The rejected options are:

- Mandatory discount for customers who reuse as it is considered that this is likely to have less impact than introducing a tax or charge for single-use cups.
- Make compostable/biodegradable alternatives mandatory because closed loop systems are required and where these are in place targeting reuse rather than recycling is preferable and this would take the form of a DRS scheme, which is one of our shortlisted measures.
- Voluntary agreements because stronger options are seen as feasible that have greater potential to shift consumers away from single-use items and towards reuse.
- Enhanced litter clean-up, on the go bins, and awareness campaigns paid for by industry, as this would only likely be a small contribution towards overall litter costs, and would do nothing to prevent waste.

A.6.3 Takeaway Food Packaging

The rejected options are:

- A ban on certain materials, as this would be much more difficult to implement than alternative approaches to incentivising a shift away from certain materials.
- An industry charge (not visible to the consumer) based on weight placed on the market to fund litter/waste management costs, as a better option would be full EPR, while an explicit cost visible to the consumer is seen as likely to leverage a greater shift to reusables which would likely also drive a reduction in littering.

- An industry charge (not visible to the consumer) based on packaging type - as a better option would be full EPR.
- Voluntary agreements, because stronger options are seen as feasible which would either provide a financial incentive to consumers to shift to reusable and more recyclable alternatives or would provide greater choice to consumers in providing access to reusables.

A.6.4 Single Portion Sachets, Pots etc.

The rejected option is;

- Voluntary agreement with vendors because stronger mandatory options are seen as feasible.

A.6.5 Black Plastics Food Containers

The rejected options are:

- Industry charge based on the end-of-life value of materials, because full EPR would be a better approach
- Voluntary agreement, as work is already progressing on such an approach but progress to date has not been rapid, and mandatory approaches have greater potential.
- Explicit charge at point of sale that varies by colour because if, as suggested, black plastic does make food more attractive then this may not be effective. Retailers are also unlikely to present alternatives to consumers and so a charge serves little purpose as there is not an alternative towards which customers can be driven by the charge.

A.6.6 Metallised plastic films for Crisps, Confectionary etc.

The rejected options are:

- Voluntary agreement, as the effect would likely be more limited than any mandatory requirement and may not cover all producers.
- Explicit charge at point of sale as a key problem with this packaging type is the lack of alternative materials that don't unacceptably compromise product quality – and therefore a charge serves little purpose as there is not an alternative towards which customers can be driven by the charge.

A.7.0 Detailed Analysis of Beverage Container Options

A.7.1 An Accompanying Beverage Container Tax

If certain beverage containers are excluded from the scope of a DRS for practical or other reasons (as cartons and pouches commonly are), then this creates an incentive for producers to shift to those container types to avoid paying producer fees. In order to ensure that all beverage container types are treated fairly a mechanism is required to ensure there is no financial advantage to be gained from switching.

In some countries such as Sweden this is achieved simply through the imposition of a flat rate tax on beverage containers, but with an exemption for all beverage container types that join the deposit system.

However, a better example of such a mechanism is Norway's Beverage Container Tax. While this was actually implemented as a stand-alone instrument (in response to the beverage container tax, the Norwegian beverage industry voluntarily established a DRS), a tax following similar design principles would also work well alongside a Government mandated DRS in the UK.

Norway imposes an excise duty per unit of single-use beverage packaging placed on the market. The tax consists of both a base tax and an environmental tax. The base tax is payable if the beverage packaging cannot be reused in its original form (as would be the case for refillable bottles). There is an exemption from the base tax for disposable packaging that contains:[148]

- Milk and dairy products;
- Beverages made from cocoa and chocolate, and concentrates thereof;
- Products in powder form;
- Grain and soy based milk replacement products; or
- Infant formula

There is an exemption from the environmental tax for packaging used for:

- Beverages in powder form; and
- Infant formula

The rates for 2017, converted to Sterling are shown in Table A-7 1.

[148] See Norwegian Tax Administration (2017) beverage Packaging, available at http://www.skatteetaten.no/no/Bedrift-og-organisasjon/avgifter/mat-og-drikke/drikkevareemballasje/

Table A-7 1: Norwegian Beverage Packaging Excise Duty

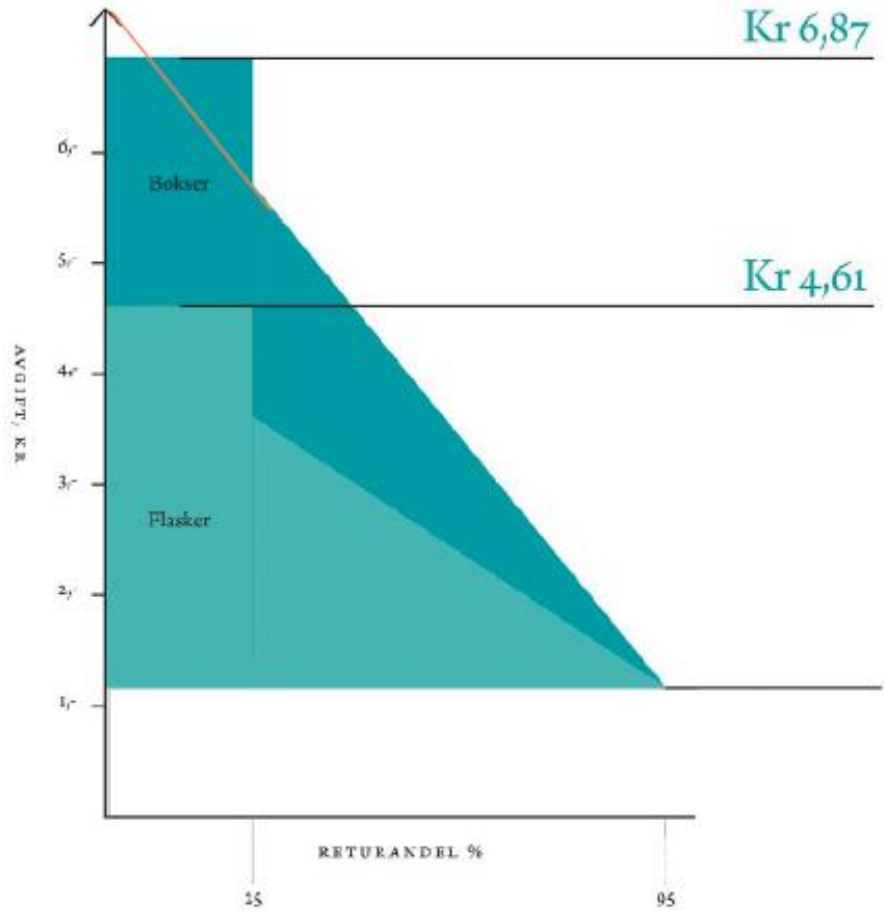
Tax on beverage packaging (GBP per container)	Full Tax per container	Effective Tax per container at 90% return rate
Basic tax, disposable packaging	£0.09	£0.09
Environmental Tax		
A) Glass and metal	£0.43	£0.04
B) Plastic	£0.26	£0.03
C) Cartons and cardboard	£0.11	£0.01

Source: https://www.regjeringen.no/no/tema/okonomi-og-budsjett/skatter-og-avgifter/avgiftssatser-2017/id2514838/

The rate of the environmental tax is further linked to the return rate for different types of beverage packaging, up to 5 litres in volume. If the return rate is less than 25%, there is no reduction in the environmental tax. Beverage packaging with a return rate between 25% and 95% is eligible for a proportionally reduced rate of the tax, and packaging with a return rate of 95% for is exempt altogether (although there are proposals to modify the tax to only allow full exemption when 100% return rates are achieved).[149] This is shown graphically in Figure A.7 1.

[149] Ch. 5.3, Norwegian Excise Duty Regulations, https://lovdata.no/forskrift/2001-12-11-1451/§3-5-1; Infinitum (2017) The Environmental Tax System, available at http://infinitum.no/english/the-environmental-tax-system

Figure A.7 1: Norwegian Beverage Container Tax Rates



Source: Infinitum

In this way, manufacturers are incentivised to increase recovery rates for their packaging, or use packaging that are more easily recovered, in order to avoid a higher rate of tax.

To date, the annual rate of the tax has been determined in Parliament, and the actual tax rate is later reduced according to documented return shares. Proposals are in place to change this in order to simply charge the tax based on the previous year's return rates. In order to further incentivise recycling of such material, new proposals from the Norwegian Environment Agency also include a transitional arrangement for the exclusion of energy recovery from the recovery rates associated with the tax, as well as a shift from the current base tax to an incentive tax. This would encourage manufacturers to increase the use of recycled content in their packaging.[150]

[150] Environmental Directorate website (2014), News - Improvements in the regulation of beverage packaging http://www.miljodirektoratet.no/no/Nyheter/Nyheter/2014/Mars-2014/Forbedringer-i-reguleringen-av-drikkevareemballasje/

It’s worth noting that for beverage containers within a DRS, data of a very high quality is obtained as to the return rate – down to the return rates for specific beverage types - as precise numbers of containers placed on the market and returned are known.

Accordingly, if such a tax based approach were to be implemented in the UK, reconciling the level of tax owed by producers of such containers is a relatively straightforward process. For beverage containers outside of a DRS, the onus would be on the producers to supply sufficient evidence of actual return rates to the relevant authorities.

While the principles of the tax would work well in the UK context, the specific levels of the tax for each beverage container type, and the rate at which the tax declines as the return rates increases would have to be determined based on modelling of the financial effects. It is beyond the scope of this project to suggest specific tax rates.

If the tax per beverage container were set to decline at 1% for each 1% increase in the return rate, the effect would be akin to the full rate of tax only being applied to beverage containers that are not returned. The revenue raised could thus potentially be used to cover the cost of beverage containers that are not returned through the DRS (and indeed those that are not separately collected through any parallel system for packaging materials).

A.7.2 Anticipated Effects of a DRS on Litter

A detailed analysis of the evidence in respect of the litter reduction effects of a DRS is included in Appendix A.7.8.

Based on observed reductions in beverage container litter from the implementation of a DRS in other countries, it is anticipated that a DRS would lead to a 95% reduction in littering of deposit-bearing beverage containers. On the basis that beverage containers account for circa 40% by volume of all litter in Wales, this should reduce the volume of litter overall by circa 38%.

Evidence presented in Appendix A.7.8 suggests that the reduction in litter that will occur as a result of the implementation of a DRS will reduce the rate at which other items are littered.

The financial effects on local authorities resulting from a drop in litter from a DRS are discussed in Appendix A.7.6.

A.7.3 Impacts on Producers

A DRS for beverage containers would, in line with EPR principles, lead to a shift in costs for end-of-life management of used beverage containers away from taxpayers/citizens, towards producers/consumers.

Unredeemed deposits and material revenues provide two sources of funding for a DRS, with the balance made up by producer fees.

In a previous piece of analysis carried out for Zero Waste Scotland revenue from producer fees for a DRS in Scotland was estimated to vary between £6m and £17m per annum, equalling a cost per container sold of between 0.24 and 0.72 pence per container.[151] Further sensitivity analysis identified a possible range from 0.64 pence per container to 1.13 pence per container. Accordingly, producer fees of circa 1 pence per container would seem a reasonable assumption.

Effectively, this producer fee, of 1 pence per container represents the entire net costs of the system (after material revenues and unredeemed deposits are accounted for). It thus represents the net costs to cover the management of the whole system, including the logistics, and also includes the handling fees paid out to retailers (See Appendix A.7.4).

Industry representatives in the workshop on EPR options for beverage containers held in November 2017 in Cardiff expressed concern that there could be an impact on sales of different formats of beverage product as a result of DRS.[152] Their consumer preferences

[151] Eunomia Research & Consulting Ltd (2015) *A Scottish Deposit Refund System*, Report for Zero Waste Scotland, 2015

[152] Personal communication with Nick Brown, Coca Cola GB.

research which had sought to help shoppers imagine a situation where a DRS was in operation and think forward to how they might behave if such a system existed suggested there might a shift in preference from multi-pack to single larger containers along with changes to when or where consumers would purchase beverages. However, the representatives were unable to provide any quantitative or qualitative data to further elaborate on these reported findings.

A.7.4 Impacts on Retailers

Although DRS schemes in which consumers return their containers to centralised depots to redeem their deposit exist, it is more common in Europe to have 'return to retail' system due to the greater convenience for consumers. Return to retail is also associated with higher return rates.

A number of organisations representing small retailers including the Association of Convenience Stores (ACS) and Scottish Grocers Federation (SGF) have raised concerns about the impacts of DRS on retailers, both in response to the 2015 feasibility study for ZWS and, ACS, at the November workshops[153], regarding;

1) The space to store and manage high volumes of returned beverage containers, including;
    a. Reverse vending machine storage
    b. Manual storage of beverage containers behind the till
    c. Storage of uncompressed containers prior to collection
2) In store delays and staff costs;
3) The displacement of sales from smaller to larger format stores; and
4) The financial costs of RVMs for independent convenience store retailers.

The following additional concerns were raised in submissions to the two Environmental Audit Committee (EAC) enquiries concerning plastic bottles in 2017.[154,155]

5) Annual registration fees for small retailers;
6) Hygiene concerns associated with staff handling dirty containers; and
7) Costs associated with having to implement IT systems.

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[153] Personal Communication with Julie Buyers, Association of Convenience Stores.
[154] SGF & ACS (2017) Written evidence submitted by the Association of Convenience Stores and the Scottish Grocers Federation, Coffee Cups and Plastic Bottles: Disposable Packaging Inquiry, PKG0068, 25 April 2017, available at http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/packaging/written/49804.pdf
[155] SGF & ACS (2017) Written evidence submitted by the Association of Convenience Stores and the Scottish Grocers Federation, Disposable Packaging: Coffee Cups and Plastic Bottles Inquiry, PKG0014, 10 October 2017, available at http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/packaging/written/70619.pdf

However, on reading the submissions referenced above, it seems that these concerns could, in large part, be down to misinterpretation of the possible nature of a DRS, and the way in which retailers are compensated under such a scheme.

Significantly, in other schemes, handling fees are negotiated to take into account all likely capital and labour costs, and other losses incurred by the retailer (such as sales space foregone). This was noted at the November Workshop by industry representatives. The Welsh Retail Consortium representative, when asked (at the workshop) what level of handling fee their members would seek, responded that this is not something that they are currently able to answer, and that they will be consulting on this with members soon.[156]

Retailer handling fees paid by a selection of operating deposit schemes in other European countries, for plastic bottles, metal beverage cans, and glass bottles, are shown in Table A-7 2, Table A-7 3, and Table A-7 4 respectively.

Table A-7 2: Retailer Handling Fees for Plastic Bottles (converted to Sterling – pence per container taken back by the retailer)

	Norway	Sweden	Estonia	Lithuania
Manual	0.8	1.7	1.4	2.3
RVM – no Compaction	0.8	1.7	2.8	2.3
RVM - Compacting	1.9	2.2 – 4.2[157]	4.0	4.4

Table A-7 3:Retailer Handling Fees for Cans (converted to Sterling – pence per container taken back by the retailer)

	Norway	Sweden	Estonia	Lithuania
Manual	0.4	0	1.4	2.3
RVM – no Compaction	0.4	0	2.8	2.3
RVM - Compacting	1.5	1.5 – 1.7[158]	4.0	4.4

[156] Personal Communication with Sara Jones, Welsh Retail Consortium.
[157] Depending on bottle size and type of pick up
[158] Depending on type of pick up

Table A-7 4: Retailer Handling Fees for Glass Bottles (converted to Sterling – pence per container taken back by the retailer)

	Estonia	Lithuania
Manual	1.6	2.3
RVM – no Compaction	3.0	2.3
RVM - Compacting	3.0	4.4

Regarding space concerns, there is often the option for the smallest retailers to be exempt from taking part in schemes, and for small communal take back points to be set up in the vicinity to which they could direct people. Additionally, those that do take part could have the option of choosing an RVM or manual take-back based on their specific circumstances.

Regarding displacement of sales to larger stores from smaller ones due to the potential for consumers to choose to stockpile containers and return them in bulk to larger stores for convenience reasons, it is certainly true that this might be unavoidable if smaller retailers choose to be exempt from DRS schemes. However, as 77% of those who use convenience stores live within a mile of their local store, with 51% of those living within a quarter of a mile, and 17% living within 100 yards, there could be the potential for increased footfall, if they choose to partake.[159] In addition, for individuals consuming drinks on-the-go, convenience stores that will refund a deposit might benefit from further footfall relative to those that don't.

Regarding hygiene concerns, these seem to have arisen from a misunderstanding as to the types of container typically included within DRS. Retailers have expressed concerns specific to food and, as this possible DRS system would be targeting beverage containers, takeback of food packaging would be out of scope.

Although some organisations have expressed a range of concerns regarding impacts on small retailers, it should be noted that the National Federation of Retail Newsagents, which represents the very smallest shops, has come out in support of DRS. Additionally, Iceland and the Co-operative have recently become the first UK supermarkets to back a UK-wide DRS, followed soon after by Tesco.

[159] Association of Convenience Stores (2016) The Local Shop Report 2016, available at https://www.acs.org.uk/wp-content/uploads/2016/09/Local-Shop-Report-2016.pdf

A.7.5 Impacts on Consumers

The upfront payment that a consumer makes for a beverage is ultimately refunded in the form of the deposit. However, it is possible that costs to producers (the fees paid by producers to the system operator or revenue lost through taxes on materials) will be passed through to consumers in product prices. These producer fees are likely to be around 1p per beverage container. However, the extent to which these would ultimately fall on consumers (rather than producers) would depend upon the price-responsiveness of demand for the product, which relates to the response of demand both to the price of the product itself, and that of competitor products.

An additional possible impact on consumer could result from the aforementioned shift in preferences for different sales formats of beverages, for example from multipacks to larger single containers. However, as previously mentioned, industry representatives were unable to provide evidence as to the extent to which such a shift would occur.

Concern was expressed at the stakeholder workshop as to the way DRS would work alongside the growing trend for online ordering and delivery of groceries. However, it is possible, as it is in other systems, for used beverage containers to be placed in sealed bags and returned to the delivery driver, avoiding any issues of contamination. The consumer would be expected to get the refund automatically in such a case.

Two existing systems - in Norway and Germany - already make provision for those people who want to return some or all of their empty drinks containers via a home delivery service provided by retailers. In Norway close to 1% of returns are via home delivery. Infinitum, the system operator, provides the bags free of charge, which are embedded with a code underneath the barcode which tracks the bag and its contents. When considering how a Welsh or UK-wide system could be designed, retailers will be able to learn from their counterparts in other countries as to how home deliveries can become part of the system. Of course there are additional benefits, in that integrating home delivery trucks into the DRS ensures there aren't trucks driving around empty.

Finally, it should be noted that public support across the UK for a DRS is extremely high. In a YouGov poll for the Marine Conservation Society, almost three quarters of those questioned supported the introduction of DRS across the UK for single-use drinks bottles (plastic and glass) and cans. Of specific note is that the levels of support remain high among the less affluent in society, as shown in Table A-7 5.

Table A-7 5: Public Support Levels for DRS

	Social Grade	
	ABC1	C2DE
Strongly support	43%	36%
Support	33%	33%
Neither support nor oppose	14%	16%
Oppose	5%	7%
Strongly oppose	2%	4%
Don't know	3%	4%
Net: Support	76%	69%
Net: Oppose	7%	11%

Source: YouGov poll on behalf of the Marine Conservation Society.
Question asked: To what extent would you support or oppose the following in the UK? Deposit return systems (DRS) across the UK for single-use drinks bottles

A.7.6 Impacts on Local Authorities

Concern has long been expressed by local authority representatives as to the financial impact to them of a DRS being implemented - a concern driven in large part by the loss of material revenue from kerbside collections, especially of aluminium and PET. However, while there will be losses in material revenue, there will also be reductions in the amount of residual waste requiring treatment, along with the possibility of reduced material recovery facility (MRF) costs and potential efficiencies in collection. There also appears to be potential for a reduction in street cleansing costs.

Initial analysis undertaken in 2015 by Eunomia on behalf of Zero Waste Scotland indicated that a DRS would lead to annual savings to local authorities in Scotland of £4.6 million.[160]

More recently, Eunomia was commissioned to undertake a more detailed analysis of the financial impacts of a DRS on local authorities in England.[161] With the main concern expressed to date on behalf of local authorities being the potential loss of material revenue, the study focused on those already performing well in terms of recycling (on

[160] Eunomia Research & Consulting (2015) A Scottish Deposit Refund System, Final Report for Zero Waste Scotland, available at http://www.zerowastescotland.org.uk/sites/default/files/ZWS%20DRS%20Report_MAIN%20REPORT_Final_v2.pdf

[161] Eunomia Research & Consulting Ltd (2017) Impacts of a Deposit Refund System on Local Authority Waste Services, available at http://www.eunomia.co.uk/reports-tools/impacts-of-a-deposit-refund-system-for-one-way-beverage-packaging-on-local-authority-waste-services/

the basis that the local authorities that currently achieve high rates of recycling are those that will have the most to lose in the event that a DRS is implemented).

The study identified that on average, for the authorities with higher recycling rates, potential savings of £1.47 per household would be possible (without accounting for any possible savings from reduced litter clean-up costs). It is not a straightforward matter to transfer these figures to the Welsh context. However, it is worth noting that as there is no two-tier system in operation in Wales, savings will accrue to the authority as a whole, whereas in England, the typical finding was that while disposal authorities made savings greater than the increased costs to collection authorities, collection authorities were concerned that these savings might not be shared.

In order to fully understand the financial impacts on Welsh local authorities it would be necessary to undertake modelling with each authority.

A.7.6.1 Possible Litter Savings

The study for Keep Britain Tidy also identified possible savings associated with the reduction in the number of beverage containers littered, and the associated reduction in the overall volume of litter. These included:

- Reduced requirement for litter bin provision;
- Reduced requirement for street sweepers;
- Savings to parks budgets as much time is spent clearing up beverage container littered by people drinking outdoors when the weather is warm and sunny.

While presented in the report to Keep Britain Tidy as areas where savings would be expected to be delivered, alongside illustrative estimates of the savings for specific local authorities, but these were not scaled up nationally.

While savings were identified, the reduced level of litter was also considered as enabling service improvements on existing budgets. One example was that sweepers on high streets, with the avoided requirement to pick up so many beverage containers, could sweep ‘headways’ (i.e. a couple of car lengths up streets branching off from high streets). Furthermore, it was noted by one authority that half of the caged vehicles currently focus on emptying litter bins, with the other half on fly-tipping and uncontrolled waste. It was thus suggested that any reduction in the number of bins to be emptied could mean an improved response to fly-tipping incidents.

A.7.6.2 Reform of Extended Producer Responsibility for Packaging

It is worth reflecting, briefly, on the concept of Extended Producer Responsibility (EPR), and how the way in which it is implemented for packaging in the UK[162] underpins the key concern from local authorities that a DRS would impact on their costs (i.e. that they are currently responsible for funding the majority of household services, and therefore feel exposed to measures that may impact on their finances).

EPR is defined by the OECD as:[163]

> *'An environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle'.*

The practical implications of this approach are that responsibility for collecting or taking back used goods, and for sorting and treating for their eventual recycling lie with producers. Such responsibility may be simply financial or, additionally, organisational.

In the UK, the fee from producers is estimated to cover only about 10% of the total cost of the system, whereas in many other schemes in European countries, 100% of net costs are covered.[164] In reality, little if any of this reaches local authorities so, in practice, in the UK, virtually all of the costs of dealing with waste packaging are covered by local authorities (i.e. by taxpayers) rather than producers (and, in turn, consumers).

This point bears consideration in respect of local authority concerns - and indeed packaging industry bodies' reiteration of such concerns - about loss of material income from bottles and cans being diverted from the kerbside system under a DRS.[165]

At present, local authorities are bearing a cost that arguably should, and in many other EU Member States, already is, being borne by producers. Accordingly, while the question of lost material revenue is a legitimate concern under the current situation, a bigger question might be why it is that the status quo should have persisted for so long, particularly against a backdrop of increasingly straitened local authority finances. In any discussions around packaging producer responsibility reform, local authorities would be justified therefore not simply in considering marginal changes to their waste service budget, but also to seek to address the lack of financial support they receive from the packaging industry generally to cover costs of collecting and managing their products once they become waste.

Of course, as calls grow for the Packaging Recovery Note system to be reformed or replaced, it seems increasingly likely that in the relatively near future, local authorities

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[162] Common *"Producer Responsibility Obligations (Packaging Waste) Regulations"* apply to England, Wales and Scotland. Northern Ireland has its own separate regulations. However, in both cases the implications upon local authorities finance and waste management systems is the same.
[163] OECD (2001) Extended Producer Responsibility: A Guidance Manual for Governments
[164] Bio by Deloitte (2014) Development of Guidance on Extended Producer Responsibility, Final Report to DG Environment of the European Commission
[165] See http://www.letsrecycle.com/news/latest-news/deposit-scheme-hit-councils-warns-vanston/

will not be as concerned about possible loss of material revenue, as the majority – or possibly all - costs of collecting and managing packaging waste should be borne by producers.

A.7.7 Employment Impacts

Eunomia undertook a study for CPRE in 2011 that explored the potential employment impacts of a one-way DRS in the UK.[166] The report specifically examined the impacts of introducing a DRS on the number, type and location of jobs involved in the collection and processing of beverage containers. The calculations were based on the DRS system modelled for an earlier study for CPRE that considered the costs and benefits of a DRS.[167]

If it is assumed that all additional reprocessing jobs that result from higher separate collection of beverage containers under a DRS are created in the UK and are thus included in the overall labour impacts, the introduction of a DRS leads to a 4,248 to 4,292 increase in full-time equivalent (FTE) posts, with a higher net increase in jobs from an 80% compared to a 90% return rate scenario. Pro-rating on the basis of population, this would suggest 201 to 204 additional jobs in Wales

Even without the inclusion of any FTE posts from reprocessing (i.e. assuming it all takes place overseas), there remains an overall increase in FTEs ranging from 3,062 to 3,156 for the 90% and 80% return rate scenarios respectively. The majority of jobs created are at a similar skill level to the existing jobs, though there is perhaps a slight increase in the total number of higher skilled jobs. Pro-rating on the basis of population, this would suggest 145 to 150 additional jobs in Wales

Another observed benefit of DRS, albeit one for which there is no data, is that bottles that are littered may be collected by the poorest in society who return them for recycling and redeem deposits. Indeed in Germany this approach has been 'formalised' as litter bins have 'collars' in which used beverage containers can be placed if consumers cannot be bothered to return them, with the intention being that these are held in place until someone else picks them up.

A.7.8 Detailed Analysis of Litter Reduction Evidence

Perhaps surprisingly, to the best of our knowledge, no specific research has been undertaken in the European context to identify the effect of a DRS on littering of beverage containers. It is therefore necessary to look to studies undertaken in the US. A

[166] Eunomia (2011) From Waste to Work: The Potential for a Deposit Refund System to Create Jobs in the UK

[167] Eunomia (2010) Have We Got The Bottle? Implementing a Deposit Refund System in the UK, Report for CPRE

2005 peer review for Defra, by Perchards, of a study on DRS systems for packaging highlights a number of examples.[168] The peer review notes that:

> *Mandatory deposits came into force in nine US states between 1972 and 1983 (the only deposit law adopted since then was in Hawaii in 2002, though a related measure was California's Advance Disposal Fee, adopted in 1986). The leading US authority on litter measurement, Dan Syrek of the Institute of Applied Research, conducted a series of litter studies in a number of US states during this period, including a series of "before and after" studies in the states where mandatory deposits were imposed on non-refillables, and "side- by - side" studies comparing results in adjacent deposit and non-deposit states.*
>
> *These studies were carried out with a very robust methodology and they present an unsurpassed view of the effect of this policy measure on littering. We are unaware of any European studies of comparable comprehensiveness.*

The Perchards peer review highlights that one of Syrek's studies, prepared for a Special Joint Committee of the Michigan Legislature to study the impact of the Beverage Container Deposit Law, collected samples in September 1978 and September 1979. The deposit law came into force on 3 December 1978. It appears that this may well be the *only* dedicated piece of research implemented on behalf of a state government specifically to determine the effects on littering of a DRS on beverage containers. Perchards notes, in respect of the Michigan study that:[169]

> *It was found that while beverage container litter had declined by 85%-88%, the changes in total litter rates were not statistically significant*

Perchards then offers the data shown in Table A-7 6.

[168] Perchards (2005) Deposit Return Systems for Packaging Applying International Experience to the UK, Peer Review of a Study by Oakdene Hollins Ltd., Report to Defra 14 March 2005, available at http://www.oakdenehollins.com/pdf/Deposit_Returns_2005_Peer_Review.pdf

[169] Perchards (2005) Deposit Return Systems for Packaging Applying International Experience to the UK, Peer Review of a Study by Oakdene Hollins Ltd., Report to Defra 14 March 2005, available at http://www.oakdenehollins.com/pdf/Deposit_Returns_2005_Peer_Review.pdf

Table A-7 6: Results presented in Perchards (2005) for Before-and-After Studies

IAR FINDINGS ON DEPOSIT LEGISLATION EFFECTIVENESS				
	Measurement Parameter	Beverage container Litter rate	Other Litter rate	Total Litter rate
BEFORE-AND-AFTER STUDIES				
Michigan 1978	Visible items per mile	226.0	1447	1673
Michigan 1979	Visible items per mile	6.3	808	815
	% change	*-91.5%*	*+2.1%*	*-10.5%*
California 1986	Visible items per mile	70.0	1836	1953
California 1993	Visible items per mile	42.2	1970	2013
	% change	*-63.9%*	*+7.3%*	*+3.1%*

Source: Perchards 2005, reporting Syrek

The first thing to note about this table is that the 85%-88% reduction in beverage container litter reported in the text for Michigan is not matched by that shown in the table, which is a reduction of 91.5%. However, if the reported number of visible items per mile are accurately presented, then the 91.5% shown in the table is also inaccurate. A reduction in the beverage container litter rate from 226 to 6.3 visible items per mile is actually a 97.2% reduction in beverage container litter.

An error has also been made in presenting the 'other litter rate' and the 'total litter rate'. For 'other', i.e. non-beverage container litter, the reduction from 1447 to 808 items is a decline of 44.2% rather than an increase of 2.1% as indicated. For total litter, the drop from 1673 to 814.3 visible items per mile is a reduction of 51.3%, rather than a reduction of 10.5% as in the table.

The key figure in respect of considering impacts of a DRS is the 97.2% reduction in beverage container litter. This is consistent with the findings from a study by PwC on the German Einwegpfand (one-way deposit) that stated:[170]

> *With a deposit system, there is practically no longer any littering of single-use beverage containers bearing deposits*

Interestingly, the percentage changes calculated in the Perchards report based on the findings from the California studies are also incorrect. The number of visible items per mile that are beverage containers drops from 70 in 1986, to 42.2 in 1993, which is a reduction of only 39.7%, rather than the 63.9% indicated. The total number of visible

[170] PWC (2011) Reuse and Recycling Systems for Selected Beverage Packaging from a Sustainability Perspective: An analysis of the Ecological, Economic and Social Impacts of Reuse and Recycling Systems and Approaches to Solutions for Further Development, available at http://www.duh.de/fileadmin/user_upload/download/Projektinformation/Kreislaufwirtschaft/PwC-Study_reading_version.pdf

items per mile in 1986 is also incorrect - it's overstated - and should be 1906 rather than 1953. This means that the total increase in visible items per mile between 1986 and 1993 is 5.6%.

Notwithstanding these errors, it's remarkable that the California scheme is presented as one of the two examples of 'before and after' studies that apparently, according to Perchards:[171]

Present an unsurpassed view of the effect of this policy measure on littering

Firstly, it's important to note that the level of the deposit in California, at only 2.5 cents (on beverage containers smaller than 24oz, 5 cents on those above this size), meant the financial incentive to return the beverage container was far smaller than in other schemes. For example, the deposit level in Michigan, upon scheme implementation in 1979, was 10 cents on non-refillables (i.e. one-way beverage containers). Even without accounting for the effect of inflation between 1979 and 1987, it is clear that a 2.5 cents payment on return is unlikely to lead to the same reduction in littering as a 10 cents deposit/refund.

Secondly, there are seven years between the 'before' and 'after' study. In this time, overall consumption of beverage containers will most likely have increased, and the value of the 2.5 cent or 5 cent payment for return of the beverage container will have been further eroded by inflation.

That the California example is presented here strongly suggests that the Michigan study, which as we can see showed a 97.2% reduction in beverage container litter, was the only credible 'before and after' study undertaken by Dan Syrek and the Institute for Applied Research.[172]

The Perchards peer review also presents the findings from adjacent state studies by Syrek. These findings are reproduced in Table A-7 7.

[171] Perchards (2005) Deposit Return Systems for Packaging Applying International Experience to the UK, Peer Review of a Study by Oakdene Hollins Ltd., Report to Defra 14 March 2005, available at http://www.oakdenehollins.com/pdf/Deposit_Returns_2005_Peer_Review.pdf

[172] Perchards, in their 2005 peer review, do not provide a reference for Syrek's work, although they do indicate that one of his studies was published in 2003. In fact in another paper by Perchards ('Peer Review of the Boomerang Alliance Report: National Packaging Covenant – Say No to the Waste Club', 3 March 2005, available at http://www.pca.org.au/application/files/5614/3769/2418/Oz_Boomerang_Report.pdf) in which the same miscalculations are presented, the list of references include Syrek (1980) Michigan: After – a study of the impact of beverage container deposit legislation on street, roadside and recreation area litter in Michigan. The Institute for Applied Research; and Syrek (2003) What we now know about controlling litter – Findings pertinent to Michigan derived from thirty years of litter research. The Institute for Applied Research. It has not been possible to find either of these papers online

Table A-7 7: Results presented in Perchards (2005) for Adjacent State Studies

IAR FINDINGS ON DEPOSIT LEGISLATION EFFECTIVENESS				
	Measurement Parameter	Beverage container Litter rate	Other Litter rate	Total Litter rate
ADJACENT STATE STUDIES				
California 1974	Visible items per mile	228.2	1998	2226
Oregon 1977	Visible items per mile	27.6	1930	1958
	% difference	*-87.9%*	*-3.4%*	*-12.0%*
Pennsylvania 1984	Visible items per mile	167.5	3117	3285
New York 1984	Visible items per mile	52.7	3485	3538
	% difference	*-68.5%*	*+11.8%*	*+7.7%*

Source: Perchards 2005, reporting Syrek

Assuming the number of visible items per mile are correctly reported, the percentage changes shown are accurate. Unfortunately it has not been possible to find the original analysis from which these figures are derived. Again, it does seem strange that studies that apparently present 'an unsurpassed view of the effects of a DRS on littering' includes a survey of two adjacent states, but taken three years apart (California 1974, and Oregon 1997).

It's interesting to note that while the Perchards peer review reports on Pennsylvania and New York as adjacent states, it neglects to mention a 1986 study published in a peer reviewed journal, that compares the 'before' and 'after' situation in New York (either side of the September 12, 1983 implementation of the New York State Bottle Bill), with measurements, at the same time, in the adjacent state of New Jersey.[173] The study considered both highway exits and railroad tracks, where groups 'tend to party' according to the authors. For deposit-bearing beverage containers, the authors reported immediate reductions of between 95% and 99% depending on the location. Clearly not all beverage containers were deposit-bearing, and the authors report that the overall reduction in beverage container litter was more moderate – an initial 44% reduction at highway exits in New York, for example.

What's therefore important to note is that Syrek's figures reporting the number of visible beverage containers per mile, as presented in Perchards' peer review, may not distinguish between those that are deposit-bearing and those that are not deposit-bearing. The figures thus presented may therefore *understate* the reduction in littering of deposit-bearing beverage containers.

[173] Levitt, L. & Leventhal, G. (1986) Litter Reduction: How Effective is the New York State Bottle Bill? Environment and Behavior, Vol. 18 No. 4, July 1986, 467-479.

These findings strongly suggest that reductions in littering of deposit-bearing beverage containers in excess of 95% could reasonably be expected in the UK.

A.7.8.1 Impacts on Other Litter

That litter breeds litter is intuitive, and borne out by research. A DRS on beverage containers can be expected to reduce the littering of beverage containers by 95%. Given that beverage containers account for 40% of litter by volume, there will be a significant reduction in overall litter volume. In thus reducing overall litter volume, this can be expected to reduce the likelihood that people will litter other items – "a lightly littered environment breeds litter at a slower rate than a more heavily littered environment".

This expectation is supported by the academic literature. In fact, Cialdini et al. [174] report this finding in their 1990 paper, as does a 2013 study by Schultz et al. [175] This latter research identified that the level of pre-existing litter (which the researchers rated on a scale from 0-10) was predictive of observed littering behaviour. For every 'unit' increase in existing litter, the observed rate of littering increased by 2%.

Accordingly, reducing the overall volume of beverage container litter through implementing a DRS, through making places less littered, is likely to reduce the rate at which other items are littered.

[174] Cialdini R. B., Reno R. R., Kallgren C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. Journal of Personality and Social Psychology, 58, 1015-1026, available at http://www-personal.umich.edu/~prestos/Downloads/DC/pdfs/Krupka_Oct13_Cialdinietal1990.pdf

[175] Schultz, PW., Bator, RJ., Large, LB., Bruni, CM., Tabanico, JJ. (2011) Littering in Context: personal and Environmental Predictors of Littering Behaviour, Environment and Behaviour, 45 (1) , pp 35-59, available at http://journals.sagepub.com/doi/abs/10.1177/0013916511412179

A.8.0 Further Analysis of Options for Other F&D Packaging Types

A.8.1 Single-use Cups and Lids

It should be kept in mind for single-use cups and lids that the options presented here are not necessarily mutually exclusive, and in combination could be particularly effective. For example, the combination of a consumer-facing fee for single-use cups and lids could have knock-on impacts on the littering and waste reduction of other packaging types if combined with a ban on single-use cups as an eat-in option. The fee could result in an incentive to eat in and, as drinks are often purchased alongside food in single-use packaging, there might be a reduction in other such single-use packaging being taken off site and littered. If a ban is also placed on single-use takeaway food packaging as an eat-in option, then this would also lead to further waste and litter reduction benefits.

Even if a ban is not implemented on single-use takeaway food packaging, the consumer still has an incentive to eat in and so the costs of managing the resulting waste stream are shifted from the public, if the packaging is littered or placed in a public litter bin, to the retailer, when it is disposed of in their bins.

A.8.1.1 Consumer-Facing Financial Incentive

From the consumer perspective this would take the form of a visible fee payable at the point of sale for a single use cup and lid. This fee could be a charge, much like the plastic bag charge, with funds initially going to industry but potentially ultimately being directed to charity, or a tax, with revenue accruing to central government.

While the waste prevention effects of a tax or a charge would be the same, in principle a tax might be preferable. This is for two reasons. Firstly; a tax would avoid the risks – that could occur with a charge – that funds disbursed by retailers displace CSR spending, as industry representatives suggested might occur during the November Workshops. Secondly, a charge could result in undue influence over recipients including NGOs, who themselves might become overly dependent upon the proceeds of the charge, potentially limiting their support for high ambition in respect of waste and litter prevention.

The amount which would be raised from such a charge/tax depends on:

- The level of the charge/tax; and
- The level of reduction achieved.

Implementation Considerations

It is suggested that this charge or tax would apply to all retailers of single-use cups and lids – including the smallest – so as to maximise the intended shift in preference for reusables through creation of a social norm.

Industry representatives at the November workshops suggested that vending machines represent a significant proportion of the single-use cup sales. Consideration would thus need to be given to the way in which the tax would be applied, and whether customers could use their own cups. It might be that it is not possible for customers to use their own cup in such cases, and if so a tax would have to be applied to every beverage consumed from such machines. However, given sufficient notice of an impending tax, companies selling coffee and other beverages via such machines would need to make the commercial decision as to whether or not to adapt the machines to accept customers' reusable cups and allow them to avoid the tax.

Anticipated Impacts on Litter, Recycling and Waste Reduction

It is sensible to assume that littering of single-use cups and lids would decrease in line with their sale. A recent study by academics at Cardiff University involving a trial of a consumer-facing fee at a small number of coffee shops noted that:

> *Through clear messaging, the provision of reusable alternatives, and financial incentives, the use of reusable coffee cups can be increased by (on average) 2.3 to 12.5%.*

The authors further note that the experiment was small in scale and introduced at a limited number of sites. They further state that:

> *It is likely that the reduction would be even greater with a mandatory charge on disposable coffee cups at the national level. It then becomes more worthwhile for consumers to adapt to the widespread introduction of the charge by using reusable alternatives.*

However, it should be noted that the level of reduction in use would likely vary with the level of the charge imposed. Therefore, setting a high fee level might result in a larger reduction in sale and littering of single-use cups and lids. One approach in implementing a consumer-facing fee could be to steadily increase its level, starting from a base level of perhaps 25p.

Alongside a reduction in littering through reduced sales, this option would result in a related reduction in waste through encouraging a shift to reusables.

Manufacturer Impacts

It is expected, indeed intended, that this measure would result in a reduction in sales of single use cups and lids. The extent to which Wales-based producers are impacted will depend on proportion of their total sales which occur in Wales.

Those manufacturers who produce reusable cups would, however, expect to see an increase in sales.

The extent to which producers are impacted would also depend on the degree to which consumers make the shift to reusables. As stated earlier this will likely depend on the level of the charge, and the associated shift in the social norm in favour of using reusables.

Retailer Impacts

It is expected that retailers would support, albeit perhaps not publicly, such a charge as, at present, single-use cups and lids together can cost about 10 pence each to small retailers.[176] These then have to be stored somewhere which is a particular issue for the smallest retailers. If customers bring reusable cups to be filled, there is an immediate saving of ten pence to the retailer. However, it seems likely that large chains will be able to negotiate a much better price per disposable cup than independent retailers, and they therefore might not see as large a saving per cup.

Although one might consider exemptions for the smallest shops attractive, it is worth keeping in mind that the Association of Convenience Stores, the National Federation of Retail Newsagents (NFRN) and the British Retail Consortium all came out in support of all retailers, of all sizes, being included in the scope of the carrier bag charge in England. The key reason for this was so that they would not be out of pocket through being expected to continue to provide such bags for free at the point of sale.

Retailers might also choose to partake in schemes such as Cup Club which was piloted in London in 2017, and which is being rolled out in January 2018. Cups are delivered to stores which subscribe to the scheme, customers take their coffee away in them and then deposit them at dedicated drop-off points after which they are collected by the system operator, washed and returned to stores. CupClub is also looking into ways that customers who partake in CupClub can be rewarded for using their reusable cups for example through discounts in store.

Consumer Impacts

Consumers will bear an ongoing cost if they do not change their behaviour, having to pay the fee each time, but will face a one-off larger cost if they choose to purchase a reusable cup. Those who consume the most and on a regular basis, will receive greatest incentive to invest in a reusable cup, if they don't have one already. All things being equal, the higher the charge, the sooner any consumer who has invested in a reusable cup will recoup the costs of the purchase.

There is a distinction worth making between regular and infrequent consumers. Those who consume irregularly are less likely to carry a reusable cup with them and so are more likely to pay the fee repeatedly.

[176] See http://www.isonomia.co.uk/?p=4413

Local Authority Impacts

Through reduced littering local authorities might see cost savings. The extent to which they see this saving will depend on the level of ambition and thus level set for the fee, and the associated reduction in consumption. As is the case for beverage containers, coffee cups, which account for 2.2% of Welsh litter by weight, are high volume items, and thus fill up bins relatively quickly, as well as contributing disproportionately to the visual disamenity of litter.

Waste Management Industry Impacts

Through contamination of waste streams coffee cups create problems for certain reprocessors. All things being equal a reduction in the use of single-use cups should reduce the number in the waste stream.

A.8.1.2 Ban on Single-use Cups as an Eat-in Option

This option would be entirely consistent with the application of the waste hierarchy under the waste regulations, as there is obvious potential to employ reusables in preference to single-use items. If adopted this option could also be built upon in the future with a ban being extended to cover other single-use items for which there are reusable alternatives such as cutlery, albeit it is understood that the Welsh Government does not at present have the powers to implement such a ban. That said, the theoretical potential of the approach is further discussed below.

Implementation Considerations

It would be beneficial to provide retailers with sufficient notice period to react to the onset of new obligations. This will allow them to develop obtain or increase ceramic stock and run down existing stock of single-use items.

Retailers, backed by producers of such cups, may also seek to appeal against a ban on single-use items or seek exemptions for specific businesses.

Anticipated Impacts on Litter, Recycling and Waste Reduction

The extent to which this option results in waste reduction will depend on the number of stores currently offering single-use cups for eat-in and whether customers would shift to single-use takeaway in preference of eat-in with crockery, though this seems unlikely. As there is, at present, no robust data for these two key variables it is unknown what effect this option would have relative to other options. However, as a number of the largest retailers run on a business model of offering only single-use for eat-in, such as McDonald's, this could result in a substantial reduction in waste.

It is possible that there could be an unintended consequence for littering if consumers shift to takeaway single-use packaging in preference of eat-in with crockery, however this seems an unlikely scenario.

Manufacturer Impacts

As with a consumer facing charge, it is expected that this measure would result in a reduction in sales of single use cups and lids. Again, the extent to which Welsh

producers are impacted will depend on proportion of their total sales which occur in Wales.

Retailer Impacts

This option would, for some businesses, require the installation of washing machines for reusable cups which industry representatives suggested could be difficult for smaller retailers who are space constrained.

However, it stands to reason that the number of cups requiring washing over the course of a day will decrease in line with the size of a retailer as there will be less space for customers to eat in. As such the very smallest retailers with eat-in space will have very few cups to clean and in such circumstances a dedicated sink, which needn't take up very much space at all, might suffice. For larger, but still small retailers, there may still not be a large number of cups to wash in a day but they may not have space for a full-size dishwasher. In these instances, a half-width dishwasher or, again, dedicated sink could be installed. Larger retailers should have sufficient space for a dishwasher.

Alternatively, smaller retailers could have cups collected for washing at a centralised facility which could be run collaboratively in locations such as shopping centres or could be provided by a third party.

Consumer Impacts

There is not likely to be any significant impact on consumers. Those that think they might wish to leave with their drink would be required to use a single-use cup and consume it off premises, or would choose to eat-in with reusable crockery.

Local Authority Impacts

As for a consumer-facing fee on single-use items local authorities might see cost savings due to reduced levels of litter, as it is expected that this option might drive a shift to eat-in.

Waste Management Industry Impacts

A reduction in single-use takeaway cups within the waste stream would likely be welcome, as they can cause problems for reprocessors.

A.8.1.3 Mandatory Provision of Take Back Facilities

This would involve retailers who sell beverages in single-use cups and lids having to accept consumers returning any single-use cup and lid in their stores regardless of where it had been purchased, in effect creating a network of return points. This is the policy that Costa Coffee currently implements.

Implementation Considerations

Exemptions might have to be considered for small retailers, especially those in areas of high footfall who are likely to have a very large number of cups and lids returned to them.

Industry representatives at the November Workshop suggested that this option might be combined with a recyclability requirement so that a certain quality of returned cup is maintained.

Anticipated Impacts on Litter, Recycling and Waste Reduction

This measure could lead to a reduction in littering if consumers see returning the cup to a store as easier than littering it. However, this option offers no incentive for return.

The intention of this measure is that it will encourage industry to build upon the good work of those engaging voluntarily with schemes such as Simply Cups which offer a collection service for plastic-lined paper cups for transportation to one of a few dedicated recycling facilities around the country.[177]

On its own this measure would not lead to waste prevention.

Manufacturer Impacts

This measure would have no major impact on producers directly but might prompt greater involvement with existing industry-led initiatives such as the Paper Cup Recovery and Recycling Group.

Retailer Impacts

Retailers would require dedicated space for the storage of returned cups such as the dedicated cup recycling racks that Costa Coffee currently uses in its stores which allows the stacking of cups and thus economic use of space. There was concern raised by industry representatives that smaller retailers might not have space to store returned cups and therefore exemptions for the smallest stores might be sensible.

Regarding hygiene concerns related to the rinsing out of cups, retailers could be allowed right of refusal if cups were unacceptably dirty, such as Costa Coffee currently retains under its policy on cup takeback.[178]

Regarding collection from stores for recycling or other treatment, this could either be operated in house by the company, or retailers could pay a service provider such as Simply Cups to collect their cups and transport them to a dedicated recycling facility. Alternatively, such service providers also provide a post-back service whereby retailers generating a small volume of cups and/or on an infrequent basis send back their cups when ready in bulk. This might be an option for retailers in rural areas who never generate sufficient numbers of cups to warrant a dedicated collection.

Those retailers who choose to recycle the containers they collect would likely benefit from good press related to Corporate Social Responsibility.

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[177] Simply Cups (2016), available at http://www.simplycups.co.uk/
[178] Costa Coffee, Our Cups, available at https://www.costa.co.uk/responsibility/our-cups/

Consumer Impacts

The responsible disposal of single-use cups and lids will become easier for consumers as a network of disposal points will effectively be created.

Local Authority Impacts

If this measure is effective in encouraging reduced littering, and indeed the amount of used cups in litter bins, then local authorities might see cost savings.

Waste Management Industry Impacts

If this measure is effective then it will:

- Remove coffee cups from residual waste streams which can cause contamination issues; and
- Create a separate, uncontaminated stream of material that can be recycled in specialist facilities.

This option would therefore likely be supported by the waste management industry.

A.8.1.4 Mandatory Use of Reusables Supported by DRS

This would involve the complete phase out of single-use cups and lids for beverages to be replaced by the use of reusable cups only. To facilitate this a deposit return scheme would be implemented involving a centralised system operator who would manage delivery of cups to retailers, collection of used containers from deposit points, washing of containers and subsequent redelivery to retailers. Consumers would still be allowed to bring their own reusable cups to retailers.

As was outlined in Appendix A.8.1.1, a system similar to this has already been trialled in London by the company Cup Club, which was one of the winners of the New Plastics Economy Innovation Prize this year.[179]

It is envisaged that this option might be considered an aspirational policy option for implementation in the future after one or more of the other options have been implemented, and have already delivered some shift towards reusables. Although other measures might well be effective in preventing waste and litter, this option would effectively eradicate all single-use cup waste and litter. This option could therefore be the final step in a phased path towards greater and greater use of reusable containers, once public support for reusables has been increased through other measures.

Implementation Considerations

Although this option is suggested as an aspiration for future implementation, it might be advisable to run one or more pilots in environments such as markets or shopping centres hosting a number of beverage retailers. These could be used to uncover important

[179] New Plastics Economy (2017) Innovation Prize Winners, available at https://newplasticseconomy.org/innovation-prize

lessons about implementation while also making clear the intention to take a phased approach towards high levels of reusables. Public appetite for such a scheme could also be gauged.

On the operational side, the level of deposit would need to be higher than the value of container. The funding of the scheme would also be dependent on fees, presumably paid by the retailer and then passed through to the consumer.

Anticipated Impacts on Litter, Recycling and Waste Reduction

This measure would effectively eliminate the littering of single-use cups and their presence in waste streams, if there were no exemptions allowed.

Manufacturer Impacts

This would represent the highest possible impact of all the options on producers of single-use cups without a change in business model, for example towards producing reusable cups.

Producers of reusable cups would see a significant rise in sales.

Regarding overall impacts on employment intensity, it is difficult to estimate the results. However, we know from experiences with deposit return schemes for beverage containers filled before the point of sale that a large number of jobs are created in the setup and operation of such a system. These mirror in type a number of the jobs involved in the maintenance of supply chains for single-use cups at present. For example, in delivery to retailers. Though jobs would be lost in production of single use cups and perhaps in the waste management industry, they would be created in reusable cup production, through the logistics involved in the collection of cups from drop-off points and subsequent washing, and in the administration of DRS systems.

At present it is not possible to say for certain whether such a system would result in an increase or decrease in overall employment intensity.

Retailer Impacts

Retailers would face some logistical burden in storing used reusable cups ready for collection and cleaning and then facilitating collections. Industry representatives at the November workshops expressed concern that smaller retailers might struggle to store coffee cups prior to collection.

Although the smallest retailers in areas of high footfall might indeed struggle to store cups if no systems were put in place to alleviate this, there are number of solutions that could be implemented. Firstly, if a standardised reusable cup design were created, which would be advisable, then cups could be designed to be stackable so that each additional cup needing storage takes up a far smaller additional volume than the first.

In addition, as occurs for well-designed DRS systems for single-use beverage containers filled before the point of sale, retailers could request additional collections as necessary from the central system operator. In some DRS, predictive models are used to help inform the system operator when collections are required, or storage infrastructure

which counts the number of returned items informs the system operator via an internet connection when collection is needed, reducing the administrative burden on retailers.

Finally, it might be that some form of automated collection infrastructure could be developed that would remove the requirement for the retailer to be directly involved in takeback, similar to RVMs. This automatic collection infrastructure could also be placed strategically outside of retailer premises in areas of high footfall to further reduce logistical burden on retailers.

If the scheme cost less to operate (on a per cup basis) than the current cost of disposables, retailers may save money.

Consumer Impacts

This would be a convenient option for consumers, who would no longer need to carry a reusable cup. If the scheme cost less to operate (on a per cup basis) than the current cost of disposables, retailers may save money.

Local Authority Impacts

This option could theoretically eliminate littering of single-use cups which could result is lower litter clean-up costs for authorities.

A.8.2 Takeaway Food Packaging (filled at the point of sale)

This section covers takeaway food packaging filled at the point of sale. For pre-filled single-portion sachets, pots etc. see Appendix A.8.4.

A.8.2.1 Ban on Single-use Items for Eat-in Option

This option would be entirely consistent with the application of the waste hierarchy under the waste regulations, as there is obvious potential to employ reusables in preference to single-use items. If adopted this option could also be built upon in the future with a ban being extended to cover other single-use items for which there are reusable alternatives such as cutlery, albeit it is understood that the Welsh Government does not at present have the powers to implement such a ban. That said, the theoretical potential of the approach is further discussed below.

Implementation Considerations

It would be beneficial to provide retailers with sufficient notice period for the onset of new obligations. This will allow them to develop supply of replacement ceramic stock and run down existing stock of single-use items.

Retailers, possibly backed by producers, may also seek to appeal against a ban on single-use items or seek exemptions for their specific businesses.

Anticipated Impacts on Litter, Recycling and Waste Reduction

The extent to which this option results in waste reduction will depend on the number of stores currently offering single-use takeaway packaging for eat-in and whether

customers would shift to single-use takeaway in preference of eat-in with crockery or other forms of reusables, though this seems unlikely. As there is, at present, no robust data for these two key variables it is unknown what effect this option would have relative to other options. However, as a number of the largest retailers run on a business model of offering only single-use for eat-in, such as McDonald's, it is likely this could result in a substantial reduction in waste.

It is possible that there could be an unintended consequence for littering if consumers shift to takeaway single-use packaging in preference of eat-in with crockery, however this seems an unlikely scenario.

Manufacturer Impacts

As for the banning of single use cups and lids as an option for eat in, it is expected that this measure would result in a reduction in sales of single-use takeaway packaging. The extent to which Welsh producers are impacted will depend on the proportion of their total sales which occur in Wales.

Retailer Impacts

Some industry representatives at the November workshops raised concerns related to whether retailers would have space for the washing facilities required under this option. As was outlined in Appendix A.8.1.2, it stands to reason that smaller retailers will have fewer spaces for eat-in and thus less crockery requiring washing in any one day. Such small retailers will therefore not need a full-size dishwasher and a half-width dishwasher or even small dedicated sink area may well suffice. Larger retailers with more seats for eat in, will require larger washing facilities, but are more likely to have sufficient space for this.

Alternatively, smaller retailers could use crockery that is delivered and then collected for washing at a centralised facility which could be run collaboratively or could be provided by a third party.

Consumer Impacts

There is not likely to be any significant impact on consumers. Those who wish to leave with their food would be required to use a single-use takeaway packaging and consume it off premises, or would choose to eat-in with crockery/reusables.

It might also be perceived by some as offering a higher quality dining experience.

Local Authority Impacts

Local authorities might see cost savings due to requiring fewer staff hours for litter clean-up as it is expected that this option might drive a shift to eat-in.

Additionally, this measure could have some impact on the contamination of Local Authority-managed litter by food waste. If this measure prompted a shift to greater eat in then more food waste might be kept within the waste stream managed by the retailer. A recent composition study of Welsh litter found that on average 20.7% by

weight of litter was food waste, of which a proportion might reasonably be expected to have come from takeaway food outlets. [180]

Waste Management Industry Impacts

Lower levels of contamination by food waste in collected litter bin waste streams might be a positive impact on the reprocessing industry.

A ban on single-use items for eat in might well lead retailers to bring management of end-of-meal waste back to being the responsibility of staff members. This might create an opportunity for collection of a cleaner stream of food waste if separate collection is implemented by retailers.

Additionally, if this option leads to a shift to eat in, then a greater volume of food waste being disposed of on retailer premises might make separate collection of food waste a more viable prospect for those that don't already implement it.

A.8.2.2 EPR for Takeaway Food Packaging

This option would involve a fee payable by producers to cover costs of end-of-life management including litter.

Implementation Considerations

This fee should be modulated in large part by volume, as this factor more than weight is likely to drives litter management costs and a weight-based modulation might incentivise light-weighting which does not help to reduce litter. Modulation should also take account of the nature of the material and the associated end of life costs. It would be sensible for this to be part of a wider reformed EPR scheme covering all packaging.

Anticipated Impacts on Litter, Recycling and Waste Reduction

The effect of this measure on littering may well be limited, albeit it should mean that more of the costs are borne by producers than taxpayers.

A modulated fee would drive a shift towards materials with higher recycling rates.

Manufacturer Impacts

Producers would face a cost, as is the intention of EPR, in line with the quantity of material they place on the market and the end of life costs associated with that material. The extent to which producers are affected by this charge would depend on the proportion of their packaging sold in Wales.

Retailer Impacts

There would be no significant impacts on retailers, unless the costs faced by producers translate into noticeably higher costs to consumers.

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[180] Resource Futures for WRAP (2017), *Litter Composition Study – Wales,* March 2017

Consumer Impacts

The impacts on consumers would depend on the extent to which the costs were passed through by producers.

Local Authority Impacts

This measure would see industry bearing a greater proportion of the costs of litter clean-up and so this option would bring cost savings to Local Authorities.

A.8.2.3 Consumer-facing Financial Incentive + Encouragement to Offer Reusable Alternatives

From the consumer perspective this would take the form of a visible fee payable at the point of sale for takeaway single-use food packaging, with reusable containers being available as alternative. As with a customer-facing fee for single-use cups and lids, this could take the form of a tax or a charge, however for the reasons outlined in Appendix A.8.1, a tax would be preferred to avoid displacement of CSR funding and undue influence over the recipients of funds raised through a charge.

The amount which would be raised depends on:

- The level of the tax/charge; and
- The level of reduction achieved.

Implementation Considerations

It is suggested that this tax/charge would apply to all retailers of takeaway food packaging– including the smallest – so as to maximise the intended shift in preference for reusables through creation of a social norm.

Anticipated Impacts on Litter, Recycling and Waste Reduction

This measure is suggested as the other measures discussed are unlikely to have large impacts on prevention of waste caused by takeaway food packaging from food consumed off-premises. There would be merit, therefore, in an option which would both incentivise a shift towards reusables and provide Welsh Government with funds to be targeted at research or pilots of schemes further promoting reusables in a wider range of foodservice applications. Such pilots and associated research could help to identify solutions to those problems most commonly raised by industry in response to promotion of reusables, including hygiene and storage space concerns for retailers.

However, plans announced plans by the Asian Catering Federation (ACF) for the introduction of a nationwide Tiffin Club to begin in 2018 suggests that some problems being voiced on behalf of retailers, small retailers in particular, might not be a concern to retailers themselves. The Tiffin Club will allow ACF's 35,000 members to purchase reusable tiffin sets which they then provide to customers in return for a refundable £20 deposit, a £5 membership fee and a £5 donation to a partner charity targeting marine

plastic such as the Marine Conservation Society. It should be noted that these figures are still being finalised and are subject to change.

Manufacturer Impacts

It is expected that this measure would result in a reduction in sales of single use takeaway packaging. The extent to which Wales-based producers are impacted will depend on the proportion of their total sales that occur in Wales.

Those manufacturers who produce reusable containers might however see an increase in sales.

The extent to which producers are impacted would also depend on the degree to which consumers make the shift to reusables. As stated earlier this will likely depend in part on the level of the tax/charge.

Retailer Impacts

It is expected that retailers would support such a charge as, at present, the purchase of single-use takeaway packaging will likely represent a significant cost to them. Although we do not have estimates of costs across all takeaway types, the Asian Catering Federation reports that the packaging for a typical family meal for four costs around 25p, and across a year this can represent costs of £5,000 – £6,000 for a busy takeaway restaurant. If customers bring reusable containers to be filled, there is an immediate saving to the retailer. However, it seems likely that large chains will be able to negotiate a much better price per item of takeaway packaging than independent retailers, and they therefore might not see as large a saving.

Interestingly, those working on the aforementioned Tiffin Club scheme have suggested that most takeaway establishments would not be challenged by accepting customers' own reusables containers. This is because a fairly rigorous approach to portion control already exists for the filling of single-use containers and, regarding hygiene and safety, there would not be concern so long as restaurants were given freedom to define key parameters for those containers they would accept, such as rigidity, having a lid and cleanliness, and were given right of refusal. [181]

Finally, an important point raised by those behind the Tiffin Club scheme was that many takeaway food establishments currently absorb the cost of the carrier bag charge for fear of losing customer loyalty. They are therefore concerned that further charges for packaging may also be absorbed by restaurants, ultimately resulting in many restaurants potentially running unsustainably and also subverting the environmental aims of financial incentives. They therefore suggested that takeaways should be forced to pass the costs of any tax/charge on to customers and not be allowed to absorb them into their operating costs.

Platform Retailers

[181] Personal Communication with Asian Catering Federation, November 2017

It should be noted that Platform Retailers such as JustEat and Deliveroo could be significantly impacted by implementation of any measure which shifts consumer towards reusable containers. Because these retailers act as an interface between consumers and restaurants, any measure that requires consumers to directly contact or visit restaurants to collect takeaways, or that requires the Platform Retailer to return reusables containers to retailers, could result in a loss of revenue.

Consumer Impacts

Consumers will bear an ongoing cost if they do not change their behaviour, having to pay the fee each time, but will face a larger one-off cost if they choose to purchase a reusable container. Those who consume the most and on a regular basis, will have the greatest incentive to invest in a reusable container.

Local Authority impacts

Through reduced littering local authorities might see cost savings as they might require fewer staff hours for litter clean-up. The extent to which they see this saving will depend on the level of reduction achieved.

A.8.3 Black Plastic Food Packaging

The options for this packaging type are focussed on addressing the issue of recyclability of black plastics (e.g. CPET and PP trays with carbon black pigment) and encouraging waste prevention where possible. Litter is not considered a key driver for this stream.

At present, the carbon black pigment in trays poses a problem due to the inability of near-infrared (NIR) sorting technology to detect the polymer type, resulting in trays being discarded. To address this issue, WRAP carried out research and several market trials in 2011/12 to test the viability of alternative pigments to carbon black, finding that they were suitable in terms of masking the presence of other colours, for food contact applications and in terms of sorting and recycling back into food grade material at the end of life. Increasing the volume of the material being collected was identified as paramount to making this closed loop process work.[182]

Despite its success, the 6-7 years since WRAP's trials have seen little, or no progress in encouraging the switch from carbon black to NIR detectable pigments for black plastic food packaging. Most recently, the industry-led Black Plastic Packaging Recycling Forum has been convened in order to further assess the options for recycling black plastics.[183] However, a commitment to only develop voluntary best practice guidance suggests that further intervention is required in order to tackle the issue more widely, and in a manner that adheres to EPR principles more closely.

[182] http://www.wrap.org.uk/content/recyclability-black-plastic-packaging-0
[183] http://www.recoup.org/news/7531/black-plastic-packaging-recycling-forum

This issue is being recognised more widely in other EU member states – for example, the French PRO Eco-Emballages (now CITEO), charges a 'penalty' fee to producers who put 'disruptive' packaging on the market, including packaging containing carbon black. It now offers an 8% reduction in the fee to packaging producers who remove black carbon dye from their products.[184]

While closed-loops for black plastic material offers one solution, it is important to note that clear polymers in general have a wider market and hence removal of black pigment altogether is a wider objective.

The following policy options have been identified for consideration:

- A ban on certain uses (purely aesthetic uses of black plastic), combined with producers being required to use NIR sortable pigments otherwise; and
- EPR for plastic food packaging with modulated fees to reflect end of life costs, recyclability and inclusion of recycled content.

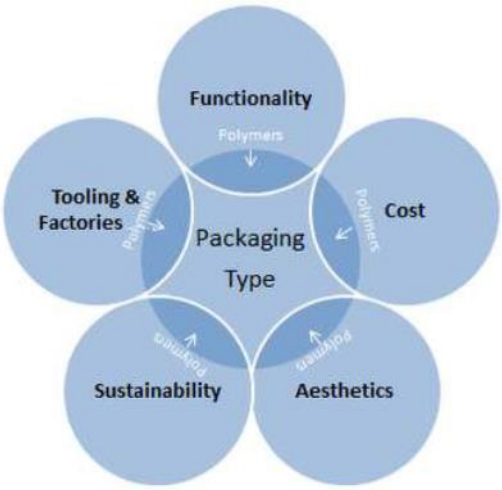
A.8.3.1 Ban on Certain Uses + NIR Sortability Requirement

This option would see a ban on black plastic for food packaging when used for purely aesthetic purposes, e.g. to make a product look better rather than to enhance functional properties such as UV barriers or allow the use of mixed recyclate. Where black plastic is allowed there would be a mandate for producers to use NIR sortable pigments/ additives.

Choice of polymer type and colour is a function of several factors (see Figure A.8 1 below) and the burden of proof for derogations from the ban (i.e. to prove that use of the carbon black pigment is functionally necessary other than to enhance product appearance) would lie with producers.

[184] https://ieep.eu/uploads/articles/attachments/47856bb4-4af9-47a6-a710-7af0fe8b3518/Policy%20options%20brief%20EPR%20price%20modulation%20IEEP%20Nov%202017%20final.pdf?v=63677462325

Figure A.8 1: Factors Affecting Polymer Choice



Source: Recoup (2017)

For applications where derogations are granted, to ensure proper end of life management of this stream, producers would also be required to ensure that the polymers used in the black packaging are easily detectable using the existing NIR technology. Alternative systems for sorting plastics, such as tracer-based sorting (TBS) and watermarking might be relevant in the future, but are currently nascent and require additional equipment to be installed in waste management facilities. [185,186] In order to make black plastics sortable using existing NIR technology, therefore, alternative pigments to carbon black would have to be used. WRAP tested a range of these in 2009-11 with positive results (Figure A.8 2).[187]

[185] Tracer-based sorting (TBS) refers to the addition of fluorescent pigments to plastic packaging items– these are only visible under certain special light conditions at the sorting plants, which aids quick sorting into the relevant recycling lines.

[186] Watermarking consists in concealing digital information within a product's structure, which can be detected by sensors/cameras. It is analogous to an invisible barcode. Research into watermarking appears to be much less advanced than that into UV-tracer technologies.

[187] http://www.wrap.org.uk/sites/files/wrap/Recyclability%20of%20black%20plastic%20packaging.pdf

Figure A.8 2: Summary of WRAP Black Pigment Trial Results

Table 1: Summary of trial results for Sicopal, Lumogen, carbon black, Colour Tone and ColorMatrix colourants

	Detectable with NIR Spectroscopy?			Average Recognition Rate		
Polymer/Colourant	**PET**	**PP**	**PS**	**PET**	**PP**	**PS**
Sicopal K0095	✓	✓	✓	100%	100%	96.7%
Lumogen FK4210	✓	✓	✓	98.9%	100%	98.3%
Carbon Black UN MB	X	X	X	0%	0%	0%
Colour Tone IRR 95530	✓	✓	✓	97.6%	100%	Not tested
Colour Tone IRR 95550	✓	✓	✓	100%	Not tested	Not tested
ColorMatrix Dye Black-5	✓	✓	✓	100%	Not tested	Not tested

Implementation Considerations

During the workshops, representatives from Natural Resources Wales and SEPA highlighted that this measure would require the conditions of the ban and the requirements for derogations to be outlined very clearly, so that environmental regulators could clearly assess applications and monitor the system. In addition, INCPEN noted that the new requirement could be incorporated within the existing vehicle of the Essential Requirements for Packaging as enforced by trading standards – though this suggestion was received with some scepticism as the Essential Requirements have resulted in only a handful of prosecutions in the UK and are difficult to enforce.

It was also suggested that this measure is somewhat incomplete, as it addresses the issue of black plastics individually, rather than considering issues associated with other opaque/ coloured plastics in food packaging as a whole.

Anticipated Impacts on Litter, Recycling and Waste Reduction

This measure is likely to have no impact on litter, which is not a key driver for this packaging type. However, the measure will fully address the issue of black plastic recyclability, by making the material sortable using existing NIR technology, or banning it. This will move the material up the waste hierarchy, though it is unlikely that any waste prevention benefits will be realised.

Manufacturer Impacts

The stakeholder workshops held in Cardiff in November 2017 confirmed that manufacturers (packaging converters or packer-fillers) are likely to face an initial increase in costs associated with either applying for derogations from the ban, or using the alternative pigments when black plastics are deemed functionally necessary. While the former is likely to involve an increase in administrative costs, these are difficult to estimate and would depend on the standard of proof required under the system.

For the latter, the use of alternative pigments at a 1% addition rate was estimated in 2011 to involve an incremental cost per tonne of trays manufactured in the region of

£70 - £140 (£0.075 - £0.35 per tray).[188] The authors of the study further qualified this finding, stating:

> *However it should be noted that these indicative cost ranges are based on preliminary prices and it can be expected that if the supply chain wishes to implement alternative black pigments that commercial prices would be negotiated on the basis of large volumes, and therefore could be significantly lower.*

Reduced sales of black plastics would likely be matched by an increase in sales of clear alternatives. In the long term, a shift away from black plastics and greater adoption of clear alternatives could increase the quality of recyclate from the plastic packaging stream, allowing more recycled content to be used in such applications. This could potentially lead to environmental benefits associated with the move towards closed loop recycling for clear PTTs.

In addition, costs may be incurred in order to make consumers aware of the changes to packaging and waste collection systems. This is in line with EU EPR guidance, which states:[189]

> *Full costs theoretically include… Costs for public information and awareness raising (in addition to a PRO's own communication initiatives), to ensure participation of consumers within the scheme (i.e. through separate collection)*

In terms of the manufacturing process itself, representatives from WRAP pointed out at the workshop that the option might have adverse effects on the economics of the manufacturing process by making the only available sink for black skeletal waste from the manufacturing process unviable. However, a counter point was that with less black plastic on the market there would be proportionally less black plastic offcut material to accommodate.

In addition, problems associated with the lower masking properties of the alternative black pigments were raised, in terms of the appearance of the recycled content product when mixed with other lighter colours (especially white), although WRAP's trials suggested that in most cases, the amount of white in "jazz grades" of mixed plastic is unlikely to be high enough for this to be a major problem. It is also worth noting that other dark coloured pigments, such as dark brown or dark blue, may also be suitable for masking the use of mixed colours in recycled content.

Retailer Impacts

Retailers are likely to welcome this measure, as it potentially offers a level playing field without fear of losing market share (e.g. due to concerns that products such as meat look less appealing to consumers when they're packaged against material that is not

[188] WRAP (2011), Development of NIR Detectable Black Plastic Packaging, September 2011
[189] http://ec.europa.eu/environment/archives/waste/eu_guidance/pdf/Guidance%20on%20EPR%20-%20Final%20Report.pdf

black) whilst allowing them to improve their environmental credentials. Regulating for this shift sends a clear market signal and ensures equal treatment for all retailers, which is a contrast with voluntary approaches where firms risk losing market share.

The measure could also prompt innovation, as realising CSR benefits of the shift would necessitate a public facing communications campaign on the environmental benefits of their packaging. Retailers would also be forced to innovate to find new ways to signal "high quality" products without using coloured alternatives.

Finally, a previous study concluded that shifting to clear/ transparent packaging need not result in significant cost increases to retailers in the long run. For example, the European wholesale company METRO moved away from black meat packaging trays and on to transparent/clear plastic alternatives, finding that they could save on packaging costs by also choosing to use more soft-plastic foils where it was possible.

The additional manufacturing cost of adopting alternative black pigments for packaging, as discussed in above, is likely to be passed down to retailers, which may also make clear alternatives more attractive.

Consumer Impacts

In 2014, a consumer survey by Danish supermarket chain, COOP, showed that

> *Customers preferred meat in black plastic trays since that was the choice they were familiar with. In this regard another important reason (for consumers to choose products enclosed in black plastic packaging) is that the colour contrast makes the food product (e.g. meat or tomatoes) look more appealing.*[190]

However, the same survey also showed that consumers tend to be unaware that black plastic complicates the recycling process of packaging, but that "black packaging is connected to least environmental friendliness by the consumer compared to other colours". [191] In addition, the survey points out that elsewhere in the EU, where manufacturers "are willing to produce and sell packaging in alternative colours" consumers are "more accustomed to different colours e.g. meat trays are coloured yellow". This implies that in the UK, where awareness of the issues associated with black plastic packaging is already spreading, a targeted communications campaign, with a shift to alternative packaging across all retailers, should result in consumers quickly adapting. While not the majority, many ready meals and other food products have been provided in clear or opaque packaging for some time in the UK and hence must be acceptable to consumers and commercially viable.

In terms of waste management, consumers would also welcome the inclusion of black plastics in the recyclable stream, as it reduces confusion about separation requirements.

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[190] ibid

[191] http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=PLASTIC_ZERO_sort_plast_brochure_final_en.pdf

Local Authority Impacts

In Wales, where pots, tubs, and trays (PTTs) are already collected by 95% of local authorities (relative to 76% of LAs on average across the UK), the addition of black plastics to the range of PTTs currently collected for recycling is not likely to have a significant impact on collection systems, although a targeted communication campaign would have to be included to ensure consumers are aware of the change. [192] EPR principles suggest that this should additionally be funded by industry, at least in part.

In addition, the move is likely to be welcomed as the quantity and quality of recycling would increase. WRAP estimates that in 2013 in the UK, 30,000 tonnes of black CPET packaging from the household ended up in landfill or energy recovery.[193] At an assumed consumption growth rate of 2% per annum, this would equate to roughly 32,250 tonnes of black packaging residual waste in the UK in 2017. Given that Wales accounts for around 5% of all UK households, and assuming that consumption patterns are similar across the UK, this amounts to 1,565 tonnes of black plastic waste that could potentially be diverted from energy recovery or landfill to recycling, and potentially a further 522 tonnes diverted from other residual/ litter streams (see Appendix A.3.2.5). [194] WRAP estimated that this was associated with potential savings in disposal costs of £2.2-£2.8 million per year for UK local authorities.

Waste Management Industry Impacts

Packaging industry representatives at the Cardiff workshops pointed out that the current lack of end markets for black plastic recyclate is an issue that is likely to be raised by the waste management industry. The issue here is largely around mixed black plastic polymers and CPET markets, however, and the ability for black PTTs to be sorted would at least allow separation of the PP that does have good markets in the automotive sector for example. In terms of CPET, the tray manufacturers are willing to recycle these back into food grade trays if the separation and cleaning of the material can be done effectively (the closed loop system noted earlier).

In addition, although this measure deals with the issue of carbon black pigment in black plastic, it does not necessitate the use of alternatives that are more easily manageable at the end of life. For example, other opaque and semi-opaque plastics are also difficult to recycle – and are often cheaper than clear alternatives. Thus, the problem may simply be displaced, and not completely eliminated.

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[192] Recoup (2017) Household Plastics Collection Survey, 2017

[193] http://www.wrap.org.uk/sites/files/wrap/In_market_trial_to_prove_recycling_process_for_black_CPET_trays_case_study.pdf

[194] Recoup (2017) Household Plastics Collection Survey, 2017

A.8.3.2 EPR for Plastic Food Packaging

This measure would involve full end of life costs being covered by producers, with modulated fees accounting for differences in costs, and being used to incentivise recycled content.

The fees could vary based on points for good and bad characteristics relating to recyclability of the packaging, including, but not limited to:

- Clear (good) or opaque/coloured (bad);
- Sortable by NIR (good) or not (bad); and
- Single polymer (90%+; good) or not (bad), etc.

Due to the ability of producers to avoid a proportion of costs by switching to more readily recyclable alternatives, and depending on the level and variations in the charges set, in theory, this could act as a driver for eco-design and increased recycling, to generate secondary raw material, facilitate use of recycled content, and reduce the cost of recycling.[195]

In order to further encourage closed loop recycling and the growth of end markets for the additional materials recycled as a result of this system, additional points could be awarded based on the amount of recycled content in the product. This would require a definition of recycled content, quality standards, and a system of traceability for recycled material.

The Eco-emballage EPR approach noted earlier is an example of this approach in relation to additional charges for using black pigment.

Implementation Considerations

The basis upon which fees are devised would have to be transparent, and sufficient notice would have to be given to producers in order for them to make preparations for responding to the new financial incentives. It would be sensible for this to be part of a wider reformed EPR scheme covering all packaging.

Anticipated Effects on Litter, Recycling and Waste Reduction

Given that the current quantity of litter associated black plastic food packaging is low, any effect will be limited. The modulation of fees would be expected to drive a shift towards increased recycling, and use of recycled materials, though the extent to which this would be the case would depend on the design of the fee. Such an EPR scheme would not of itself lead to waste prevention.

[195] https://ieep.eu/uploads/articles/attachments/47856bb4-4af9-47a6-a710-7af0fe8b3518/Policy%20options%20brief%20EPR%20price%20modulation%20IEEP%20Nov%202017%20final.pdf?v=63677462325

Manufacturer Impacts

The suggestion of EPR, as long as it were designed well, was welcomed by producer representatives at the Cardiff workshops, with the desire expressed that the scheme be transparent, flexible and that all funds from scheme fees be directly traceable in terms of their use. In addition, preference was stated for a scheme managed by a PRO (led by industry), but where there were no exemptions for smaller producers, such that there is a level playing field. Additionally, in order to prevent unfair competition, importers of packaging would also need to be obligated under this system. Finally, there was a stated desire for the producer's contributions and data on progress towards targets for different streams to be publicly available.

Retailer Impacts

In ensuring a level playing field, and incentivising the move towards transparent polymers, retailers would not be disadvantaged (as they currently might be) through unilaterally shifting away from black plastic food packaging.

Consumer Impacts

A move towards more recyclable products would reduce confusion surrounding the recyclability of various PTTs. Consumers may be impacted negatively if any additional costs are passed down the supply chain, however this is consistent with EPR principles, and would act to incentivise consumers to buy products that exhibit lower costs at end of life.

Awareness campaigns undertaken as part of the EPR scheme should help to reinforce the message that certain PTTs are more recyclable than others, in addition to publicly available data on the fees paid by, and performance of, various manufacturers and retailers vis a vis the recyclability of their products.

Local Authority Impacts

Local authorities would welcome this measure as it would most likely boost household recycling rates, and would result in a shift of the cost of managing the stream at end of life to the producers.

Waste Management Industry Impacts

This measure is likely to be welcomed by the waste industry, as the modulation of the fees encourages uptake of materials that are more likely to be recycled at end of life. In addition, depending on the design of the fee, it could support the development of end markets for recyclate from the PTT stream.

Accordingly, the measure was supported by representatives from WRAP, who emphasised the need for compelling commercial incentives to act as levers not only to penalise negative behaviour on the supply side of the packaging industry, but to incentivise positive outcomes on the demand side (i.e. through support for the development of end markets, closed loop systems and recyclability within existing systems).

In practice, it is likely that co-ordination with the waste management industry will be key to understanding the range of sorting and recycling capabilities available for the various materials in this stream, as well as to regularly report on both costs of management, to inform the level of the charge, and treatment outcomes, to inform progress towards targets, and any adjustments needed.

A.8.4 Single Portion Sachets, Pots, etc.

The key issues associated with single portion sachets, pots, etc. are similar to those associated with other laminates – they are not widely recycled, and often contribute to litter when consumed on the go, ultimately ending up in landfill or the wider environment.

However, single portion packaging items like these pose additional issues – due to their small size (and therefore large surface area), they tend to be a highly contaminated, dispersed waste stream, which would be expensive to collect, sort, and wash, even if they were more readily recyclable. They can also contaminate separate food waste streams when incorrectly disposed of – a problem that is sometimes exacerbated by the design of such items, with tear-able strips, seals and caps that become separated from the main body of the packaging, which makes them difficult to detect and separate from food waste. Finally, even when they are disposed of and collected correctly, they pose problems for sorting technology as they often slip through trammel screens, or are too small and contaminated to be detected by sorting technology.

Therefore, with a view to addressing both issues of consumer behaviour (littering and waste prevention) as well as incentivising manufacturers to take responsibility for the end of life management of this stream, the following options are considered:

- Explicit charge at point of sale combined with a requirement to have dispensers for certain types of condiments; and
- Modulated fees under EPR for single portion packaging.

It is noted that in this case, the options are complementary and are likely to have the greatest impact on desired outcomes when combined.

A.8.4.1 Explicit Charge/ Tax + Mandatory Provision of Reusable Alternatives for Certain Types

This measure would involve a consumer facing charge or tax per item at the point of sale (similar to the carrier bag charge), with the aim of reducing wasteful consumption of such items. However, under such a system, the possible absence of alternatives implies that some consumers might feel unfairly penalised for a behaviour they have no choice but to adopt (if they wish to consume condiments). Therefore, this option would further requires reusable alternatives (in the form of condiment dispensers, salt and pepper shakers, sugar cubes, etc.) to be made available at all establishments providing single portion packaging for such items.

Charging for single serve sachets and providing 'free' alternatives is something that numerous establishments already do anyway. For example, ketchup, mustard, brown sauce, salad cream might be made available in dispensers or reusable bottles, as well as sachets, while additional options are available in single portion formats only. In such cases, the single portion items can often cost the consumer £0.25 - £0.30 per sachet, implying a significant mark up on the costs of these items.

Implementation Considerations

It is worth noting that in most establishments such sachets are free to consumers and hence a charge of even a few pence would discourage the taking of more than required, e.g. 1 sachet rather than 2 or 3 when they are free. This could have an important food waste prevention outcome as well as the packaging related outcome.

The added requirement for reusable alternatives necessitates further research into and understanding of the types of condiments that are amenable to being stored in reusable packaging formats, on account of food waste and hygiene concerns related to portion control. For example, mayonnaise and cream based condiments (salad dressing, tartar sauce, etc.) have a short shelf life (1-3 months) even when resealed and refrigerated correctly, while others like mustard, vinegar and soy sauce are easier to store in dispenser formats. The design of these dispensers could be modified in order to restrict the portions that are dispensed at a time (as modern hand wash units do).

The design of the dispenser has additional impacts in terms of the end of life management of materials used for these alternatives. For example, some dispensers incorporate a hard, opaque plastic shell, encasing a laminated pouch containing the condiment with plastic nozzles (available in different sizes) protruding through the casing. Although this design addresses hygiene, shelf life, and portion control issues, the use of non-recyclable pouches does not necessarily represent a better environmental outcome from a pure LCA perspective than the use of many single portion sachets, although it will help to prevent littering.

Refillable glass bottles may be preferable to plastic ones as they can be washed in a commercial dishwasher and are more amenable to closed loop recycling, although plastic ones tend to have better barrier properties and are easier for portion control.

Anticipated Effects on Litter, Recycling and Waste Reduction

This measure is likely to have large impacts in terms of both waste and litter prevention of items in this stream – this is likely to be increasingly significant given that consumption of single use portion packaging is forecasted to increase by roughly 65% to 2025 (see Appendix A.4.0). There would be merit, therefore, in an option which would both incentivise a shift towards reusables and provide Welsh Government with funds to be targeted at research or pilots of schemes further promoting reusables.

Stakeholder Impacts

The price to the establishment of a typical 11g sachet, or 25g dip pot, of ketchup ranges from £0.05-£0.15 (usually costing less for bulk-buys). [196] Thus the key stakeholders, i.e. those who currently provide these sachets to customers, would see a direct financial saving.

A.8.4.2 EPR for Single Portion Sachets, Pots, etc.

This would involve charging producers per item of single portion sachets, pots, etc. placed on the market, in order to cover the full costs of their end of life management (including litter clean ups). Similar to the option for black plastic food packaging (see Appendix A.8.3.2), this charge could be further modulated to encourage manufacturers to innovate and uptake alternatives with better eco-design properties, e.g. recyclability, recycled content and the need for the item to be opened without a part of the pack easily tearing off.

For single portion packaging in particular, this could include a minimum size requirement as well as incentives for single part portable packaging (e.g. as shown in Figure A.8 3 below, Australian company Masterfoods' 'squeeze-mate' format has no tear off corners, tabs or films, as opposed to traditional ketchup dip pots and sachets).

It is recommended that this be part of a wider EPR scheme that covers all types of packaging, rather than a stand-alone scheme.

Figure A.8 3: Masterfoods' Single-part 'Squeeze-Mate' Format

[196] http://www.marfast.co.uk/ambient-food-products/sauces-relish.html

Stakeholder Impacts

The impacts of this measure on stakeholders is likely to be similar to those discussed for other EPR options in this report (see Appendix A.8.2.2, A.8.3.2).

A.8.5 Metallised Films for Crisps etc.

Metallised films for crisps, confectionery and snack packaging are a concern as they are currently not recyclable and contribute significantly to the problem of litter. Despite these issues, no viable alternatives seem to exist at present for the metallised films that are currently used for crisps packets, due to the requirement for grease and gas barrier properties of packaging that are simultaneously attractive from a branding perspective.

As a result, the key drivers underlying options for this material are the imperative to reduce littering, and the need to incentivise innovation to either enable the recycling of these materials, or design alternatives. Additionally, this would level the playing field for manufacturers concerned about branding, i.e. if all manufacturers were subject to the same rules, this would cease to be an issue, as the challenge of making more readily recyclable packaging 'attractive' would apply equally to all products.

It is important to note that although the above is true for crisps packaging, recyclable alternatives do exist for confectionery in the form of paper wrappers with grease barrier properties, paper bags (for sweets), and so on. In this case, the economics of manufacturing currently make metallised films the more attractive option, but only when one excludes the end of life management costs of materials, including litter.[197]

These costs therefore have to be internalised by manufacturers under an EPR scheme for these materials.

Keeping these issues in mind, the following options can be considered, either in combination or individually:

- Takeback requirement / DRS mechanism for metallised films for crisps and confectionary; and
- EPR for metallised films for crisps and confectionary

A.8.5.1 Takeback requirement/ DRS mechanism for metallised films for crisps and confectionary

This option involves the establishment of an industry funded scheme to encourage consumers to collect and take back crisps/ confectionary wrappers to retailers, or other collection points, to ultimately be sent to producers. The intention is to ensure that in the first instance, used crisps and confectionary packaging is not littered, and that

[197] https://www.huffingtonpost.com/quora/why-is-chocolate-rarely-w_b_4099561.html

producers take operational and financial responsibility for managing the proportion that is returned to them.

In its simplest form, this could require producers to mark the insides of all bags/ wrappers with unique codes. Consumers could then go online into a dedicated portal to enter the code, and earn points for each code entered, with prizes for a certain number of codes collected. These schemes have previously been trialled by Yeo Valley for their yoghurt range (https://www.yeovalley.co.uk/things-to-do/yeokens), and Mars under the SweetSunday scheme (https://www.sweetsundays.co.uk/). While this scheme would be relatively easy for producers to administer, and would encourage a "take home" rather than "throw away" attitude to disposal of these materials, impacts would be limited due to the absence of a mechanism for the material to be returned to the producer. For example, consumers could use mobile phones to enter the code onto the site and still proceed to litter the item.

Alternatively, this system could take the form of a simple prize giveaway scheme, whereby, for example, consumers could collect and return ten bags to a participating retailer or cinema in order to win cinema tickets. Another option would be a loyalty scheme, whereby consumers can earn stamps, or points, for each eligible item returned to participating retailers, with the fifth item, or a certain number of points, earning a free item.

A third option, and one more likely to lead to more significant changes in consumer behaviour, is a deposit mechanism for crisps and confectionary packaging. This could either take the form of a deposit that goes towards a prize fund, with those returning their used wrappers getting a chance to win money, or a refundable deposit for every packet returned.

It should be noted that for the former, a pool of "deposits" is likely to be substantial – in 2015, for example, it was estimated that on average, 56g of crisps were consumed per week per person in the UK.[198] This equates to roughly 1.6 bags of average size (34.5 g) per person per week, equivalent to 83.2 bags per person per year. The population of Wales in 2015 was roughly 3.1 million.[199] This implies that even a 1p deposit per 34.5g bag of crisps would create a prize draw fund of roughly £2.6 million in Wales. Prizes much greater than the value of the deposits could thus be offered to many people. However, this could be seen as a government-endorsed incentive to consume more crisps and confectionary.

Thus, a straightforward deposit-return mechanism would be preferred, whereby consumers pay an additional deposit on purchase, which is returned when the used

[198] https://www.statista.com/statistics/380343/weekly-household-consumption-crisps-united-kingdom-uk/

[199] https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2015

packaging is returned to a collection point such as a retailer. In principle, the typically short timespan between purchase of a packet of crisps and the crisps being eaten, means that deposits can be refunded relatively quickly. Alternatively, if consumers wished to save a number of empty crisp packets before returning them, given that little space will be required to store them, this should not present too many practical difficulties.

Implementation Considerations

There are several implementation considerations associated with this measure, depending on its design. These include the infrastructure for takeback (whether in the household, at retailers, or via post to producers), and the associated infrastructure for deposit return, or prize giveaway as the case may be. In addition, the potential for fraud under this measure has been identified if introduced at a Wales-only level.

Anticipated Impacts on Litter, Recycling and Waste Reduction

The most significant impact of this measure is likely to be a reduction in litter. However, due to a lack of either recyclable or reusable alternatives at present, recycling benefits are not likely to be realised in the short term, apart from the potential for lower contamination of other streams. In the long term however, shifting the burden of responsibility for end of life management to the producers should incentivise innovation to either make metallised films recyclable (with associated end markets), or develop alternative materials which can be better managed within the existing waste system.

Manufacturer Impacts

As a result of this measure, producers are likely to incur significant costs either setting up, managing, monitoring and reporting on a deposit fund (if the measure was designed in this manner), or alternatively, paying out to provide incentive for takeback. Unlike beverage container DRS, there are no end markets known at present for metallised films from this stream, and therefore no revenue to be earned in respect of material sales to offset the costs of running the scheme.

Producers will therefore have the added responsibility of managing the material that is returned to them, probably by sending it for energy recovery initially. These costs are likely to be high enough to incentivise producers to either develop end markets for the material themselves, or support research into, and development of, alternative materials for these products. It is likely that these outcomes will only be realised in the long term, though shorter term gains might be possible in the confectionery market.

Finally, a key issue that is likely to be raised by both producers and retailers is the potential for cross-border fraud under the DRS variation of the system e.g. if crisp packets consumed in England are transported over the border in order to redeem deposits. This would require special Welsh specific branding on packages, which would lead to additional expense.

Retailer Impacts

Retailers are likely to incur some costs associated with this measure due to the need for them to act as takeback points for the material. However, these are not likely to be

significant, as costs associated with transporting the material back to producers will be covered by the latter, and the storage costs associated with metallised films will not be significant (as they are an easily compactable stream).

In addition, retailers might welcome the additional sales that may arise from consumers making more visits to stores in order to return films. An important consideration in this respect is that all retailers selling these items must be obligated to provide takeback service, in order to avoid consumers shifting their demand to other competitors.

Consumer Impacts

The level of uptake of this measure by consumers will depend on the type and level of incentive provided. This uptake will be key in order for the measure to have the most impact both upstream and downstream. Although all consumers might not take part, the assignment of a consumer-visible value to the waste material should encourage collection of any discarded material by non-consumers as well, as a potential revenue stream (though once again, this will depend on the nature and level of the incentive provided to do so).

Local Authority Impacts

Local authorities might see cost savings due to requiring fewer staff hours for litter clean-up as it is expected that this option would encourage consumers to return used packets to collection points. In addition, this might encourage retrospective clean-up of existing litter in addition to preventing generation of new litter in this stream by non-consumers who seek to obtain the refund.

Finally, this measure could have some impact on the contamination of Local Authority-managed recycling streams, particularly for metals and plastics, where people mistakenly assume the material is recylable in one or another of these streams.

Waste Management Industry Impacts

In the short term, there are unlikely to be any significant impacts on the waste management industry arising from this measure, aside from reducing contamination of other streams.

A.8.5.2 EPR for Non-Recyclable Films

This option is similar to the EPR options described in earlier sections (see Appendix A.8.2.2, A.8.3.2, A.8.4.2). The difference in this case arises from the fact that there are currently no readily available alternatives for metallised films for crisp packaging, implying that a modulated fee could have little impact here. In addition, neither the weight nor the volume of this stream poses a problem at end of life, as the material is light weight and easily compactable, Instead it is the quantity of items that is the key issue, with large numbers either getting landfilled due to a lack of recycling options, or getting littered.

It would be sensible for this to be part of a wider reformed EPR scheme covering all packaging.

Accordingly, fees for such packaging under a broader EPR scheme should reflect these costs, and not simply be based on weight. Such modulated fees would be expected to encourage research into, and further development of, alternative packaging formats and/or new recycling technologies.

In the case of confectionery, alternatives to metallised plastic films for wrappers do exist, and the industry charge could therefore be modulated to properly reflect the end of life costs of these various formats so that more readily recyclable alternatives (e.g. paper based wrappers) are incentivised.

Stakeholder impacts

The impacts of this measure on stakeholders is likely to be similar to those discussed for other EPR options in this report (see Appendix A.8.2.2, A.8.3.2, A.8.4.2).

A.9.0 End-of-Life Costing Methodology

A.9.1 Overview

The end of life costs of managing the different F&D packaging types are composed of the collection, processing and disposal costs alongside those costs associated with the items in the litter stream. This section provides a high-level overview of such costs, focusing solely on municipal waste (acknowledging that some items will be within the commercial waste stream) giving a basis upon which to consider what an indicative financial EPR contribution, could look like. An explanation of the methodology and assumptions is provided below.

A.9.2 Municipal Collections

We derive indicative costs based on municipal waste management costs. The average cost for the collection and disposal of one tonne of residual waste is £174 per tonne.[200]

The average cost per tonne of recyclate varies depending on the material type, as different materials will achieve different revenue depending on current commodity markets. A number of simplifying assumptions have been made. For example, the cost per tonne for the recycling of dense plastics has been applied to disposable lids, straws and takeaway food packaging, as the items within these categories that do end up being recycled will fall into the dense plastic stream. The results are shown in Table A-9 1.

[200] Based on data from WRAP's ICP Tool, http://laportal.wrap.org.uk/ICPTool.aspx, see Appendix **Error! eference source not found.** for further details

Table A-9 1: End of Life Costs - Municipal Collections

	Total Municipal Residual Cost	Total Municipal Recycling Cost	Cost per item collected
Cups (all disposable)	£968,982	£2,448	0.19p
Lids (all disposable)	£178,815	£4,809	0.05p
Straws	£22,566	£607	0.01p
Takeaway Food Packaging	£125,882	£6,530	0.29p
Black Plastic	£363,479	£0	0.3p
Sachets	£12,484	£0	0.02p
Metallised Films	£72,227	£0	0.01p

A.9.3 Litter

The annual cost of managing litter within Wales is reported to be in the region of £70 million.[201] However, there is a lack of clarity as to what this figure covers, meaning that it could also include wider street scene costs that go beyond those associated with litter.

Research undertaken in Scotland indicates that the cost to Scottish local authorities of picking up litter that has been improperly discarded on the ground (i.e. excluding litter that is correctly placed in bins) is £36 million per year. In Scotland, it is estimated that 15,866 tonnes of litter are cleared from the ground by local authorities each year.

There is no similar data available for Wales, so we transfer these estimates based on relative size of population (assuming that littering behaviour is similar in Wales to that in Scotland). This suggests that 9,139 tonnes of litter are cleared from the ground in Wales each year, with an associated cost of £20.7 million, giving a cost per tonne of litter clearance of £2,269.

[201] Welsh Government (2013) Litter, 15th May 2013, http://gov.wales/topics/environmentcountryside/epq/cleanneighbour/litter1/?lang=en

Assuming a final disposal cost of £116, if we assume that all litter cleared is sent to landfill, then this represents a minimum cost of £2,385 per tonne for the collection and processing of littered materials. The larger part of this cost is due the labour required to collect, transport and process the material. It should be noted that these figures do not account for the environmental impacts of litter that do not get disposed of and remain in the environment, including the disamenity value associated with highly visible items like bottles and coffee cups.

It's also worth noting that this tonnage, and the associated cost estimate, excludes litter that is correctly placed in litter bins. However, in tonnage terms, it is estimated that the split between litter on the ground and litter correctly discarded in litter bins is about 50:50. In the absence of tonnage figures we conservatively assume this is managed in the residual waste stream.

The cost associated with clearing specific littered items will vary based on the nature of the item. Lightweight items are likely to be more widely scattered by the wind, meaning that it takes more time to pick them up as the distance that has to be travelled is greater. Lightweight but bulky items, such as EPS clam shells, take up more space in sacks. Accordingly, the weight of an individual item is not necessarily the most appropriate metric to use in calculating the cost associated with litter clearance of a specific item. However, as we have data on the tonnages of specific items, we use these to estimate arguably very conservative costs per item managed. If seeking to understand the full costs associated with the management of litter, and how these might be better reflected in any future EPR scheme for packaging, a detailed study into the different cost drivers in relation to collection of littered items would be required.

Table A-9 2 shows the weight-based estimate of total cost and cost per item of managing the litter of each packaging stream considered within this study. **It is worth re-iterating that these are likely to be an underestimate of the overall costs that can be attributed to the items considered within this study, which tend to be lightweight items.**

Table A-9 2: Weight-based Estimates of End of Life Costs - Litter

	Total Cost	Cost per Item picked up (pence)
Cups (all disposable)	£1,147,833	2.5p
Lids (all disposable)	£233,204	0.68p
Straws	£29,430	0.08p
Takeaway Food Packaging	£331,410	4p
Black Plastic[1]	£0	0p
Sachets	£1,414	0.23p
Metallised Films	£186,630	0.14p

[1] Tonnage of littered black plastic is set at 0, although it is likely that some is littered, so this figure is not representative.

- The weight for single use coffee cups comes from data from KeepCup[202] and in the absence of data for the other cup type category we have assumed these to be of a similar weight.
- The weight for single use lids also comes from Keep Cup[203] and relates to coffee cup lids. As with cups, we have assumed that all lids within the other lids category will be of a similar weight.
- The weight for single drinking straws comes from product data[204].
- Due to the variety of container sizes used for takeaway packaging, we have used an average figure calculated from product data from two different types and

[202] KeepCup (2010) Environmental Footprint: Calculator Considerations, June 2010, http://www.keepcup.com/userfiles/files/KeepCup%20Calculator%20Considerations.pdf
[203] KeepCup (2010) Environmental Footprint: Calculator Considerations, June 2010, http://www.keepcup.com/userfiles/files/KeepCup%20Calculator%20Considerations.pdf

[204] Amazon (2017) sourcingmap® 35 Pcs 8" Long White Soft Plastic Flexible Drinking Straws for Party, Accessed 20th October 2017, https://www.amazon.co.uk/sourcingmap%C2%AE-Plastic-Flexible-Drinking-Straws/dp/B008LT423S

sizes of container.[205,206] We have assumed that two thirds of packaging will be similar to the larger size, with the smaller size making up the remaining third. These assumptions have allowed for an aggregated average packaging weight.

- The weight for single portion sachets has been used based on product data[207] and an estimation of the proportion of product weight that packaging represents.
- The weight of an average snack packet and the weight of an average Mars Bar wrapper were calculated based on the container surface and density of metallised film[208]. These weights were then aggregated based on respective arisings to produce an average weight.

Table A-9 3: Average Container Weights

	Weight (g)	Items per Tonne
Glass Bottles	300	3,333
Plastic Bottles	33	30,303
Steel Cans	35	28,571
Aluminium Cans	17	58,824
Beverage Cartons	21	47,619
Laminated Pouches	2.39	418,410
Cups (all disposable)	11	90,909
Lids (all disposable)	3	333,333
Straws	0.4	2,692,308
Takeaway Food Packaging	18	1,118,730
Black Plastic[1]	-	-

[205] DrinkStuff (2017) Disposable Hinged Salad Container, Accessed 19th October 2017, http://www.drinkstuff.com/products/product.asp?ID=19692&catID=1715&name=Disposable+Hinged+Salad+Container+16oz+%2F+450ml#.WeiYWDtryUl

[206] DrinkStuff (2017) Biodegradable Sugarcane Clamshell Takeaway Box 7 x 5inch, http://www.drinkstuff.com/products/product.asp?ID=19316

[207] Eat Big (2017) Heinz Tomato Ketchup Sachets 200 x 11g, Accessed 20th October 2017, http://www.eatbig.co.uk/shop/condiments/heinz-tomato-ketchup-sachets-200-x-11g/

[208] Rhyeco (2017) *Metalized CPP Film*, Accessed 20th October 2017, http://www.rhyeco.com/metalized.html

	Weight (g)	Items per Tonne
Sachets	1	4,772
Metallised Films	0.61	630,000

[1] Data for black plastic is not present due to 0 prevalence in the litter stream, although it is likely that some is littered, so this figure is not representative. See Section **A.3.2.5** for further discussion.