

Title: Reforming the UK packaging producer responsibility system IA No: RPC Reference No: Lead department or agency: Defra Other departments or agencies:	Impact Assessment (IA)		
	Date: 01/01/2020		
	Stage: Final Stage		
	Source of intervention: Domestic		
	Type of measure: Secondary Legislation		
	Contact for enquiries: packaging@defra.gov.uk		
Summary: Intervention and Options			RPC Opinion: RPC Opinion Status

Cost of Preferred (or more likely) Option (in 2019 prices)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status Qualifying provision
-£14.5m	-£9,976m	£1,172m	

What is the problem under consideration? Why is government intervention necessary?

A producer responsibility (PR) system for packaging has been in place since 1997. It has helped businesses across the UK meet their packaging waste recycling obligations, the UK achieve its packaging waste recycling targets and has kept business compliance costs low compared to EU Member States. However, it is designed to enable producers to meet (not exceed) recycling targets. It does not incentivise producers to design packaging to be more recyclable or be reusable/ refillable. In addition, negative externalities (e.g. greenhouse gas emissions and disamenity impacts from littering) are not fully accounted for in packaging producers' and users' decisions. Other issues include stakeholders' concerns over system transparency; limited direct financial support for local authorities (LAs) managing packaging waste and that recycling that can be done at a lower cost overseas has resulted in a lack of a level playing field for domestic reprocessors. Without further government intervention these problems will persist. The UK Government together with the Devolved Administrations propose to reform the UK packaging producer responsibility system. This includes placing the full net financial costs of managing household packaging waste onto producers, who are best placed to influence packaging design. This is consistent with the 'polluter pays' principle. Reform is also required as the existing framework was introduced prior to devolution in Scotland and Wales, making this a devolved matter without a legislative framework that reflects the accountability of the Devolved Administrations.

What are the policy objectives of the action or intervention and the intended effects?

The objective is to reform the current legislation and introduce 'extended producer responsibility' (EPR) for household packaging. This will help deliver commitments made by the UK Government and the devolved administrations in various policy documents to maximise value from resources and minimise waste through the circular use of materials and to better incentivise producers to manage resources more efficiently. This includes placing responsibility on businesses for the environmental impact of their products and for the costs of managing products at end of life (i.e. EPR). The new regulations should incentivise recyclability and reusability of packaging by rewarding/penalising producers according to specified criteria. The fees paid by producers should fund better and consistent recycling collections of packaging waste and encourage more domestic recycling and reprocessing and will deliver overall system savings. Payments to LAs will take account of equity and regional considerations by looking at rurality and level of deprivation and performance expectations. Consumers should find it easier to recycle packaging due to clear labelling, and measures related to the presentation of evidence relating to the export of packaging waste for recycling will be tightened.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

We present 2 options reflecting final policy decisions following consultation:

Baseline – Do Nothing – Do not reform the packaging regulations but implement the changes in municipal recycling collections in England as set out in the Consistent Municipal Recycling Collections IA and introduce Deposit Return Scheme (DRS) for drinks containers in England, Wales, Scotland and Northern Ireland.

Option 1 – Reform the packaging producer responsibility system such that producers pay the full net cost of collection and end-of-life treatment of packaging from households (Kerbside, HWRC and binned packaging waste). Introduce modulated fees on packaging and mandatory recycling labelling of packaging. This is assumed to incentivise the correct behaviours by producers and consumers to deliver the policy objectives.

Option 2 – As option 1, with mandatory collection of fibre-based composite cups for recycling, additional reporting requirements, and recycling targets for fibre-based composite packaging. This option is our preferred option.

A non-regulatory option has not been appraised. A regulatory approach has been in place since 1997 and Government intends to reform this and extend the polluter pays principle such that packaging producers are responsible for the full net cost of waste management for the household packaging they place on the market. This requires a regulatory approach.

Voluntary initiatives for recycling labels and fibre-based composite cup recycling exist but are insufficient. Variation in the design and information provided on voluntary labelling is confusing for consumers and needs to be standardised. Voluntary fibre-based composite cup collection schemes have made some progress in increasing recycling rate of fibre-based composite cups, however the recycling rate remains low. Regulation will place a responsibility on all obligated businesses selling filled fibre-based composite cups to collect and recycle this poorly recycled packaging.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** April 2029

Is this measure likely to impact on international trade and investment?

Yes

• Are any of these organisations in scope?

• **Micro**
Yes

• **Small**
Yes

• **Medium**
Yes

• **Large**
Yes

What is the CO₂ equivalent change in greenhouse gas emissions?
(Million tonnes CO₂ equivalent)

2.3MT

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: _____ Date: _____

Summary: Analysis & Evidence

Policy Option 1: Full net cost recovery of household packaging waste, with modulated fees and new labelling requirements

Price Base Year 2019	PV Base Year 2020	Time Period 10 Years	Net Benefit (Present Value (PV)) (£m)		
			Low: -2850	High: 2214	Best Estimate: 19.3

COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	86.9		1076.1	9343.8
High	122.8		1406.2	12215.3
Best Estimate	98.7		1199.5	10421.4

Description and scale of key monetised costs by 'main affected groups' (all costs discounted) and for the 10-year appraisal period
Producers cover the full net cost of household packaging collections (£10,985m), Administrative and Regulatory Costs (£513m) and will be mandated to label packaging based on recyclability (£89m); Material Facilities will face additional sampling and compositional costs (£203m); Reprocessors and exporters will face additional reporting costs (£6m); Public sector will face loss of landfill tax (£80m) and IT investment costs (£12m).

Other key non-monetised costs by 'main affected groups'
Potential cost pass through from producers to consumers is not considered in the cost benefit analysis, rather within the wider impact section (these costs are ascribed to businesses in the cost benefit analysis).

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		1090.7	9364.9
High	0.0		1347.9	11558.3
Best Estimate	0.0		1216.9	10440.7

Description and scale of key monetised benefits by 'main affected groups' (all benefits discounted)
LAs benefit (£10,985m) from a transfer of costs for the collection, sorting, treatment and disposal of packaging waste to producers; there are additional material sales profits by reprocessing and recycling industry (£122m); avoided residual disposal costs from diverting packaging waste from incineration and landfill treatment into recycling, including landfill tax savings (£322m); avoided greenhouse gas emissions from diverting waste from landfill and incineration to recycling (£517m).

Other key non-monetised benefits by 'main affected groups'
Domestic reprocessing market might benefit due to more material being recycled. Natural capital benefits from reduced reliance on virgin materials and a reduction of waste going to landfill and incineration. There is also benefit to consumers of clearer labelling on packaging and communications on how to recycle and dispose of packaging waste and improved recycling collection services making it easier for them to recycle. There are also several system-wide benefits including increased transparency in the system.

Key assumptions/sensitivities/risks	Discount rate
Packaging placed on the market ('POM') data might be higher than currently estimated, affecting recycling rates and sectoral costs. We conducted sensitivity analysis on non-household municipal packaging waste arisings. Material prices (including reprocessed and recovered prices) as well as landfill gate fees are assumed to be constant. The analysis is sensitive to the growth of POM, baseline assumes that both consistency and the deposit return scheme (DRS) policies are in place, POM split between HH (household), NHM (non-household municipal or household-like) and C&I (commercial and industrial) packaging; and the carbon price assumptions provided by BEIS.	3.5%

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 1201.3	Benefits: 36.0	Net: 1183.5	
			1165.4

Policy Option 2: Full net cost recovery of household packaging waste, with modulated fees and new labelling requirements, plus mandatory labelling and takeback of fibre-based composites

Price Base Year 2019	PV Base Year 2020	Time Period 10 Years	Net Benefit (Present Value (PV)) (£m)		
			Low: -2934.4	High: 2204.0	Best Estimate: -14.5

COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	110.2		1080.4	9401.8
High	190.2		1414.3	12347.2
Best Estimate	136.1		1205.0	10502.8

Description and scale of key monetised costs by ‘main affected groups’ (all costs discounted) and for the 10-year appraisal period
Same as option 1, with the inclusion of the additional costs for fibre-based composite cup producers of a mandatory takeback scheme. These costs include: costs borne by producers: cup collection costs, enforcement and training (£50m), cup bin costs (£40m).

Other key non-monetised costs by ‘main affected groups’
Same as option 1

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		1096.7	9412.8
High	0.0		1353.9	11605.8
Best Estimate	0.0		1222.8	10488.3

Description and scale of key monetised benefits by ‘main affected groups’ (all benefits discounted)
Same as Option 1, with the addition of mandatory takeback of fibre-based composite cups. This will divert this material from landfill and incineration to recycling, generating GHG emission savings and wider benefits for the environment. Material revenues for reprocessors will increase as more material will be reprocessed. Benefits for reprocessors and recyclers from the cup material revenue (£14m). Benefits for obligated packaging producers in terms of decrease in residual waste costs as used cups will now be collected for recycling (£16m). Reduction in cup litter clean-up costs that is currently borne by LAs (£2m). Societal benefits in terms of carbon emissions reduction (£2m).

Other key non-monetised benefits by ‘main affected groups’
Same as option 1.

Key assumptions/sensitivities/risks	Discount rate (%)
Packaging placed on the market (‘POM’) data might be higher than currently estimated, affecting recycling rates and sectoral costs. We conducted sensitivity analysis on non-household municipal packaging waste arisings. Material prices (including reprocessed and recovered prices) as well as landfill gate fees are assumed to be constant. The analysis is sensitive to the growth of POM, baseline assumes that both consistency and the deposit return scheme (DRS) policies are in place, POM split between HH (household), NHM (non-household municipal or household-like) and C&I (commercial and industrial) packaging; and the carbon price assumptions provided by BEIS.	3.5%

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 1210.5	Benefits: 37.6	Net: 1190.1	
			1172.9

INTRODUCTION AND EVIDENCE SUMMARY

Introduction

This is the final impact assessment for reforming the packaging producer responsibility regulations¹ and follows the previous consultation impact assessments in 2021² and 2019³. The analysis from the previous impact assessments has been updated to reflect final policy decisions with further evidence collected through the consultation process. This impact assessment accompanies the government response to the 2021 EPR consultation, which provides analysis of feedback from the consultation as well as further details on final policy decisions.

Current system and reforms

Under the current regulations, obligated producers of packaging⁴ are required to register with the regulator, report data on the amount of packaging they placed on the market and meet certain recycling targets. To do this, producers must purchase recycling evidence known as PRNs (Packaging Recovery Notes) or PERNs (Packaging Export Recovery Notes), equivalent to their recycling obligation. This evidence can be supplied by reprocessors and exporters of packaging for recycling based on the amount of packaging they recycle. This is a market-based system, such that the price of evidence fluctuates based on market forces⁵. This system is designed to incentivise the industry to increase packaging recycling rates to meet recycling targets and it leads to producers paying partial costs of dealing with packaging waste under this system.

The reforms outlined in this impact assessment will see obligated packaging producers pay the Full Net Cost (FNC)⁶ of collecting and managing packaging waste collected from households through efficient and effective systems under an Extended Producer Responsibility (EPR) scheme. This includes the proportion of household kerbside residual waste and recycling collections costs attributed to packaging waste, as well as the cost of managing packaging waste through Household Waste and Recycling Centres (HWRCs) and bring sites. Producers will also be required to make payments to cover the costs of managing binned packaging waste. Costs paid by producers will be on the basis of modulated fees, such that producers placing packaging on the market which is more expensive to recycle, or has a higher environmental impact, will face higher fees. Overall, this is expected to incentivise producers

¹ See Annex 1 for more details.

² https://consult.defra.gov.uk/extended-producer-responsibility/consultation-on-reforming-the-uk-packaging-produce/supporting_documents/packagingepiconsultimpactassessment.pdf

³ https://consult.defra.gov.uk/extended-producer-responsibility/extended-producer-responsibility-for-packaging/supporting_documents/Extended%20Producer%20Responsibility%20Impact%20Assessment.pdf

⁴ A shared point of compliance exists, whereby producers at different stage of the supply chain have a shared obligation. The main producer categories obligated are raw material manufacturers, packaging conversion, packer/fillers and sellers. Importers of packaging and service providers are also obligated.

⁵ See Annex F for details of historic prices.

⁶ Net of any revenue from selling packaging recyclate to reprocessors and exporters.

to reduce unnecessary packaging, switch to more recyclable packaging and increase the recyclability of the packaging they place on the market.

Within the previous consultations, Government also set out options for introducing FNC payments to cover certain packaging collected for recycling from businesses. While there was strong support for the principles underpinning the reforms, and for many of the proposed approaches set out in the consultation, there was less agreement on a viable payment mechanism for managing business packaging waste. None of the proposed options received majority support, and 63% of respondents strongly disagreed with one or more of the options put forward. These objections related to the complexity and value for money of introducing a new payment mechanism, given that obligated sectors already bear much of this cost, and the potential for fraud in the system. Government has decided to prioritise introducing FNC payments to cover household packaging as soon as possible, while further exploring options to extend FNC payments to packaging collected from businesses.

Under the reformed system producers will still need to provide evidence of meeting their recycling obligations for all packaging. To facilitate this, as an interim measure, producers will continue to purchase recycling evidence (PRN/PERNs) on all packaging. Where producers are obligated to make payments to cover the FNC of their household and binned packaging, they will be required to make an additional payment to bring their contribution for the management of household and binned packaging to FNC⁷. Government proposes that further consultation will be conducted to gain stakeholder views on the best way to increase the efficiency of the PRN/PERN system, such as requiring more regular reporting of data and a more active role for Compliance Schemes, with the expectation that necessary changes will be made to the system in time for the reforms in this IA.

In addition to the introduction of payments to cover household and binned packaging, the reforms will include the introduction of mandatory labelling on packaging to communicate the recyclability of the packaging. There will also be specific measures to increase recycling of fibre-based composite packaging⁸. This will include the introduction of a Mandatory Takeback Scheme for sellers of fibre-based composite cups, whereby sellers must provide bins to collect and recycle this packaging. Fibre-based composite producers will also be required to report data on the packaging placed on the market, and a specific fibre-based composite recycling target will be introduced to be met by obligated producers.

To enable these reforms, additional data requirements will be placed on the packaging waste supply chain, including on Material Facilities as well as reprocessors and exporters of packaging for recycling.

Summary of impacts on supply chain

This section summarises the responsibilities and impacts on businesses from across the packaging supply chain as a result of the reforms.

Packaging Producers

⁷ For further information on how this will work, see Annex F

⁸ Packaging that is predominantly fibre based (for example made of card) but includes other materials (usually a plastic lining).

Obligated packaging producers will still be required to purchase evidence to meet their recycling obligations on all packaging. Producers handling packaging likely to be collected from households will then be obligated to make an additional payment to meet the FNC of managing household and binned packaging. These costs include:

- The costs of collection and management of packaging materials for recycling minus the revenue received from the sale of these materials. This is in addition to the cost of collecting and disposing of packaging in the residual stream.
- The costs of collection and management of packaging at Household Waste and Recycling Centres (HWRC) and bring sites
- The cost of collection and management of binned packaging waste

Producers will also face costs associated with mandatory labelling, whereby packaging must include a label indicating whether it can be recycled or not. Additionally, producers will cover the cost of EPR Scheme Administration, the regulator and may also pay for Compliance Scheme costs.

There will be savings to producers, relative to the baseline, on their FNC payments towards household packaging collection and management costs as more packaging waste is recycled rather than sent to residual.

Fibre-Based Composite Cup Sellers

Sellers of fibre-based composite cups will be required to introduce a Mandatory Takeback Scheme and provide bins for the collection and recycling of these cups. They will also be required to report the tonnage collected and recycled to the regulator. There will also be specific fibre-based composite recycling targets to be met by producers.

Public Sector

There will be gains to the public sector as producers make payments to Local Authorities to cover household packaging collections and end-of-life treatment as well as binned packaging waste costs. This is a transfer from the public sector to packaging producers.

The public sector will face additional costs relating to set up costs, including IT system set up costs. There will also be reductions in landfill tax as more packaging is diverted from residual routes to recycling. This is a transfer from HMT to Local Authorities (and ultimately packaging producers), businesses disposing packaging waste and fibre-based composite cup sellers.

Overall, the public sector will see a net gain from the reforms.

Businesses Disposing of Packaging Waste

Businesses that dispose of household-like packaging waste will see savings from diverting packaging waste from residual to recycling as a result of mandatory labelling, which will see packaging more clearly labelled as recyclable or not and lead to increased recycling from households and businesses.

Material Facilities

Material facilities such as Material Recovery Facilities (MRF) and Transfer Stations (TS) are often the first destination of packaging collected from households and businesses as recycling. Here recyclate is bulked and/or sorted to be

sent to another material facility or recycler. Additional requirements to support EPR will be placed on these facilities to provide sampling and compositional data of the recyclate they receive and process. This will lead to increased costs for material facilities. To cover these costs, in scope facilities may increase the fees they charge for their services. These costs would therefore accrue to Local Authorities and businesses disposing of dry recyclate.

Reprocessor and exporters of packaging for recycling

Reprocessors of packaging, as well as exporters of packaging for recycling, will see additional costs due to increased data reporting requirements.

Reprocessors will, however, gain through increased profit from selling reprocessed packaging as inputs for new products and packaging on the secondary market. This is due to the increased supply of recycled packaging due to EPR. Although not an additional benefit, these businesses will also retain PRN/PERN income from producers.

Society

Increased recycling of packaging materials produces secondary materials for use in manufacture (e.g. new packaging). This reduces the GHGs emissions associated with the raw material extraction, packaging manufacturing and waste management. Recycling packaging materials is generally less carbon-intensive than other packaging waste treatment options. Society will therefore gain through reduced carbon emissions.

Evidence summary

A summary of costs and benefits of the reform are set out below.

<i>Present Value (2024-33) £m</i>	Option 1	Option 2
Transition Costs		
Producer - Labelling Transition	£77.89	£77.89
Producer - EPR Familiarisation	£1.30	£1.30
Producer – Fibre-based composite cup Mandatory Takeback Transition		£35.32
Material Facility - Capital and Familiarisation	£6.54	£6.54
Reprocessor/Exporter - Familiarisation	£0.52	£0.52
Public Sector - IT Investment	£10.82	£10.82
Costs		
Producer - FNC Household Packaging Collections (Kerbside collections, HWRC, Binned waste) - Transfer	£9,573.53	£9,573.53
Producer - Scheme Administrator, Compliance Scheme and Regulator	£447.14	£447.14
Producer - Labelling Ongoing	£51.16	£51.16
Producer – Fibre-based composite cup Mandatory Takeback (enforcement, training, net collection costs)		£43.93
Material Facility - Operational and Regulator	£177.47	£177.47
Reprocessor/Exporter - Ongoing	£5.01	£5.01
Public Sector - Landfill Tax Loss - Transfer	£70.02	£72.12
Benefits		
Society - GHG Emission Savings	£450.58	£469.72

Producer - Net Collection Cost Savings	£280.76	£280.76
Producer – Fibre-based composite residual savings	£0.00	£14.42
Producer – Fibre-based composite litter savings	£0.00	£1.74
Businesses - Net Household- Like Business Waste Savings	£28.70	£28.70
Reprocessor - Secondary Material Market - Indirect	£107.16	£119.42
Public Sector - Household Packaging Collections (Kerbside, HWRC, Binned waste) - Transfer	£9,573.53	£9,573.53
Total Costs	£10,421.41	£10,502.75
Total Benefits	£10,440.72	£10,488.29
NPV	19.3	-14.5

The table below outlines the recycling rates for packaging in scope of EPR under the baseline and the two options in 2033. As will be demonstrated in the evidence section, EPR packaging recycling rates are expected to increase by 4% points above the baseline in both options. Under option 2 we estimate that the fibre composite recycling rates will increase to 35% points above the baseline by 2033.

	Baseline	Option 1	Option 2
Plastic	58%	63%	63%
Wood	37%	37%	37%
Aluminium	47%	48%	48%
Steel	82%	85%	85%
Paper/Card	88%	90%	90%
Glass	77%	84%	84%
Fibre-based composite	26%	38%	61%
Total	72%	76%	76%

A summary of the direct business costs and benefits included in the EANDCB are outlined in the table below.

Present Value (2024-33) £m	Option 1	Option 2
Transition Costs		
Producer - Labelling Transition	£77.9	£77.9
Producer - EPR Familiarisation	£1.3	£1.3

Producer – Fibre-based composite cup Mandatory Takeback Transition		£35.3
Material Facility - Capital and Familiarisation	£6.5	£6.5
Reprocessor/Exporter - Familiarisation	£0.5	£0.5
Costs		
Producer - FNC Household Packaging Collections (Kerbside collections, HWRC, Binned waste) - Transfer	£9,573.5	£9,573.5
Producer - Scheme Administrator, Compliance Scheme and Regulator	£447.1	£447.1
Producer - Labelling Ongoing	£51.2	£51.2
Producer – Fibre-based composite cup Mandatory Takeback (enforcement, training, net collection costs)		£43.9
Material Facility - Operational and Regulator	£177.5	£177.5
Reprocessor/Exporter - Ongoing	£5.0	£5.0
Benefits		
Producer - Net Collection Cost Savings	£280.8	£280.8
Businesses - Net Household- Like Business Waste Savings	£28.7	£28.7
Fibre Based Composite Disposal Savings		£14.4
Total Costs	£10,340.6	£10,419.8
Total Benefits	£309.5	£323.9
EANDCB (Annualised)	£1,165.37	£1,172.90

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GLOSSARY

Packaging Recovery Note (PRN) /Packaging Export Recovery Note (PERN): Evidence issued by reprocessors and exporters of packaging, representing the packaging they have recycled

Household packaging (HH): Packaging disposed of as waste by households.

Non-Household Municipal (NHM): Businesses and public sector organisations that produce household-like waste. Household-like is used synonymously with NHM in this impact assessment.

Other C&I: Commercial and Industrial waste not considered to be household-like. For example, transit/distribution packaging.

Material Recovery Facility (MRF): A facility which takes in mixed recyclate and sorts it into separate material/packaging types to be sent to a recycler.

Transfer Station (TS): A site at which waste is consolidated, aggregated, bulked, or sorted before transported for further processing or sorting, recycling or disposal.

Reprocessor: A facility that turns waste materials (such as packaging collected for recycling) into usable inputs for new products.

Exporters of packaging for recycling: Businesses that export UK sourced packaging collected for recycling, to be recycled abroad.

Primary packaging: This is generally the packaging in direct contact with the product. This packaging is mostly likely to be handled by consumers.

Secondary packaging: This is additional packaging used with a product. This could be for purposes such as marketing/branding, extra protection or combining products sold in multipacks. Some secondary packaging is handled by consumers, but some may be retained and disposed of at the point of sale.

Tertiary packaging: This is packaging used in the transportation of products, i.e. transit packaging. This packaging is generally removed before the product is sold to consumers.

Fibre-based composite packaging: Packaging largely comprising of fibre (paper/card), with some additional material(s) such as a plastic lining.

SECTION 1: PROBLEM UNDER CONSIDERATION

Domestic regulations governing producer responsibility for packaging and packaging waste are (i) the Packaging (Essential Requirements) Regulations 2015⁹; and (ii) the Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (as amended)¹⁰. This IA assesses options relating to reforming the latter set of Regulations, which are hereafter referred to as ‘the Packaging Waste Regulations’. A system of producer responsibility for packaging waste has been in place since 1997 and operates UK-wide under GB and parallel Northern Ireland regulations. The regulators are the Environment Agency (EA) in England, Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA) and Scottish Environment Protection Agency (SEPA). Under Annex 2 of the Northern Ireland Protocol, Northern Ireland will need to meet the requirements of the EC Directive on Packaging and Packaging Waste (94/62/EC). A detailed description of the Packaging Waste Regulations can be found in Annex A.

To date, the Packaging Waste Regulations have been successful in that producers have met the packaging waste recycling targets set by Government at a low cost to business. However, the current system has shortcomings and is unable to meet the policy commitments set out by Government and Devolved Authorities.

The proposals to reform the current system, including the introduction of Extended Producer Responsibility (EPR), in which producers are required to cover the full net collection and end-of-life treatment costs for household packaging, will address these shortcomings and wider policy objectives of Government:

⁹ <https://www.legislation.gov.uk/uksi/2015/1640/body/made>

¹⁰ <https://www.gov.uk/guidance/packaging-producer-responsibilities>

- Under the current system, obligated packaging producers are required to meet recycling targets set by Government. To do so they must buy evidence known as Packaging Waste Recovery Notes (PRN) or Packaging Waste Export Recovery Notes (PERNs) from reprocessors and exporters. Reprocessors and exporters can issue this evidence based on the packaging they recycle and sell them at the market price. When these notes are in short supply, the market price should increase, providing an incentive for reprocessors and exporters to ensure more packaging is recycled. As such, the system is designed to incentivise an increase in the recycling of packaging waste above levels delivered through wider policy measures (e.g. landfill tax or requirements to recycle), and the values attached to the purchase of evidence (PRNs) essentially represents the additional cost of recycling different packaging materials. This system therefore is not designed to recover the full cost of collecting and managing packaging waste from producers.
- The income raised through the sale of PRNs has supported some growth in reprocessing capacity but only covers a small proportion of collection costs¹¹. An area of particular criticism has been that the PRN does little to support LAs to increase recycling, a criticism that has grown as LAs budgets have become more constrained and recycling rates have plateaued. Furthermore, as the current system is market driven the price of PRNs and hence the total revenue raised through the sale of PRNs can fluctuate considerably from year to year. Under EPR LAs will receive a predictable income covering the full net cost of the packaging waste they manage.
- There are also concerns around the transparency of the PRN system, particularly around the sale of evidence to producers and compliance schemes, as well as the visibility producers have of how their PRN fees have been used. Under an EPR system producers will contribute more funds into the system, so all actors require visibility of how this money is raised, distributed and the outcomes it achieves. More robust data and greater transparency of reporting are planned under the reforms and will help achieve higher recycling targets. Government also plans to reform the PRN system to increase transparency, which will help increase the efficiency of the PRN market and provide more visibility to all actors. Separately to this impact assessment, further consultation will be held on the best way to do reform the PRN system.
- There is concern that under the current system an uneven playing field exists, favouring the issuing of evidence on packaging exported for recycling abroad over that recycled in the UK leading to an over-reliance on export markets and insufficient growth in UK reprocessing capacity. Risks identified here include the potential for PERNs to be issued on recyclable material that is not packaging, packaging that is of poor quality that cannot be recycled, or on contamination such as food residuals; and that recycling that can be done at a lower cost overseas. Under the reforms, exporters of packaging for recycling abroad will need to provide more detailed evidence on the packaging exported as well as proof that it has reached its intended destination and been recycled.

¹¹ The National Packaging Waste Database reports at a high level the allocation of PRN revenue. In 2020 around 30% of the total PRN revenue funded collections, however this represented somewhere between 3-7% of the total cost of managing household packaging: <https://npwd.environment-agency.gov.uk/Public/PublicSummaryData.aspx>

- There has been limited direct support for consumer communications to encourage recycling of packaging waste with many people continuing to be confused over the packaging they can and can't recycle¹². Under the reforms, producers will be mandated to label their packaging to show whether it can be recycled or not. Further to this, producers will be required to fund national communication campaigns, run by the EPR scheme administrator, to educate consumers on where and how to recycle their packaging. This will run alongside advice services to businesses to encourage better recycling.
- It is designed to support an increase in the recycling of packaging waste, and not the design and use of more sustainable and recyclable packaging. Under EPR, producer fees will be modulated by factors such as recyclability of the packaging to incentivise producers to use more sustainable packaging.
- Producers are only required to report data on packaging they placed on the market by material category¹³, which means that data for specific types of packaging is not reported; the new system will require more granular reporting by material, packaging format (bottle, tub, jar, etc) and in the case of plastics by polymer. This has limited the opportunity to target specific packaging materials. For example, fibre-based composite cups are reported as card packaging meaning that producers can meet their obligation by purchasing card PRNs, rather than by taking specific action to increase the recycling of fibre-based composite cups.

Overall, the current producer responsibility system for packaging is not comprehensive enough, lacks transparency, and does not provide enough incentive for producers to make packaging more recyclable. The reforms seek to address this in a balanced and proportionate way, addressing the key shortcomings of the current system.

Recycling of fibre-based composite packaging

Fibre-based composite packaging, including fibre-based composite cups when sold filled (used for both hot and cold drinks), are defined as packaging and producers placing this packaging on the market are obligated to comply with the Packaging Waste Regulations. However, the current scheme does not incentivise the recycling of these types of packaging as producers can meet their obligations by purchasing paper/card PRNs. As part of the proposed reforms, government will establish fibre-based composites as a separate packaging stream and require producers to increase the collection and recycling of this material.

In 2019 the UK fibre-based composite cup recycling rate was estimated by Valpak to be 2.8%¹⁴, with fibre-based composite food packaging waste generated 'on-the-go' not recycled. Several national coffee shop brands and 'quick service restaurant' retailers are working collaboratively to increase the separate collection and recycling of fibre-based composite cups including through voluntary takeback schemes. For example, set up in 2018, the National Cup Recycling Scheme is incentivising waste management companies to separately collect fibre-based composite cups for recycling by providing the additional revenue required to make cup-collections financially viable. This is a voluntary initiative, and although driving some change in the industry, the recycling rate remains low.

¹² <https://wrap.org.uk/resources/report/pack-labelling-and-citizen-recycling-behaviour>

¹³ Plastic, Paper/Card, Aluminium, Steel, Glass, Wood

¹⁴ WRAP/Valpak, Single-use Cups and On-the-Go Fibre-composite Food Packaging (unpublished)

SECTION 2: RATIONALE FOR INTERVENTION

Polluter pays principle and negative externalities

At present, taxpayers pay most of the costs of collecting and managing packaging waste generated in the home through services provided by local authorities but have limited control over the packaging that accompanies the products they purchase. Whilst we cannot attribute precisely what proportion of costs are borne by producers at present¹⁵, packaging producers do not bear full financial responsibility for the end-of-life management of the packaging they place on the market and are not accountable for the environmental externalities of their packaging as consistent with the 'polluter pays' principle¹⁶. As a result, there is limited incentive for producers to consider the impact of disposing of the packaging they choose to use for their products at end of life.

Under EPR, producers will become financially responsible for the FNC of the collection and treatment of household packaging at end-of-life¹⁷. This will therefore internalise some of the costs of dealing with packaging waste.

With the addition of modulated fees, whereby fees vary according to the packaging's treatment cost including environmental impact, producers will have further incentives to reduce the environmental impacts of their packaging. For example, producers will have a financial incentive to use less packaging, particularly unrecyclable or hard-to-recycle packaging, in order to improve how their packaging is managed at end of life and minimise their costs. Where packaging is necessary there will be a financial incentive to make it easily recyclable. This will reduce the negative externalities associated with the production, use and disposal of packaging including natural resource depletion, wider ecosystem impacts associated with the production of raw materials and damage to eco-systems including leakage to the environment, greenhouse gas (GHG) emissions (from both production and disposing of packaging to landfill and incineration), disamenity impacts from littering and impacts on land use from landfill sites.

Poor quality of material for recycling

Contamination of materials (for example where unrecyclable materials are mixed in with recyclable materials) collected for recycling during the collection process reduces the value of the materials and results in a loss of material for recycling. EPR complements other policies, such as a Deposit Return Scheme for drinks packaging, as well as consistent recycling in England, which will lead to higher quality recyclate. EPR specifically, will incentivise producers to consider the design of their packaging and reduce hard to recycle, or disruptive materials. Mandatory labelling will require packaging to be labelled as recyclable or not recyclable which will make it easier for people to recycle correctly and reduce the amount of packaging disposed of incorrectly and reduce contamination.

¹⁵ For example, our current analysis suggests that producer payments under the current regulations would equate to around 7-11% of the full net costs of municipal (household and household-like) packaging waste collection and end-of-life treatment.

¹⁶ While producers do pay a proportion of Full Net Cost (FNC) of packaging collection through the PRN system, this is likely to be small. Producers do also likely already pay for a proportion of C&I and Non-Household Municipal (NHM) costs through backhaul and direct contracts with waste collectors, and as such Household packaging is a priority for inclusion in EPR. Government does not intend to extend FNC costs to these sectors at the current time but will keep these under review once we have improved data on tonnages and costs.

¹⁷ Net of any income from the sale of these materials to the reprocessing and recycling sectors.

Insufficient consumer information and confusion over what packaging items are recyclable

The current system has not encouraged producers or compliance schemes to educate and inform consumers, although a few have chosen to do so. This is because the costs of doing so would likely be borne by a few organisations, but the benefits could be felt by all. However, to reach high levels of collection and recycling, consumer education and information must be prioritised and scaled up. The proposed changes will require obligated producers to fund national and local consumer communication and information campaigns that will support increased recycling.

Separately many producers have chosen to label their packaging to indicate if it can be recyclable. However, research¹⁸ indicates low levels of consumer awareness on the meaning of labels, inconsistent (and sometimes inaccurate) use of labels across products and competition between various schemes. These factors are reducing the effectiveness of packaging recyclability labelling currently used across the UK.

Lack of collection and sorting infrastructure and poorly developed markets

Some types of packaging are technically recyclable but are not recycled (or not widely recycled) due to limited provision of collection points, collection services, or a lack of sorting capacity to separate this packaging from other packaging types. This may either be because it is not cost effective to put those systems in place currently or because the full societal cost of the packaging is not reflected currently in decisions regarding its use.

Examples include food and drinks cartons which despite collection provision increasing in many parts of the UK are not always collected in a way that enables them to be separated for recycling or are not separated effectively from other types of card packaging to enable them to be recycled. Whilst some types of film and flexible plastic packaging are technically recyclable, the collection and sorting infrastructure is poorly developed and there is a lack of end markets for the recovered materials. Other types of flexible plastic packaging are not suited to mechanical recycling such as packaging that is made of more than one polymer.

EPR will incentivise obligated producers to choose to use packaging materials for which there is effective recycling infrastructure in place or provide a means by which new infrastructure is funded to increase the recycling rates of certain packaging if it is more cost effective to do so. In the case of fibre-based composite cups for example, a mandatory requirement to takeback cups will ensure that producers facilitate and fund the desired increase in the collection and recycling of fibre-based composite cups.

System-wide inefficiencies

There is a lack of shared objectives across the supply chain for long term transition towards more packaging waste being recycled; a failure to include and coordinate different actors in the supply chain; a lack of support to drive market demand for recycled materials; and insufficient mechanisms to deal with uncertainty and learning through innovation. There is a need to improve the collection, sorting and reprocessing infrastructure across the whole system. This is unlikely to happen without government intervention because the costs associated with innovation and improving the flow of knowledge and technology between actors would need to be faced by individual businesses whilst the whole sector would enjoy the resulting benefit. Whilst we should assume that there will be

¹⁸ https://wrap.org.uk/sites/default/files/2021-09/WRAP-On-pack-labelling-and-recycling-behaviour_0.pdf

some innovation amongst producers at present, as ultimately different actors in the supply chain still need to operate in a competitive marketplace, the current system does not drive the *optimum* level of innovation due to the potential for free riding.

Information failure & need for Government intervention in fibre-based composite packaging

Placed on the market data for cups and other types of fibre-based composite packaging is not reported currently nor do we have accurate data on recycling and capture rates for cups. Intervention is required to obtain better data so that government and industry are better able to understand the challenge and scope for improved management of this packaging stream.

The high costs associated with reprocessing fibre-based composite cups means that the net financial gain from recycling them is low and reprocessors do not have an incentive to actively seek and reprocess fibre-based composite cups¹⁹. Policy interventions that encourage fibre-based composite cups to be collected separately for recycling (i.e. mandatory reporting, mandatory takeback/ recycling targets), places the responsibility for collecting and recycling this packaging on producers. As the scale of collected fibre-based composite cups increases, it is likely that reprocessing costs will fall and the cost to producers will be lessened.

The Deposit Return Scheme (DRS) was considered as a potential approach to increase the recycling rate of fibre-based composite cups. However, views outlined in both the DRS and EPR consultations suggested that inclusion of fibre-based composite cups in DRS would risk contamination of the other materials and hence would likely require separate reverse vending machines for the return of the cups. It was therefore considered more practical to include measures to drive up fibre-based composite cup recycling including requiring producers to put in place the necessary arrangements to enable the separate collection of these cups as part of EPR.

SECTION 3: DESCRIPTION OF OPTIONS CONSIDERED

Baseline

In the baseline it is assumed that there will be no reform to current packaging regulations. It is therefore assumed that producers would continue to be required to purchase evidence, in the form of PRN/PERNs, to demonstrate that they have met their recycling obligations. Although we do not attempt to forecast future PRN/PERN prices, we do make assumptions about the cost to producers for meeting these obligations. These are discussed in Annex F.

The baseline makes an ex-ante assumption about the approach to consistency of recycling collections in England, which we have assumed will be implemented in 2024. The baseline also accounts for the introduction of a Deposit Return Scheme for beverage containers for England, Northern Ireland, Wales and Scotland. It is assumed that an 'All-in no glass' Deposit Return Scheme will be introduced in England and Northern Ireland, whereas an 'All-in' scheme including glass will be introduced in Scotland and Wales. It is assumed that DRS will be introduced in all

¹⁹ <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/657/657.pdf>

Nations by 2024, the year in which EPR is due to be introduced²⁰. Sensitivity analysis including the impact of different baseline assumptions for these policies is included in Annex M.

We expect some packaging switching from harder to recycle (or non-recyclable) packaging materials to more recycled packaging materials pre-2024, due to government's announcement of its intention to reform packaging producer responsibility policy combined with voluntary initiatives by industry such as the UK Plastics Pact. These switches have been accounted for in the modelling. For more info, please check Annex B.

EPR option 1 (minimal product): full net cost recovery for packaging waste collected from households and binned packaging waste, modulated fees, mandatory labelling and retention of the PRN system

Option 1 is to reform the packaging producer responsibility system. The principal change in this option will see the requirement placed on producers to take financial responsibility for the Full Net Cost (FNC) of managing packaging they place on the market which arises as waste in households, and the introduction of modulated fees. Modulated fees are the mechanism by which those costs are recovered from producers and the costs varied to reflect the costs of managing different packaging materials and criteria, such as the recyclability of the packaging. The IA quantifies these changes for all materials in scope by using a model developed by Eunomia on behalf of Defra²¹. Producers will also cover the costs of managing collection and disposal of binned packaging waste.

Within the 2019 and 2021 EPR consultations, Government also set out options for introducing FNC payments to cover household-like packaging collected for recycling from businesses. Stakeholders raised concerns about the options in the consultation relating to the complexity and value for money of introducing a new payment mechanism, given that obligated sectors already bear much of this cost, and the potential for fraud in the system. Government has decided to prioritise introducing FNC payments to cover packaging collected from households by Local Authorities as soon as possible while further exploring options to extend FNC payments to packaging collected from businesses. As an interim measure, producers will still be required to purchase recycling evidence (PRN/PERNs) to meet their obligations on all packaging.

Requirements for mandatory labelling will be implemented in a manner that supports the wider approach to packaging EPR whilst minimising additional compliance costs for businesses. There will be mandatory UK-wide labelling of packaging to provide clear information on the recyclability of any item of packaging and to help consumers dispose of packaging waste appropriately. It is proposed that producers would label their packaging as 'Recycle' or 'Do Not Recycle' (informed by the recyclability assessment producers will be required to undertake to report packaging data to the EPR Scheme Administrator to determine the disposal costs (modulated fees) they will pay).

²⁰ Although the Scottish Government has committed to introducing a DRS at an earlier date.

²¹

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20310&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

The labelling measures will be complemented by producer funded local and nation-based communications and education initiatives to advise consumers on how to recycle their packaging and the consequences of making the wrong disposal choices. These costs will be included in the fees paid by producers.

EPR option 2: full net cost recovery for household packaging and binned packaging waste, modulated fees, mandatory labelling and fibre-based composites

This option is the same as Option 1, with the addition of mandating all retailers of filled fibre-based composite cups²² to i) report what they place on the market and ii) facilitate their separate collection for recycling. These producers will be able to establish their own collection systems and determine how best to maximise the collection and recycling of fibre-based composite cups or they may choose to contribute financially / join a cup collection system. Under mandatory takeback, consumers will be able to return their used cups to any obligated business. In addition to this, recycling targets for fibre-based composite packaging will be introduced to encourage the development of recycling systems for this packaging.

Since the consultation IA, WRAP and Valpak have completed an evidence project to better understand the current state of recycling of these packaging types²³. Several policy options for reducing the use of or/and increasing the recycling of fibre-based composite packaging were also identified and their likely impact modelled. This has enabled us to further develop this approach and improve our analysis of the costs and benefits of a mandatory take-back scheme for this IA.

Option 2 is our preferred option as it goes one step further than option 1 by including a packaging material/format that currently is not widely recycled and therefore would meet the policy objective to increase packaging that is recycled. As we discuss in the cost benefits analysis section, we assume that retailers will provide fibre-based composite cup bins, reprocessors will invest in infrastructure to reprocess these cups and consumers will dispose of cups in the appropriate bins.

Non- Regulatory Option

Producer Responsibility

A non-regulatory option was not appraised. There are no realistic non-regulatory alternatives that would achieve the aims of full net cost recovery. Standard economic theory implies that it would not be rational for one producer to voluntarily cover the full costs of their product/packaging going through the waste system unless their competitors were also voluntarily paying. Thus, this market failure of coordination can only be corrected through a regulatory approach. This policy requires producers to operate on a level playing field, therefore regulations are required to ensure that all obligated stakeholders comply.

A regulatory approach to packaging producer responsibility has been in place since 1997 and has placed obligations on producers in respect of the packaging they place on the market. The UK Government made a commitment in the Resources & Waste Strategy 2018 to invoke the 'polluter pays' principle and to introduce extended producer

²² For hot drinks and cold drinks

²³ Single-use cups and on-the-go fibre-composite food packaging – WRAP and Valpak (unpublished)

responsibility for packaging meaning that producers would be required to pay the full costs of disposal of packaging they place on the market. The Devolved Administrations have made similar commitments. The 2019 and 2021 consultation on reforming the current regulations set out the case for change and sought views on the key areas for reform for which there was broad support.

The system provided by the current regulations is not designed to enable full cost recovery from producers and will not deliver government's ambitions for higher packaging recycling rates and the use of more recyclable and sustainable packaging. Regulations are required to define obligated producers, to set out the requirements and obligations on these producers including the packaging waste management and other costs payable by producers, and to ensure equal treatment of obligated producers. Regulations are also necessary to ensure provision is made for the fees paid by producers to be distributed to those incurring the costs of managing packaging waste, for example to LAs who are responsible for managing household packaging waste. Although there are many outcomes for the policy, the main policy objective is to make packaging producers responsible for the end of life costs of packaging and in doing so improve the end of life management of packaging waste. This would not be possible in a non-regulatory system.

Labelling

Voluntary labelling scheme currently exist²⁴ to support producers to include recyclability information on their packaging. Although there is evidence that on packaging labelling can have a positive impact on consumer behaviour when it comes to their disposal decisions²⁵, the current landscape creates confusion for citizens. As per unpublished research carried out by On-Pack Recycling Label Ltd (OPRL), issues include low levels of consumer awareness on the meaning of labels, inconsistent (and sometimes inaccurate) use of labels across products and market competition between various schemes.

These factors are reducing the effectiveness of packaging recyclability labelling currently used across the UK. There is therefore need for government intervention to coordinate the approach to labelling and ensure that consumers are given clear and accurate information to maximise the impact of on packaging recyclability labels.

Fibre-Based Composite Packaging

Voluntary schemes to increase the recycling of fibre-based composite packaging currently exist. Notably, The National Cup Recycling Scheme²⁶ was set up in set up in 2018 to incentivise waste management companies to recover fibre-based composite cups for recycling by providing the additional revenue required to make cup-collections financially viable with the aim of increasing the recycling rate of fibre-based composite cups. This and other voluntary initiatives have had some positive impact so far for fibre-based composite cups, but this has been

²⁴ For example, OPRL. https://www.oprl.org.uk/?gclid=EAlalQobChMlqSppeDq9AIV45PVCh1q4QTsEAAYASAAEgLCJ_D_BwE

²⁵ https://wrap.org.uk/sites/default/files/2021-09/WRAP-On-pack-labelling-and-recycling-behaviour_0.pdf

²⁶ <https://www.cuprecyclingscheme.co.uk/>

relatively small. Indeed, in 2019 the UK fibre-based composite cup recycling rate was estimated to be only 2.8%.²⁷ The corresponding recycling rate for other on-the-go fibre-based composite food packaging has been estimated to be lower still at close to zero²⁸ and although there do currently exist certain initiatives for improving the management of other on-the-go fibre-based composite food packaging waste, none seem likely extensive enough to ensure an increase in collection and recycling rates in the absence of government intervention.

SECTION 4: POLICY OBJECTIVE

The UK Government and the Devolved Administrations are working jointly on proposals to reform the current UK packaging producer responsibility regime and introduce EPR given the integrated supply chains associated with the production and use of packaging materials within the UK market; with Defra taking the lead in the resourcing and programming of the work supported by officials from Welsh Government, Scottish Government and the Department of Agriculture, Environment and Rural Affairs, Northern Ireland.

There are several objectives of the proposed policy reforms which are reflected in commitments made by the UK Government and the Devolved Administrations. These are set out in Annex B.

The UK Government and the Devolved Administrations undertook an initial consultation on proposals to reform the producer responsibility system in 2019, and a second consultation on proposals for packaging extended producer responsibility in 2021. [The summary of responses to the 2019 Consultation can be found here and the Government Response to the 2021 Consultation can be found here \[LINK TO BE ADDED AHEAD OF PUBLICATION\].](#)

Regular stakeholder engagement has enabled us to keep policy objectives well informed. Following the consultations, stakeholder engagement has continued and informed the further development of our policy proposals. This has included through an industry sounding board established with the support of INCPEN (Industry Council for Packaging and the Environment), the government's Advisory Committee on Packaging (ACP), and Defra's Packaging and Collections Working Group and Resources & Waste Stakeholder Advisory Group. Specific engagement has also taken place with local authority groups and stakeholders in England, Northern Ireland, Scotland and Wales. These have given stakeholders the opportunity to discuss the proposed reforms and put their opinions forward.

The key policy objectives are summarised below:

Increase packaging recycled	The proposals will inform the setting of packaging waste recycling targets and help obligated producers achieve these targets. A principle of EPR is that money raised from producers should be retained in the system to fund the management of household packaging waste. This should be used to support improvements to the collection and sorting infrastructure in addition to wider costs such as disposal and litter management. This will contribute towards
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²⁷ WRAP/Valak Single-use Cups and On-the-Go Fibre-composite Food Packaging, 28 April 2021

²⁸ WRAP/Valak Single-use Cups and On-the-Go Fibre-composite Food Packaging, 28 April 2021

	more packaging waste being collected and in a more consistent way and improving the sorting and reprocessing processes resulting in higher recycling rates.
Increase the recyclability of packaging	We estimate that 62% of packaging was recycled in 2020, which is equivalent to around 7.5Mt ²⁹ . The introduction of modulated fees will encourage producers to make changes to their design and use of packaging to make them more recyclable. For example, fee rates will be lower for materials which are easily recyclable and higher for materials which cannot be recycled.
Reduce unnecessary packaging	The requirement to pay the Full Net Cost of end-of-life management of their household packaging, and the introduction of modulated fees will provide an incentive to producers to review the packaging they use, including opportunities to reduce the packaging they use, thereby reducing their overall costs of compliance.
Improve the environment	Increased recycling of packaging waste will mean that less packaging waste is landfilled or incinerated, and the materials collected for recycling will reduce the use of virgin materials in the manufacture of new products and packaging. These outcomes will improve the environment for the public and for wildlife, as well as generating carbon savings.
Increase domestic recycling and reprocessing capacity	A key aim of the Packaging Waste Regulations is to increase the recycling of packaging waste and in doing so to stimulate growth in the UK recycling industry. This has not been achieved to the level that government and stakeholders would like to see; whilst stimulating an increase in the recycling of packaging waste, for certain materials much of this increase in recycling has occurred overseas. The reforms will increase the supply of materials for recycling, and also the quality of material for recycling by reducing contamination by reducing the use of packaging that is hard to recycle or not recyclable. They will also increase requirements on exporters of packaging waste to report on and demonstrate packaging waste that is exported is recycled so that UK reprocessors and exporters are operating on a level playing field. In turn, this will allow investors to be more confident in investing in the UK's recycling industry.
Enhanced data reporting	<p>The effective implementation and operation of EPR will rely heavily on data and evidence provided by participants across the packaging value chain. Appropriate reporting of packaging placed on the market and evidence on the mass flows of packaging through the waste management system needs to be provided to support and inform the setting of targets, fees to be paid by producers, and payments made for the costs incurred in delivering LA packaging waste management) services.</p> <p>Producers will be required to report data at a more granular level than under the current system to inform the cost they will pay and the setting of fee rates on individual packaging types. Under changes to the obligated producers, more packaging is expected to be brought</p>

²⁹ This analysis is discussed in the baseline section of impact assessment

	<p>into obligation and in turn will need to be reported. This will provide better quality data on the amounts, and types, of packaging placed on the market which will help policymakers in future.</p> <p>Under changes proposed to existing regulations in England, Wales and Scotland³⁰ and new equivalent regulations or requirements in Northern Ireland, materials facilities (transfer stations, bulking stations, and sorting facilities) that receive waste containing packaging will need to report on the tonnages and composition of packaging waste received, handled/sorted, lost and/or sent to other facilities and will also be required to sample against a greater number of material categories and at a higher frequency to ensure that data reported is of high enough quality to support EPR outcomes, including accurate payments and minimising the risk of fraud. The number of facilities to which these requirements apply are expected to increase.</p> <p>Reporting requirements, beyond those already required by the Packaging Waste Regulations, will also be required of reprocessors and exporters to distinguish different types and quality of recyclate entering and leaving their facilities. Many reprocessors already capture and use this information as part of their core business processes but this will be standardised.</p>
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SECTION 5: COSTS AND BENEFITS OF EACH OPTION

BASELINE

BRIEF DESCRIPTION

As described in section 4, the baseline assumes that consistent recycling in England, as well as a DRS for drinks packaging in England, Wales, Northern Ireland and Scotland are in place and the associated costs, benefits and recycling rates of these are reflected in the baseline. Packaging items in scope of the proposed DRS will be excluded from packaging EPR therefore this tonnage is not included in the data and analysis in this IA. It is assumed that DRS in Scotland and Wales will include PET drinks bottles, metal drinks cans and glass drinks bottles. It is assumed that England and Northern Ireland will include PET drinks bottles and metal drinks cans only. The cost attached to any DRS materials collected via household or other business collection services will be a matter for the DRS Deposit Management Organisation. EPR obligated producers will not be expected to pay for the costs of collecting DRS materials not returned to designated DRS collection points.

In this section we present the amount of packaging that is placed on market, current recycling rates and the amount of packaging currently found in residual waste in a 'do-nothing' option (but assuming DRS and consistency are in place). Further details on assumptions used for the baseline are detailed in the Annex D.

³⁰ Part 2 of Schedule 9 of the Environmental Permitting Regulations (England and Wales) and Code of Practice on Sampling and Reporting at Material Recovery Facilities (Scotland)

BACKGROUND

Placed on the market packaging and pre-2024 switches

In the previous IA, UK placed on the market ('POM') packaging data was taken from the material specific Pack Flow 2025³¹ reports commissioned by Defra, and carried out by Valpak Consulting, Verde Research & Consulting, Recoup and WRAP. Since the previous IA updated versions of these reports have been published which account for the impact of Covid-19 and resultant lockdowns on POM, as well as forecasting likely changes to POM with the ending of Covid-19 restrictions in future years. Assumptions from these reports have been added to our modelling.

The key benefit of using the data provided by the Pack Flow reports is that they account for packaging handled by currently unobligated businesses which is not captured by the National Packaging Waste Database (NPWD)³². The implication of this is that the Pack Flow reports are more likely to account for all packaging waste, regardless of whether the producers are currently obligated or not.

A further benefit of these reports is their granularity. The reports provide a detailed breakdown of POM for each material type by packaging format and polymer (for plastic). This is an important input for estimating the impact of modulated fees on individual packaging types as for some materials, such as plastic, polymer can impact recyclability. Assumptions made by Eunomia in their analysis of the impact of modulated fees³³ were used to provide further granularity.

According to this initial report, the use of some plastic polymers is expected to reduce significantly before 2024 and this change has been captured in the IA baseline. It is assumed that Polyvinyl chloride (PVC), Polystyrene (PS) and non-recyclable black plastic used in Pots, Tubs and Trays (PTTs) will reduce between 2021 and 2024 in favour of more widely recycled packaging. It is expected that some of this material switching will be attributable to producers starting to respond to anticipated EPR measures and some will be attributable to other incentives, including the WRAP-led UK Plastics Pact³⁴ and other independent business initiatives. Without robust data on the extent to which these switches will take place assumptions were informed by WRAP expert judgement and trends emerging from the UKPP. Annex C provides a sensitivity analysis of pre-2024 switches.

³¹ [Pack Flow report -plastic packaging](#), [Pack Flow report-metal packaging](#) ; [Pack Flow-paper/card](#); [Wrap -glass packaging](#) ; [Wrap-wood packaging](#)

³² <https://npwd.environment-agency.gov.uk/>

³³

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20670&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

³⁴ The UK Plastics Pact is a collaborative initiative that aims to help create a circular economy for plastics. Its membership includes businesses from across the plastics value chain as well as UK governments and NGOs; <https://wrap.org.uk/taking-action/plastic-packaging/the-uk-plastics-pact>

Table 1 below shows the packaging placed on market in the ‘do-nothing option’. The data is categorised into Household (‘HH’)³⁵, Non-Household Municipal³⁶ (‘NHM’) and other Commercial and Industrial (‘C&I’). NHM is the portion of C&I waste that is household-like, and other C&I is non-household like packaging such as transit and distribution packaging. EPR Full Net Cost (FNC) payments will only apply to packaging collected from households. Mandatory labelling will, however, apply to both Household and NHM primary packaging. Government will continue to explore the possibility of extending FNC payments to packaging collected from businesses, such as NHM packaging. A key uncertainty in the POM data is calculating the NHM portion of C&I packaging. A discussion on how this has been estimated and the implications of this uncertainty are discussed in Annex D.

Table 1 Baseline packaging POM data (excl. packaging in scope of DRS) in a ‘do-nothing’ scenario – best estimate

Packaging material	2024			2027			2033		
	POM (Kt)			POM (Kt)			POM (Kt)		
	HH	NHM	Other C&I	HH	NHM	Other C&I	HH	NHM	Other C&I
Plastic	1336	387	453	1348	390	457	1371	397	465
Wood	76	247	1110	75	245	1100	74	240	1080
Aluminium	47	9	39	50	9	41	55	10	46
Steel	275	128	109	275	128	109	274	128	109
Paper/Card	1624	2352	1310	1673	2421	1349	1776	2565	1432
Glass	1653	467	-	1649	465	-	1642	463	0
Fibre Based Composite	51	82	-	52	88	-	55	101	0
Total POM	5061	3672	3020	5122	3747	3056	5248	3905	3132

Projected recycling

Recycled tonnages for each packaging material are also taken from the Pack Flow reports with additional assumptions from Eunomia’s analysis, including the use of waste composition analyses³⁷, also used to provide further granularity. The Pack Flow recycling estimates are less granular than their POM estimates and so there is more reliance on these additional assumptions. Good quality household waste composition analyses are available to disaggregate household data, however the equivalent data for NHM is less detailed and these estimates are therefore less certain. For additional information on the methodology used to come up with the projected recycling

³⁵ Packaging collected as waste from households.

³⁶ Also known as Household-Like. This is packaging that is similar in nature to household packaging but collected as waste from businesses.

³⁷ <https://wrap.org.uk/resources/report/quantifying-composition-municipal-waste>

tonnages and rate in the tables below please check Annex D. Table 2 presents the baseline recycling projections in tonnes (excluding packaging in scope of DRS).

Table 2 Baseline recycling projections in tonnes (excl. packaging in scope of DRS, including IBA³⁸) in a ‘do-nothing’ scenario – best estimate

Packaging material	2024			2027			2033		
	Recycling, Kt			Recycling, Kt			Recycling, Kt		
	HH	NHM	Other C&I	HH	NHM	Other C&I	HH	NHM	Other C&I
Plastic	565	90	430	704	112	434	732	115	442
Wood	0	137	395	0	136	392	0	133	385
Aluminium	26	2	16	28	2	17	31	3	19
Steel	252	59	106	252	62	106	251	62	106
Paper/Card	1331	1649	1244	1376	2114	1282	1462	2239	1361
Glass	1180	363	-	1180	433	-	1185	431	-
Fibre Based Composite	26	5	-	30	6	-	33	8	-
Total	3380	2305	2192	3570	2865	2231	3694	2991	2312

Table 3 shows the recycling rates under a baseline option which excludes packaging captured by DRS. The removal of DRS materials reduces the total packaging recycling rate, as well as the recycling rate for the relevant material types, as DRS materials tend to be highly recycled compared to other packaging types. The introduction of consistent municipal recycling in England is expected to increase the baseline packaging recycling rate over the appraisal period. The impacts of this policy differ across material types according to the proportion of packaging in scope. For example, the baseline recycling rates for a number of packaging types are expected to increase significantly.

Table 3 Baseline packaging recycling rates (excl. packaging captured by DRS) in a ‘do-nothing’ scenario – best estimate

	2024	2027	2033
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³⁸ Incinerator Bottom Ash – Metal captured for recycling from incinerator waste outputs

	HH	NHM	Other C&I	Total by packaging type	HH	NHM	Other C&I	Total by packaging type	HH	NHM	Other C&I	Total by packaging type
Plastic	42%	23%	95%	51%	52%	29%	95%	57%	53%	29%	95%	58%
Wood	0%	55%	36%	37%	0%	55%	36%	37%	0%	55%	36%	37%
Aluminium	55%	26%	42%	47%	55%	26%	42%	47%	55%	26%	42%	47%
Steel	92%	46%	97%	82%	92%	48%	97%	82%	92%	48%	97%	82%
Paper/Card	82%	70%	95%	81%	82%	87%	95%	88%	82%	87%	95%	88%
Glass	71%	78%	-	75%	72%	93%	-	76%	72%	93%	-	77%
Fibre Based Composite	52%	6%	-	23%	58%	7%	-	26%	59%	8%	-	26%
Total recycling rate	67%	63%	73%	67%	70%	76%	73%	73%	70%	77%	74%	72%

Packaging in residual waste by sector

It is assumed that all non-recycled packaging waste is collected as residual waste and sent to landfill or Energy from Waste (EfW). This is calculated by subtracting the recycling tonnage from the POM tonnage for each material, therefore source and reliability of them can be found in Annex D. The residual figures shown in Table 4 include metal packaging recovered for recycling from Incinerator Bottom Ash (IBA). The amount of packaging collected as residual waste in the baseline is expected to fall over the appraisal period due to the increase in recycled packaging arising from consistent municipal recycling in England.

Table 4 Baseline packaging in residual waste in tonnes - best estimate

Packaging residual	2024			2027			2033		
	Kt			Kt			Kt		
	HH	NHM	Other C&I	HH	NHM	Other C&I	HH	NHM	Other C&I
Plastic	771	297	23	644	278	23	639	282	23
Wood	76	110	714	75	109	708	74	107	695
Aluminium	46	9	30	48	9	32	53	10	36

Steel	87	108	5	87	103	5	86	102	5
Paper/Card	317	703	65	319	307	67	337	326	72
Glass	473	103	0	469	32	0	457	32	0
Fibre Based Composite	24	78	0	22	82	0	23	94	0
Total packaging in residual waste	1769	1407	838	1641	920	836	1646	952	831

EPR OPTION 1: FULL NET COST RECOVERY, MODULATED FEES AND MANDATORY LABELLING

Preferred governance model

The consultation IA included two approaches to administration and governance of EPR, namely an approach with compliance schemes and a scheme administrator, and a single scheme administrator approach (SA). After exploring both options through the consultation, and decisions regarding the scope and approach to EPR overall (in particular the decision to retain the PRN arrangements), the former approach will be taken forward.

Producers will retain the choice to join a compliance scheme, or manage their compliance directly, to meet their overall packaging recycling obligations as under the current system. Compliance schemes would submit their members packaging data to the regulator (and likely support them in reporting data to the SA), take on the legal responsibility for meeting recycling obligations on behalf of their members and for providing evidence to demonstrate that they had met their recycling obligations (through purchasing PRN/PERNs). The cost of this evidence would be paid for by their members.

A SA will be appointed to manage producers' obligations where they are required to make an additional payment towards the Full Net Cost of managing household packaging (including binned packaging waste). The SA will make the necessary arrangements with local authorities (and others as necessary) for the provision of collection and recycling services for household packaging waste and the costs to be paid by producers for these services. They will establish the fee structure (modulated fees) to recover these costs from producers and make payments to local authorities. Producers placing packaging on the market that is expected to end up in household waste will register with the SA (unless they have put in place their own arrangements to collect and recycle household packaging waste).

The Environment Agency and equivalent nation agencies will be responsible for monitoring and enforcing compliance activities on the part of obligated producers.

Mandatory labelling

Based on responses to the consultation, Government have agreed with WRAP on the use of the "recycle now" recycling mark, which producers will be required to include on their packaging alongside relevant text such as

“recyclable” or “not recyclable”. This will enable a standard UK wide label which is already recognisable to many consumers to maximise impact.

All primary packaging types, except for plastic films and flexibles will be required to be labelled as ‘recycle’ or ‘do not recycle’ by 31st March 2026. Plastic films and flexibles will need to be labelled as ‘recycle’ or ‘do not recycle’ by 31st March 2027. The latter deadline is in line with the timelines for introducing kerbside film collections as part of consistent municipal recycling.

Giving businesses until April 2026 to comply with the regulation (but ensuring that the necessary resources and guidance is in place from 2024) will allow businesses time to incorporate the new labelling as part of their business-as-usual re-design processes and hence prevent significant re-design costs associated with this regulation³⁹.

To maximise the effectiveness of this measure, it is proposed that there is not a de minimis— meaning that *all* primary packaging⁴⁰ placed on the market will have to carry a label.

Importers of packaged products will be responsible for ensuring that any packaged products they import for sale in the UK are appropriately labelled. They will therefore need to liaise with their overseas suppliers to ensure that the packaging on the products they import is labelled appropriately. Excluding imported packaging and packaged products from the mandatory requirement would impact on its effectiveness.

De minimis and point of compliance

Under the Packaging Waste Regulations⁴¹, a producer is an ‘obligated’ packaging producer if it, or a group of companies it is part of, handled at least 50 tonnes of packaging materials in the previous calendar year and has a turnover of more than £2 million a year (based on the previous financial year’s accounts)⁴². This threshold is called the ‘de minimis’. Under the same regulations, compliance is shared across the supply chain. This means that all businesses above the de minimis threshold who handle packaging, from raw material manufacturers to those selling packaged products to the final user, as well as importers and service providers, are obligated for a share of the overall recycling obligation. In 2020, 7,255 producers were registered with the regulators.

Under EPR, rather than sharing compliance across the packaging supply chain, there will be a single point of compliance for any individual piece of packaging and for complying with recycling obligations. The obligations will fall mainly on brand owners; a new category of producer expected to cover several of the categories under the current scheme. Several other producer categories will also be obligated to an extent under certain scenarios. Although it is likely that some producers obligated under the current regulations will cease to be obligated with the change to the point of compliance, given that brand owners will include several of the current producer categories, and that requirements will be made on other categories (such as importers) many will retain an obligation. For the

³⁹ Based on guidance from stakeholders, it is expected that the majority of producers redesign their packaging every two years (either to comply with regulatory labelling requirements or for other reasons such as revised requirements related to health/allergens, new aesthetic etc.)

⁴⁰ This is generally the packaging in direct contact with the product. This packaging is mostly likely to be handled by consumers.

⁴¹ <https://www.legislation.gov.uk/uksi/2007/871/contents/made>

⁴² <https://www.gov.uk/guidance/packaging-producer-responsibilities>

purpose of this analysis, and as a cautious assumption, we therefore assume that that this change will not reduce the overall number of obligated producers.

Under EPR a new class of producers will become obligated. This relates to online marketplaces who will become obligated for filled packaging sold on the UK market through their platform/website by businesses based outside the UK. We estimate that this will lead to 46 additional producers being obligated under EPR⁴³. This closes a regulatory loophole whereby overseas packaged products sold through online marketplaces are not captured under the current producer responsibility scheme.

Further to this, the de minimis threshold will be reduced to producers with a turnover of more than £1 million a year and handled at least 25 tonnes of packaging in the previous year. This will bring further producers into obligation and therefore capture more of the packaging placed on the market, in line with the polluter pays principal. Defra commissioned external research to estimate the number of additional firms that would become obligated under various de minimis and point of compliance scenarios⁴⁴. Using data from the National Packaging Waste Database (NPWD)⁴⁵ on the number of producers by turnover, this research used regression analysis to estimate the number of producers below the current de minimis at different turnover levels. This research is discussed further in the Small and Micro Business Assessment. The central estimate from this analysis was that 1,823 additional businesses would become obligated under this de minimis scenario. However, the uncertainty level within the analysis was high, suggesting a range of 0 to 14,808 based on a 90% confidence level. We assumed that the number of producers will grow by 0.2% per year, which is the average growth rate between 2013-2019⁴⁶.

Table 5 Number of obligated packaging producers

	Low	Central	High
Currently obligated producers	7,255	7,255	7,255
Newly obligated producers (online marketplaces)	46	46	46
Newly obligated producers	0	1,823	14,808

⁴³ <https://www.webretailer.com/b/online-marketplaces/> 300,000 monthly site visits were used as the proxy for surpassing the de minimis threshold, as outlined above.

⁴⁴

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20670&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

⁴⁵ <https://npwd.environment-agency.gov.uk/>

⁴⁶ <https://npwd.environment-agency.gov.uk/>

(amended De Minimis)			
Total producers	7,301	9,124	22,109

Projected POM and recycling

Pre-2024 Packaging switches: It is anticipated that producers will switch some packaging to more recyclable materials before, and in anticipation of, the introduction of modulated fees. Based on recommendations by WRAP we have assumed that black plastic PTTs will be phased out completely by 2024 under the EPR option. It is assumed that this packaging will be replaced by non-black versions of the same polymers. In addition to this, it is assumed that 50% of the 2017 tonnage of household PVC and PS PPTs will be replaced by more recyclable polymer alternatives (PET, PP and HPDE) by 2024⁴⁷. These switches are assumed to occur according to a linear trend over this period. The overall tonnage of plastic packaging is not expected to be impacted by these assumptions, rather the composition of plastic polymer types.

As EPR is not the only factor influencing the choices of packaging producers when it comes to the recyclability of plastic packaging, we assume that not all pre-2024 switches will be attributable to EPR. In the central scenario we assume that 50% of these switches⁴⁸, and associated benefits, will be directly because of EPR. The remaining benefits are assumed in the baseline scenario. These switches have a relatively small impact on the overall NPV for this option, with these switches expected to be small in comparison to those from the introduction of EPR in 2024. A more comprehensive description of the assumptions, and impacts of these assumptions (including sensitivity analysis) can be found in annex C.

Modulated fees:

Due to changes in producers' behaviour an increase in packaging recycling rates is expected from the introduction of modulated fees. Initially, modulated fees will apply to primary packaging⁴⁹ and some secondary packaging⁵⁰ which could end up in household waste. This may therefore include some waste ending up in business waste. Then, in later years, producers will be able to provide evidence of any such packaging which will not end up in household waste. The analysis in this impact assessment assumes that modulated fees are applied to household packaging

⁴⁷ Based on discussion with WRAP

⁴⁸ This is an arbitrary assumption due to limited evidence. The impact of this assumption on the costs and benefits of this analysis are outlined in Annex C.

⁴⁹ Primary packaging: This is generally the packaging in direct contact with the product. This packaging is mostly likely to be handled by consumers.

⁵⁰ Secondary packaging: This is additional packaging used with a product. This could be for purposes such as marketing/branding, extra protection or combining products sold in multipacks. Some secondary packaging is handled by consumers, but some may be retained and disposed of by the point of sale.

only. Within this analysis, modulated fees will therefore only have an impact on household packaging. In reality there may be some spill over into NHM/household-like packaging recycling rates.

Defra commissioned Eunomia to analyse and make recommendations on the logistics of both a modulated fees and deposit based EPR scheme⁵¹. Based on the findings of this study and following consultation with stakeholders, modulated fees were considered the more pragmatic and effective approach, so a deposit based EPR scheme for packaging is no longer being considered.

A further objective of Eunomia's work was to suggest indicative fee levels and appraise the likely impacts of a modulated fees approach on producers. This included considering the impact of modulated fees on producers' behaviour in terms of packaging placed on the market. As part of this work Eunomia developed a model to provide indicative fee rates for several packaging types and assessed the potential impact of these fees on producer behaviour and on packaging recycling rates. Defra have further adapted this model to quantify indicative impacts of modulated fees for this analysis.

The Eunomia model includes options for how fees can be adjusted or modulated. However, all the options are based on modulating by recyclability, with the recycling rate of the packaging material used to measure recyclability⁵². Alternative approaches to measuring recyclability are discussed in Eunomia's report, however using the recycling rate was considered the most suitable method for this analysis based on the data available.

It should be noted that the options explored by Eunomia and included in this analysis are for illustrative purposes and do not imply a preferred mechanism on the part of Government for modulating fees. Indeed, implementing Eunomia's preferred approach may not be technically or economically feasible, *at least at present* due to a lack of recycling rate data for individual packaging materials and formats. Recyclability is one of several possible factors which could be used, alone or in combination, to modulate fees. The preferred mechanism for modulating fees will ultimately be a decision for the Scheme Administrator. Further details on the modelling approach, as well as sensitivity analysis are in Annex K.

Mandatory labelling: Mandatory labels will have a positive impact on the recycling rates of packaging. A study carried out by WRAP and Boots⁵³⁵⁴ in 2019 found that when a sticker was added to a bottle of shower gel to indicate that it was recyclable, the proportion of consumers who said that they recycled their product increased by 3% points (from 87% to 90%).

51

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20310&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

52 This is a simplifying assumption based on the available data. Although in many instances, recycling rate will correlate with recyclability, there will be some instances where this does not apply.

53

<https://wrap.org.uk/resources/report/pack-labelling-and-citizen-recycling-behaviour>

54 Recycle Now oversaw the analysis and reporting of the trial. The trial sample was not representative of the general population, so the observed differences in behaviour amongst trial participants should be treated with caution and may not replicate the behavioural response from the wider population.

The research split the sample of 4,000 trial participants in half, with one group receiving a non-labelled bottle and the other half receiving a labelled bottle. Within each group of 2,000 participants, half were asked about their 'disposal of bathroom items' at the recruitment stage of the process (these were the primed participants).

Once they had finished the shower gel, participants were invited to complete an online questionnaire which asked Boots' standard questions seeking their views of the product, as well as questions about how they disposed of the empty bottle. The key results of the survey are outlined in Table 6.

Table 6 Labelling Survey Results

	With sticker (primed)	With sticker (unprimed)	No sticker (primed)	No sticker (unprimed)
Recycling rate	90%	92%	87%	84%

To model the benefits associated with mandatory recyclability labelling, we have taken the percentage point difference from 'No sticker (primed)' (87% recycling rate) and 'With sticker (primed)' (90% recycling rate), 3% points, and applied it to the recycling rate of all recyclable packaging materials (this is assumed to be all packaging in scope of consistent recycling in England⁵⁵). We chose to use the evidence from the primed participants as we wanted to include a conservative estimate of the associated benefits – the 'primed participants' declared a lower change in recycling rate between with/without the label. It is worth noting that the Boots study was based on a small sample and the outcome may not be very reliable e.g., different materials may be more/less sensitive to a recyclability label.

To improve this analysis, we consulted with representatives from the CITEO⁵⁶, who run a French EPR scheme, who had already overseen labelling reforms in France. Despite these discussions, there was insufficient robust data on the French Triman Scheme available to incorporate into our analysis.

Labelling and Modulated Fees impact:

The joint impact of modulated fees and labelling is shown in Table 7. All material types are expected to see some increase in recycling due to increases in collection and over time a shift to easier to recycle materials. Based on the modelling described in the previous sections, modulated fees and labelling are estimated to increase the municipal (Household and NHM) recycling rate of packaging by around five percentage points (from 72% to 77%⁵⁷) above the baseline level by 2033. As non-municipal and transit packaging is out of scope of modulated fees and labelling, it is assumed that there will be no impact on the recycling rate of this packaging. Taking this into account, the impact on the overall packaging recycling rate is a four percentage points increase on the baseline by 2032 (72% to 76%).

⁵⁵ https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/supporting_documents/Consistency%20in%20recycling%20impact%20assessment.pdf

⁵⁶ <https://www.citeo.com/>

⁵⁷ May be lower than the percentage point rise due to rounding.

These impacts are in addition to the positive impact of consistent municipal recycling on the packaging recycling rate which are captured in the baseline.

Table 7 Joint impact of modulated fees and labelling on recycling rates for packaging in scope of EPR (excludes packaging in scope of DRS)

Recycling Rate 2033	Baseline				Option 1			
	HH	NHM	Total Municipal (HH + NHM)	Total (incl. other C&I)	HH	NHM	Total Municipal (HH + NHM)	Total (incl. other C&I)
Plastic	53%	29%	48%	58%	61%	32%	54%	63%
Wood	0%	55%	42%	37%	0%	55%	42%	37%
Aluminium	55%	26%	51%	47%	57%	28%	53%	48%
Steel	92%	48%	78%	82%	96%	50%	82%	85%
Paper/Card	82%	87%	85%	88%	85%	90%	88%	90%
Glass	72%	93%	77%	77%	82%	94%	84%	84%
Fibre Based Composite	59%	8%	26%	26%	88%	11%	38%	38%
Total recycling	70%	77%	72%	72%	76%	79%	77%	76%

It is estimated that there will be 9,420kt of packaging recycling in 2033 under the EPR option which contrasts with the baseline estimate of 8,997kt. This equates to 423kt of additional recycling per year by 2033.

Table 8 Recycling packaging (in tonnes) in 2033 under the baseline and option one

Recycling Tonnage Kt (2033)	Baseline			Option 1		
	HH	NHM	Total (incl. other C&I)	HH	NHM	Total (incl. other C&I)
Plastic	732	115	1289	833	128	1403
Wood	0	133	518	0	133	518
Aluminium	31	3	52	31	3	53

Steel	251	62	419	264	64	434
Paper/Card	1462	2239	5062	1503	2313	5177
Glass	1185	431	1616	1341	433	1774
Fibre Based Composite	33	8	41	49	11	60
Total recycling	3694	2991	8997	4022	3086	9420

COSTS AND BENEFITS

This section is structured as follows:

- Costs
 - Monetised
 - Costs to producers
 - Producer Compliance costs
 - Cost of purchasing PRNs
 - Full Net Cost of Household Packaging Waste Collection and Management
 - HWRC Packaging costs
 - Binned packaging waste
 - Data reporting costs
 - Familiarisation costs
 - Monitoring and Enforcement costs
 - Scheme Administrator Costs
 - IT Investment costs
 - Communications campaigns
 - Complying with Mandatory Labelling Scheme
 - Labelling redesign
 - Packaging technologist
 - Familiarisation costs
 - Costs to Material Facilities
 - Capital costs
 - Operational costs
 - Familiarisation costs
 - Enforcement costs
 - Costs to Reprocessors
 - Accreditation costs
 - Mandatory reporting costs
 - Familiarisation costs
 - Enforcement costs
 - Costs to the Public Sector
 - Loss of landfill tax
 - IT investment costs
- Benefits
 - Monetised
 - Public sector benefits
 - Household Packaging Waste Collections and Management cost saving

- HWRC savings
 - Binned waste savings
 - Benefits to producers
 - Household collection efficiency savings
 - Benefits to reprocessors
 - Secondary market material revenue
 - Benefits to society
 - Greenhouse gas savings
- Non-monetised benefits

COSTS

Producer compliance costs

Producers will continue to be required to purchase evidence of meeting recycling obligations on all packaging. Producers placing packaging on the market likely to end up being collected from households or as binned packaging waste, will be charged an additional fee (on top of payments to purchase PRN/PERNs) to bring their payment up to the Full Net cost (FNC) of collection and end-of-life management for household packaging⁵⁸. This will cover the packaging element of kerbside collections, Household Waste and Recycling Centres (HWRC) and bring sites, and Local Authority bin litter payments. In addition to this, producers will be required to make payments to cover regulator costs as well as administrative costs relating to the scheme administrator.

Under EPR packaging producers will face the following costs:

- The cost of purchasing evidence (PRN/PERNs) to meet recycling obligations for all packaging
- If obligated, an additional fee to cover the full net cost of household packaging collections (kerbside, HWRC and bring site) and binned packaging waste
- The cost of reporting packaging data to the Scheme Administrator and Regulator
- Fees to cover Regulator costs
- If obligated, costs to cover the running of the Scheme Administrator
- Familiarisation costs

Cost of purchasing PRN/PERNs

Producers will continue to be required to purchase PRN/PERNs to demonstrate compliance with their recycling obligations. We assume that these costs will be largely the same under the baseline as under option 1 and therefore there is no *additional* cost to producers⁵⁹. As such these costs do not contribute to the Net Present Value estimations, however, have been presented in the IA as they make up the final cost to producers under EPR. To estimate these costs, we have used historic data on PRN prices and multiplied these by the estimated tonnage of recycling by accredited reprocessors. We do not attempt to forecast future PRN prices, rather assume that the price

⁵⁸ More details on how this is expected to work are in Annex F

⁵⁹ Although lowering the de minimis will bring more tonnage into obligation, under the reformed system there will be more recycled packaging which should lead to more availability of PRNs. For simplicity, we have assumed that these factors will balance out and that producers will pay the same amount overall on PRNs after the reforms. This amount will be spread over more producers. More detailed analysis of the impact of the reforms on PRN prices will accompany the consultation to amend the PRN system.

of the PRN will remain at their highest over the past 3 years. As the PRN price for most materials spiked and then fell over this period, this is seen as a cautiously high estimate. It is assumed that producers use compliance schemes to meet their recycling obligations⁶⁰ who charge an additional purchase fee of £1 per PRN purchased. More details on these costs are in Annex F.

Table 9 PRN Costs to producers, £m

	Baseline and Option 1		
	2024	2027	2033
PRN Costs	£325	£359	£369
PRN Procurement Costs	£8	£8	£9
Total	£333	£367	£378

Household packaging kerbside collection-and-end of life treatment (residual and recycling)

As in the consultation IA, HH collection and end-of-life treatment costs are taken from WRAP modelling also used in the consistent municipal recycling IA.

Recycling costs are for the packaging proportion of dry recycling collections and are net of primary material revenues. It is assumed that consistent municipal recycling is in place and costs are modelled on this basis.

The consistent recycling option is presented as:

- Multi-stream – or twin-stream for LA's unable to change pre-2024
- Plastic film collections

Costs under EPR have been calculated by applying an estimate of the proportion of packaging in household recycling streams to the overall dry recyclables costs. For example, in 2024, WRAP's model⁶¹ estimates that LAs net collection and treatment costs of optimised collection in England would be £1,025m for all dry recyclables. WRAP estimates that packaging materials could represent around 78.7% of total volume when partially compacted by collection trucks, or 65.3% by weight⁶². Thus, packaging recycling costs are modelled to be around £686m in 2024 for England's LAs using the former estimate.

These cost estimates are higher than those included in the consultation IA. This is partly due to the addition of packaging materials to the core set to be collected for recycling, such as food and drink cartons, other types of metal packaging in addition to cans, and plastic film. The increase in tonnage relating to the inclusion of these additional materials in recycling collections is captured in Table 10.

Table 10 Tonnes contributed by inclusion of additional materials (England)

	Food & Drink Cartons		Plastic Film
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⁶⁰ In 2020 94% of obligated producers used a compliance scheme. <https://npwd.environment-agency.gov.uk/>

⁶¹ WRAP Routemap modelling, unpublished

⁶² Some aspects of the costs are calculated by weight and some by partially compacted volume.

		Other Metal Packaging	
Kt	27,028	9,284	83,693
% increase in tonnage	0.8%	0.3%	2.6%

Furthermore, WRAP estimates that operational costs will face upward inflationary pressure due to a combination of the new regulatory requirements and supply-side frictions. To comply with consistent municipal recycling requirements, it is expected that waste collectors will need to invest in additional capital items – notably haulage vehicles. Moreover, supply-side pressures – driven by a combination of the UK leaving the EU and Covid-19 induced backlogs – are estimated to push costs further upwards⁶³.

Similarly, residual costs are determined by applying the estimated proportion of packaging in residual waste (17.8%)⁶⁴ to WRAP's total modelled residual waste costs (1.5bn in 2024). Applying this proportion gives an estimated cost of £242m in 2024. These costs are inclusive of the landfill tax and average gate fees for residual waste treatment.

Table 11 Collection and end-of-life treatment costs by Nation, £m

		2024	2027	2033
Recycling	England	£686	£743	£768
	Northern Ireland	£20	£21	£22
	Scotland	£33	£36	£37
	Wales	£47	£48	£49
	Total	£786	£848	£876
Residual	England	£242	£220	£220
	Northern Ireland	£15	£13	£13
	Scotland	£46	£42	£42
	Wales	£9	£9	£9
	Total	£312	£284	£284
Total	England	£928	£962	£988
	Northern Ireland	£34	£35	£36
	Scotland	£79	£78	£79
	Wales	£57	£56	£57
	Total	£1098	£1131	£1160

⁶³ For example, based on the engagement with Industry, WRAP estimate that vehicle costs have risen by around 20-28% since the previous IA analysis.

⁶⁴ WRAP, 2019, Bristol, National Household Waste Composition 2017, prepared by Eunomia Research & Consulting Ltd

Within the consultation IA, England estimates were scaled up to estimate total UK costs. Since, analysts from the Devolved Authorities have worked with WRAP and Defra to estimate specific costs for each Nation. These costs therefore take account of specific regional differences in collection costs (for example geography). Details on how these were incorporated are set out in Annex K.

Net recycling costs are also expected to increase over the appraisal period. This is partly due to increased amounts of packaging diverted from residual to recycling⁶⁵, as well as estimated increases in the amount of packaging placed on the market over time⁶⁶. In contrast residual treatment costs are expected to reduce over the appraisal period due to lower tonnages sent to landfill and EfW. The overall impact on collection costs is an increase in costs over time, which is largely explained by predicted increases to the number of households and packaging placed on the market tonnages over time. Overall, it is expected that costs will be lower under this option than under the baseline due to additional residual packaging diverted to recycling due to modulated fees and mandatory labelling. This saving to producers is discussed in the benefits section. Sensitivity analysis showing the impact of DRS and consistent recycling in England on collection costs is included in Annex M.

Household Waste and Recycling Centre (HWRC) packaging costs

As per above, Household Waste and Recycling Centre (HWRC) costs are based on the WRAP modelling for the optimised collection option as outlined in the consistent recycling IA. WRAP's projected HWRC costs (£35 m in 2024 in England) were uplifted by 1.22⁶⁷ to determine the total UK cost (£43m).

There are savings incurred by producers for the diversion of household packaging waste from residual to recycling collection. This can be explained by the fact that the unit cost of HWRC residual is greater than the corresponding recycling value, and therefore the reduction in collection of residual tonnages more than offsets the increase in costs associated with higher recycling rates. Total costs are illustrated in Table 12. These represent a transfer of costs from LA's to obligated producers.

Table 12: Total cost of HWRC collections – best estimate, £m

	2024	2027	2033
Residual	£26.2	£25.8	£25.3
Recycling	£17.0	£17.2	£17.6
Total	£43.2	£43.1	£42.9

⁶⁵ From consistent recycling in England, as described in the baseline section, and from EPR, as modelled for this analysis and described in background section of this chapter.

⁶⁶ <https://wrap.org.uk/resources/report/packflow-covid-19-reports>; For example, the pack flow reports assume some drop in packaging tonnages as a result of covid-19 restrictions, returning to pre-covid growth trends by 2022.

⁶⁷ WRAP, 2019, Bristol, National Household Waste Composition 2017, prepared by Eunomia Research & Consulting Ltd; England proportion of UK packaging waste

Binned packaging waste clean-up costs

Following the 2021 consultation, the Government intends to include binned packaging waste in the definition of “full net costs”.. These costs to be borne by obligated producers from 2024 onwards.

Eunomia undertook a research project⁶⁸ that provided a quantitative estimate of the costs of binned and littered packaging clean-up across England, Scotland⁶⁹ and Wales⁷⁰. This project was commissioned to improve the evidence basis and understanding of the costs of managing littered packaging to inform policy decisions regarding the inclusion of litter and binned packaging management costs as part of costs to be recovered from producers. Further detail is provided in annex H.

According to the report, total street cleaning costs borne by UK primary local authority Street Cleansing Departments and Other Duty Bodies⁷¹ was £932m per year, of which approximately £662 million was litter and binned waste clean-up cost. It is estimated that packaging accounted for 35% of the total modelled cost. This reflects that although packaging makes up a majority of litter by volume (~85%), when count (~42%) and weight (~40%) are used to attribute cost for different components of litter provision, this brings the relative contribution down; as staff time for ground litter is the largest fraction of cost (attributed on the basis of count) this leads to count-based units influencing the percentage attribution more than the other units. After removing clean-up costs attributed to packaging in scope of DRS scheme⁷², litter and binned waste clean-up costs attributed to EPR packaging amount to £212m⁷³ per year. Of this, 35% is related to binned waste. This is £74m per year.

When this report was produced it was assumed that an ‘All-in’ DRS would be implemented across all DAs. This has meant that *all* glass, metal and plastic beverage containers have been removed from the total cost estimates. As England and Northern Ireland are expected to implement an ‘All-in no glass’ DRS, this means that binned glass beverage containers will in fact be in scope of EPR. Defra have adjusted this estimate to include glass binned packaging waste in England and Northern Ireland leading to an estimate of **£98.1m**. This was done first by taking Eunomia’s estimate of the total UK⁷⁴ wide cost of dealing with DRS packaging materials as binned waste, removing the component of the cost associated with non-glass materials from the estimate, and then scaling down by the population of England and NI relative to the whole UK.

In order to extract the component of cost associated with glass from Eunomia’s estimate we have estimated what proportion, out of all the DRS packaging used to calculate cost by Eunomia, is glass. Eunomia have included in their DRS cost estimate all beverage containers made out of glass, metal or plastic so the proportion of glass relative to

⁶⁸ <https://wrap.org.uk/sites/default/files/2021-03/WRAP-eunomia-financial-cost-of-packaging-litter-phase-2-2021.pdf>

⁶⁹ Scotland’s Litter Problem report done by Eunomia and formed the basis of this analysis <https://www.zerowastescotland.org.uk/litter-flytipping/scotlands-problem>

⁷⁰ The contractors were unable to speak with any Northern Ireland local authorities due to time constraints.

⁷¹ ‘Primary LA street cleansing departments’ are street cleaning departments responsible for the majority of bin emptying, street sweeping etc. They are different from other departments who may have litter clearing within their remit, for example Parks or Highways. Beside LAs, other bodies (referred to as ‘Other Duty Bodies’) have a duty to remove litter. These are called litter authorities in the legislation and include schools for example.

⁷² These are covered in the DRS impact assessment

⁷³ This includes costs associated with collection and disposal of composite fibre litter (£43m) which are included in the overall baseline costs. The methodology for calculating such is explained further under *EPR Option 2*.

⁷⁴ <https://wrap.org.uk/sites/default/files/2021-03/WRAP-eunomia-financial-cost-of-packaging-litter-phase-2-2021.pdf>

the total of all of these packaging types is the relevant metric. This proportion can be calculated in a number of different ways due to the fact that there are a number of different ways in which we can measure packaging waste. For example, we could look at the proportion of glass weight relative to total weight of all these material types or alternatively we could look at the count of these items..

The different components of total binned waste cost (e.g. disposal, people) are calculated by Eunomia based on different measurements of packaging waste units. For example, the disposal component of binned waste cost is calculated using a weight based measure of packaging waste while the component associated with people is calculated using a volume approach.⁷⁵ To be as accurate as possible we have calculated glass proportions based on each different measurement unit (count, volume and weight⁷⁶) and then adjusted each component's cost down using the proportion calculated from the same measurement unit as was used for that component's cost calculation.

Producer data reporting costs

Under the current system, producers generally hire the services of compliance schemes⁷⁷, who take on their legal obligation to meet recycling targets. Compliance schemes will also provide data reporting services, whereby they take raw data from the producer and do all necessary calculations and formatting to report placed on the market data to the regulator. Producers are required to report packaging data by the six main packaging categories⁷⁸.

Under the reformed system, producers will still be required to report placed on the market data, however those obligated to make additional FNC payments to cover household collections will need to provide significantly more granular data. This will ensure the Scheme Administrator can accurately calculate their additional FNC fee based on modulated fees. Therefore, the number of packaging categories they need to report on will increase significantly. Producers only required to purchase recycling evidence, and those required to make an additional payment for household packaging collections, will be able to report data via the same portal, however, as stated, the latter will need to report at a higher granularity.

Compliance schemes will still be able to take on the legal obligation for meeting recycling targets (and purchasing recycling evidence), including data reporting, on behalf of producers but will not have a statutory role in meeting additional obligations under FNC. Producers required to pay FNC payments may still find it beneficial to hire the services of compliance schemes to collate their data for reporting, however, will retain the legal responsibility for the accuracy of this data. For the analysis in this IA, we assume that producers will continue to pay compliance schemes to collate and report the necessary data for both elements of their obligation.

⁷⁵ <https://wrap.org.uk/sites/default/files/2021-03/WRAP-eunomia-financial-cost-of-packaging-litter-phase-2-2021.pdf>

⁷⁶ Count and Volume were estimated using <https://www.keepbritaintidy.org/sites/default/files/resources/20200330%20KBT%20Litter%20Composition%20Report%20-%20FINAL.pdf>; and Weight was calculated using DRS POM tonnages as set out in Annex E

⁷⁷ For example, in 2020 94% of obligated producers used a compliance scheme (<https://npwd.environment-agency.gov.uk/Public/PublicSummaryData.aspx>).

⁷⁸ Plastic, Paper/Card, Aluminium, Steel, Glass, Wood

Generally, compliance schemes will charge a membership fee which allows them access compliance services. Some schemes charge a fee comprising only of membership, with additional services acquired on top, whereas others will charge a higher fee, which includes a more comprehensive service. Based on discussions with industry experts as well as compliance schemes, we have assumed an average membership fee (including data reporting services) of £1,500 per producer. This is multiplied by the number of obligated producers in each year to estimate the total data reporting costs for producers under the baseline.

To gather evidence on the costs of providing these services under a reformed scheme we spoke to industry stakeholders, including compliance schemes. Further information was taken from stakeholder engagement as part of the second EPR consultation. Although compliance schemes were able to provide us with information such as the number of hours/days they spend on the average producer, the additional time taken to help newly obligated producers and the rates they charge, much of this information is sensitive. We have therefore used a range of aggregated estimates for these costs and have not named the stakeholders spoken too. Together, the stakeholders spoken to are considered representative of the industry.

Stakeholders generally felt that requirements to report data towards household FNC payments would be sufficiently different to reporting data for estimating recycling targets that this would be the equivalent of at least the same costs again. In other words, producers would need to pay at least a further £1,500 to account for the new requirements.

We have therefore assumed that producers will be charged a combined £3,000 by compliance schemes on average for data reporting. To account for uncertainty, we have also included a high estimate of £4,000 per producers for data reporting costs.

To calculate the total data reporting costs for producers under EPR, these costs are multiplied by the number of producers (9,124), which includes newly obligated online marketplaces and producers newly obligated through lowering the de minimis.

Table 13: Total cost of data reporting for producers, £m

	Baseline			Option 1		
	2024	2027	2033	2024	2027	2033
Data Reporting Costs	£10.90	£10.95	£11.05	£27.41	£27.54	£27.80

Familiarisation costs

It is assumed that costs for newly obligated producers would be higher initially as they would need to become familiar with the requirements. Compliance Schemes we spoke to suggested that it could take an extra day (8 hours) of work to help a new producer to understand their obligations. Compliance Schemes could charge anywhere from £600-£1000 per day to provide this advice. The mid-point of this range (£800) is used for the central estimate. This additional cost is assumed to only occur in the first year of EPR.

Table 14: Familiarisation costs to producers, £m

	2024
Familiarisation costs	£1.50

Regulator costs

Currently, producers are required to pay a registration fee to the regulator to cover the costs to the regulator of compliance monitoring the scheme. The current regulator fee is dependent on the size of the producer and whether they register directly or via a compliance scheme. For direct registrants the fee is £772 or £562 for small producers. For producers using a compliance scheme the fee is £564 or £345 for small producers⁷⁹. These fees are multiplied by the number of obligated producers to estimate the compliance monitoring costs. As 94% of producers use a compliance scheme, £564 has been used for the analysis.

The producer fees under the current system have not been changed since amendments in 2007 and are now out of step with current costs, it is therefore not appropriate to use these fees as an estimate under the reformed system. A reformed system will need more detailed data sets and may require the development of protocols and assessment of methodologies by regulators which will impact the type and level of fees charged. We therefore expect there to be a material difference in the level of fees charged by regulators. Under the reformed system producers may have differing obligations and therefore a single regulator fee may not be appropriate, fees more reflective of the level of monitoring may be necessary.

A more robust costing exercise will need to be undertaken by Regulators, however they have conducted some modelling for this IA. Current indications through their modelling estimate regulator fees for producers to fall on average between £1,000 and £1,500 per producer. We have therefore used this range to estimate costs, with the mid-point of £1250 as the central estimate.

Table 15: Regulator costs, £m

	Baseline			Option 1		
	2024	2027	2033	2024	2027	2033
Regulator Fee	£4.10	£4.10	£4.11	£11.42	£11.44	£11.46

Scheme administrator costs

The costs provided in this section are based on advice by Valpak and WRAP. Analysis by Valpak on the costs involved in administering an EPR scheme are based on their experience of supporting the delivery of producer responsibility for packaging through their compliance scheme. The WRAP analysis was developed with guidance from Defra and was informed by their experience of managing UK-wide voluntary schemes on behalf of producers. These have been updated since the previous IA to reflect final policy decisions. For example, the number of staff FTEs has been updated to reflect the additional producers in scope due to amendments to the de minimis threshold. This is balanced out by changes in scope to FNC which, initially, is not expected to include payments to cover packaging collected from businesses.

⁷⁹ <https://www.gov.uk/guidance/packaging-producer-responsibilities>

The costs below do not include costs to producers of using compliance schemes were discussed previously.

Staff costs:

It is assumed that the central administrative body will need to employ 201 FTEs⁸⁰. The roles assumed to be required include account managers, technical specialists, analysts, financial professionals, admin, management, HR, audit, marketing, communications and IT staff. For the purposes of this assessment each staff member is assumed to cost the scheme administrator £45,800⁸¹. We have applied a 2% annual wage growth rate to this salary each year to 2033.

Table 16 staff costs of governance model, £m

	2024	2027	2033
Staff Costs	£11.2	£11.9	£13.4

Office costs:

Office costs expected to be required include: the cost of a premises, ground rent, utility bills, security, cleaning and maintenance. The office costs are set out in Table 17 and have been estimated based on internal analysis of commercially sensitive data provided by Valpak. These are expected to stay constant each year during the appraisal period.

Table 17 – Annual office costs for each scheme, £m

	Per year
Cost of premises	£0.17
Ground Rent / Rates / Utilities	£0.41
Security / Cleaning / Maintenance	£0.46
Office Costs	£0.16
Total	£1.20

Source: Valpak modelling, adjusted by Defra based on number of employees

Admin costs

The admin costs are set out in Table 18 and are also based on internal modelling using confidential data. These are expected to stay constant each year during the appraisal period.

Table 18 – Annual admin costs for each scheme, £m

	Per year
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⁸⁰ "What is a likely cost for an EPR Scheme Administrator?" WRAP (unpublished), estimate that an EPR Scheme Administrator would need 165 FTEs. This was however, based on the assumption that the number of producers in scope would remain the same as under the current system. We assume that lowering the de minimis could increase the number of producers by 26% and have therefore upscaled the number of FTEs estimated to be working on producer related activities by this amount.

⁸¹ This salary was provided by Valpak and has been uplifted by 22% to account for non-wage labour costs

Audit & Tax	£0.34
Legal	£0.12
Insurance	£0.38
Other Professional Fees	£0.27
Other	£0.50
Total	£1.61

Source: Valpak modelling, adjusted by Defra based on number of employees

Set Up Costs

Based on estimates by WRAP⁸², and then adjusted by Defra based on the estimated number of staff numbers, an additional £1.2m set up costs are included in the analysis. These are assumed to occur in 2023.

Total Costs

The total administrative costs for both options are presented in Table 19 below.

Table 19 – Total costs for SA, £m

	2024	2027	2033
Total SA Admin Costs	£14.04	£14.80	£16.30

Running cost for IT system

New IT systems are required to facilitate the running of EPR scheme. These IT systems will be required for a number of functions including reporting of the packaging placed on the market, charging producers, and making the necessary payments from scheme administrators to LAs. Once the IT systems have been developed, the costs of running the IT system will be borne by the scheme administrator (with the costs ultimately passed on to producers). Since the consultation IA, further work has been done by Defra's Data, Digital and Technology Services (DDTS) team estimate the ongoing costs.

Table 20 – IT system cost per year, £m

£m	2024	2027	2033
IT system costs	£2.88	£2.88	£2.88

Communication campaigns

⁸² "What is a likely cost for an EPR Scheme Administrator?" WRAP (unpublished), assume around £950k of set up costs including £350k for interim HR/Recruitment and £600k for office fit.

The SA will be able to charge producers for national communication campaigns to maximise packaging collected for recycling from households and businesses. It ultimately will be for the Scheme Administrator in conjunction with its producer members to determine how much they wish to spend on national communications campaigns in England, Northern Ireland, Scotland and Wales. However, for the purpose of this IA cost estimates have been included based on WRAP's analysis⁸³.

WRAP estimate producing national guidance and one to one business support could cost around £49.6m, of which around 80% of the cost relates to dry recycling materials. Only costs relating to dry recycling materials are included in the IA. Under the central option we assume that these costs would cease after all businesses are complying with consistency regulations. However, WRAP have suggested that they could continue at a lower cost after 2027 (which we have included in our high estimate). Our low option assumes a lighter touch version of the central estimate, which supports less businesses. Ultimately it will be up to the Scheme Administrator to decide how best to conduct communication campaigns and how much to spend.

Table 21 – Business communications campaigns, £m

	2024	2027	2033
Low	£39.6	£39.6	£19.9
Central	£39.6	£39.6	£0.0
High	£19.8	£19.8	£0.0

Costs to producers of complying with mandatory labelling

Packaging technologist cost

It is expected that businesses placing packaging and packaged items on the market will have to pay for additional 'packaging technologist' services⁸⁴ to support their compliance with new labelling requirements.

For the purposes of this analysis, we have assumed that this cost will be a one-off payment, borne by all producers obligated to comply with the packaging producer responsibility *labelling* regulations (12,934 businesses⁸⁵). Specialist technologist services will be required to:

- Offer advice on the recyclability of different packaging materials and formats.
- Support the redesigning of packaging to improve recyclability.

We have estimated the increased costs per business for packaging technologist services for different types of business, as shown below:

⁸³ Unpublished WRAP analysis

⁸⁴ Packaging technologists are responsible for the design and manufacture of packaging.

⁸⁵ The assumptions behind this figure are outlined in Annex G.

- Non-food retailer, with 90,000 Stock Keeping Units (SKUs) (£2,362,500)
- Supermarket, with 12,000 'own brand' SKUs (£315,000)
- Large brand, with 500 SKUs (£13,125)
- Small brand, with less than 15 SKUs (£788)

These are the best estimates based on discussions with stakeholders. However, due to the varied nature of different businesses these costs will in reality differ significantly for each business – i.e. two supermarkets will face different costs dependent on the number of SKUs they place on the market and their business operations. The following broad assumptions were used to estimate these figures. Each technologist is assumed to have the capacity to review 1200 (SKUs)/year⁸⁶. The packaging specification technologist salary costs are estimated to amount to £28k-£35k/year⁸⁷. To work out the cost per business, the mid-point of this salary range was taken and the cost per SKU calculated (£26.25). This was then scaled up to the number of SKUs within each business type. The number of SKU's placed on the market by business type was derived during stakeholder engagement. These costings factor in overhead costs, based on discussions with RPC.

For small brands, a slightly different approach was taken. We assumed that the cost per SKU will be higher due to small brands being more likely to rely on external agencies to help them to comply due to their buying power not expected to be strong and they are unlikely to have internal expert resource. We expect that this will double their costs relative to larger businesses from £26.25/SKU to £52.50/SKU⁸⁸.

The total expenditure on packaging technologists is expected to amount to £91m during the transition period (2024-2025) - all SKU's will be reviewed during this period. The majority of these costs will occur in 2024 and 2025 to meet the introduction of regulations for most packaging types by the end of March 2026, however as producers will have an additional year to comply with regulations for plastic film packaging, some costs are expected to occur in 2026.

Table 22 – Central estimate, packaging technologist costs⁸⁹, £m

	2024	2025	2026
Packaging Technologist Costs	£42.9	£42.9	£5.5

Labelling design costs

Based on guidance from stakeholders, it is expected that most producers redesign their packaging every two years either to comply with other regulatory labelling requirements or for other reasons (revised requirements related to health/allergens, new aesthetic etc). Consultation responses suggested that three years would be needed to implement mandatory labelling from when the Scheme Administrator is in place. Assuming an SA is in place in 2022, this should give enough time for producers to incorporate these requirements into their wider redesign plans.

⁸⁶ Assumption based on stakeholder engagement

⁸⁷ £34,000 - £43,000 including overhead costs at 22% - salaries based on stakeholder engagement

⁸⁸ Based on discussions with stakeholders including WRAP and OPRL.

⁸⁹ Overheads at 22% were applied to the salary costs to determine the total packaging technologist cost to businesses.

Training costs

It is assumed that labelling will require all businesses to spend time training their staff on the packaging regulations. This could be either online or face-to-face training.

For small/large brands, we have assumed 3 FTE days per year to train new staff/keep up to date with any rule/process changes⁹⁰. For Supermarkets/Non-food retailers, we have assumed 5 FTE days⁹¹. These estimates have previously been approved by OPRL⁹². The wage we have assumed for this cost is the median hourly wage of 'advertising and market research' as reported by the ONS in 2020 we have then increased this to a 2024 wage level (assuming a 2%/annum wage increase) and then added overheads at a rate of 22% (£19.25/hour)⁹³ - resulting in a total cost of 1 FTE equal to £221. A 2% wage growth is applied each year from 2024.

The costs summarised in Table 23 are net of the training costs expected to occur in the baseline which accounts for the costs of training staff to comply with OPRL rules for those who currently already use the recycle now mark. These costs are summarised in Annex G.

Table 23 - Total estimated training costs (2024-2033), £m

	2024	2027	2033
Baseline	£0.48	£0.60	£0.72
Option 1	£7.34	£7.39	£7.55
Additional Costs	£6.86	£6.80	£6.83

Costs to Material Facilities

For EPR to be implemented, appropriate data on the flow of packaging through the waste system needs to be collected. Data is needed for the calculation and setting of targets, fees, and payments, as well as monitoring compliance of the scheme. Once collected from households and businesses, dry recyclate (which is majority packaging⁹⁴) is generally taken to a material facility, often a transfer station or Material Recovery Facility (MRF) to be bulked⁹⁵ and/or sorted before being sent to a reprocessor and/or exported. As these are often the first point at

⁹⁰ We expect this to be a reasonable estimate based on the size of the regulatory change and the number of different workers that may need to undertake training.

⁹¹ As above.

⁹² OPRL are non-for-profit organisation specialising in on-pack recycling labels

⁹³ <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datalist?uri=employmentandlabourmarket/peopleinwork/earningsandworkinghours/datalist&filter=datasets&page=2> (Earnings and hours worked, UK region by industry by two-digit SIC: ASHE Table 5)

⁹⁴ For example, 65% of dry recyclate collected from households by weight is estimated to be packaging; <https://wrap.org.uk/resources/report/quantifying-composition-municipal-waste>

⁹⁵ Waste is combined and compressed to be transported onwards for further processing, disposal or recycling.

which packaging waste is bulked or consolidated with similar waste from other sources, this is a key point at which data collection is needed.

For EPR purposes, any such site considered to be a First Point of Consolidation (FPoC) will be required to sample input material, and where undertaking a sorting process into target material streams, output sampling. A site will be considered a FPoC if it receives packaging waste directly from multiple waste collectors, that undertakes the first weighing, consolidation/bulking and/or sorting of the packaging waste before sending onto another material facility, reprocessor or to export. FPoCs will be mandated to undertake sampling and compositional analysis and report this data to the regulator.

Instead of having a separate EPR sampling regime placed on FPoCs, to reduce the sampling and reporting burden on material facilities, we are planning to expand the current Material Recovery Facilities (MRFs) sampling regulations in England and Wales⁹⁶, and equivalent Code of Practice in Scotland⁹⁷, which require MRFs to sample both input and output material. There is no equivalent legislation in Northern Ireland, who will need to develop new legislation or requirements or amend/use existing legislation to accommodate consistent sampling and reporting requirements. For EPR purposes, additional sites will come into scope of these regulations (for example where a material facility is a FPoC and includes facilities that manage source separated waste streams), input sampling categories will change (to understand packaging composition) and sampling rates will increase from 60kg per 125t to 60kg per 75t. This is crucial as this data will be key for determining evidence of packaging collected and managed, and the allocation of EPR payments to Local Authorities and must therefore be sufficiently accurate. It is acknowledged that this will increase the number of businesses facing a cost, as well as increasing the level of cost to each business.

As with the current regulations, the de minimis will be retained such that sites that handle waste below a 1,000t per year will be excluded. This is discussed further in the Small and Micro Business Assessment (SaMBA) section.

Based on estimates from Waite Resource Management it is assumed that 953 sites across the UK could be in scope. Further details on how this was estimated are in Annex I.

One off capital costs

Waite Resource Management and WRAP conducted a costs survey on behalf of Defra⁹⁸. This survey asked MFs that are expected to be in scope to provide details on costs to meet the current regulations and an estimate of additional costs to meet an amended input sampling methodology including additional material categories (based on the suggested list in the 2021 consultation) and a higher sampling frequency for packaging of 60kg every 25t (as proposed in the consultation). Costs were split into operational and capital. 33 businesses were contacted, with 12

⁹⁶ Part 2 of Schedule 9 of the Environmental Permitting Regulations (England and Wales) <https://www.legislation.gov.uk/uksi/2016/1154/schedule/9>

⁹⁷ Code of Practice on Sampling and Reporting at Materials Recovery Facilities Practice (<https://www.zerowastescotland.org.uk/sites/default/files/MRF%20Code%20of%20Practice%20Guideline.pdf>); The Waste (Recyclate Quality)(Scotland) Regulations 2015 (<https://www.legislation.gov.uk/ssi/2015/101/contents/made>)

⁹⁸ Estimated Costings and Facility Numbers for EPR Manual Sampling (WRAP/Waite Resource Management Ltd) 2021 Unpublished

providing a response. Although a small sample size, the responses did cover both LA and private operated facilities as well as different sized facilities, ranging from 1,500t to 160,000t per year. Survey responses were used as the basis to estimate costs for this IA.

Within the survey the average cost per tonne that sites suggested they would need for to sample every 25 tonnes was around £0.50 per tonne. As this was to sample every 25 tonnes, this was adjusted to represent sampling every 75 tonnes. The survey asked sites to provide information on capital spend to meet the current regulations (sampling every 125 tonnes) as well as the additional costs for an increased sampling frequency. On average, sites suggested they would need 50% more capital than they have currently, if they were to increase the sampling frequency by 5 times. For sampling every 75 tonnes it was therefore assumed that sites would need 25% more capital spend, or 75% of the overall expenditure recorded in the survey. Hence a newly obligated site would need a total of £0.38 per tonne capital spend. £0.30 and £0.45 per tonne were used as sensitivity.

Overall, the average site would need to spend around £8.3k on capital⁹⁹. This leads to total costs of around £8.2m.

Some MRFs are required to submit sampling and compositional data under the current MRF regulations. These are essentially baseline costs. Data from the WRAP MRF portal¹⁰⁰ was used to determine how many MRFs submitted data in 2019, and which size bracket they fall into. As only English and Welsh sites reported data via WRAP in 2019, the Scottish Environment Protection Agency provided the number of sites reporting in Scotland in 2020. Currently no equivalent regulations exist in Northern Ireland. Overall, it was assumed that 110 sites are currently required to comply.

Current regulations require sampling every 125 tonnes, and survey respondents suggested current costs made up around half of overall costs needed under sampling of 25 tonnes. Therefore, it was assumed that currently in scope sites would need to spend 0.25t per tonne less than newly in scope sites. This led to baseline costs of around £1m.

Table 24: Capital costs to MFs, £m

	2024
Baseline	£1.1
Option 1	£8.2
Additional Costs	£7.1

Ongoing operational cost

The same survey data was used to analyse the operational (largely staff) costs required under the updated sampling regulations. Trend analysis was used to determine the correlation between cost per tonne and size. The results showed some evidence of a trend such that smaller sites expected to need to spend more per tonne than larger sites. Although a small sample size, this suggests the possibility that there are economies of scale to sampling. This could be for example, due to smaller sites having less clear division of labour (where a full-time sampling staff is not

⁹⁹ £6.6m in the low scenario and £10k in the high

¹⁰⁰ <https://wrap.org.uk/resources/tool/materials-facility-mf-reporting-portal>

needed), or larger sites having more efficient processes¹⁰¹. The implications of this economies of scale are discussed in the Small and Micro Business Assessment.

Using a weighted average, the average operational cost per tonne is estimated to be around £2 per tonne sampling at a rate of every 25 tonnes. Within the cost survey conducted by Waite Resource Management, sites suggested that on average additional operational costs would be 5 times higher if sampling at a rate of every 25 tonnes compared to every 125 tonnes as this would require 5 times more sampling. To estimate the cost per tonne of sampling every 75 tonnes this was therefore multiplied by 3/5. This gives a cost per tonne estimate of around £1.22 per tonne.

Evidence from the previous MRF regulation impact assessment¹⁰² and subsequent review of the regulations was used as an additional source to estimate the operational costs. In this assessment it was assumed that sites would spend £0.27 per tonne on staff to sample at a rate of every 125 tonnes. An assessment of these costs carried out in 2019 included surveying MRFs complying with regulations found that these costs were in line with those experienced by MRFs. We adjusted this to account for wage growth¹⁰³ which leads to an estimate of £0.36 per tonne. As this relates to sampling every 125 tonnes, we adjusted this to every 75 tonnes which gives £1.09 per tonne.

Lastly, based on a subsection of survey respondents, Waite Resource Management Ltd survey estimates that the average operator can process 3.5-4.1 samples per day. This suggests that 1 FTE would be needed for every 25t of input into the site. The average annual salary for operatives provided by survey respondents was £21.7k which would mean costs of £26.5k per year after adjusting for non-labour staff costs¹⁰⁴. This would suggest a flat operation cost rate of around £1.00 per tonne when sampling every 25 tonnes. Adjusted to every 75 tonnes this leads to around £0.60 per tonne. As this is however based on a small sample size it is only used as sensitivity.

Overall, the low, central and high estimates use £0.60, £1.09, £1.22 per tonne respectively. Under the central estimate the average operational cost per site is around £24k per year, which leads to aggregate costs of around £24m

Again, as some sites are already sampling under current regulations, we have estimated the baseline costs. These use £0.20, £0.36 and £0.41 as the low, central and high cost per tonne respectively. Under the central estimate, the aggregate baseline operational costs are £1.5m per year.

Table 25: Operational costs to MFs, £m

¹⁰¹ Overall costs to smaller sites are still expected to be lower than that for larger sites as they will take in a lower tonnage. Economies of scale would suggest that the cost per tonne is higher for smaller sites.

¹⁰² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/278833/mrf-consult-sum-resp.pdf

¹⁰³ The analysis used a wage of £7.75 per hour (uplifted by 25%) in 2014. In our cost survey, the average salary quoted for a sampling operator was £21,700 per year, which equates to £10.43 per hour when divided by 40 hours. This is an increase in wages of 35%.

¹⁰⁴ At a rate of 22%

	2024	2027	2033
Baseline	£1.5	£1.5	£1.5
Option 1	£23.7	£23.7	£23.7
Additional	£22.2	£22.2	£22.2

Regulator costs

Under the current regulations, in scope MRFs must pay a fee of £2,240¹⁰⁵ to the regulator to cover monitoring and enforcement costs. The fee under the new regulations will be set by regulators based on the costs needed to cover their costs. Regulators have indicated that there are some economies of scale when it comes to these costs and they may be able to charge a lower fee due to the increased number of sites in scope. As such we have presented three scenarios: the high scenario in which the fee per MF is as it currently, the central in which the fee is reduced by 20% and the low in which the fee is reduced by 50%. Under the baseline, 110 sites are assumed to be reporting and paying the current fee¹⁰⁶.

Table 26: MF Regulator costs, per year, £m

	Baseline	Option 1	Net Costs
Low	£0.3	£1.1	£0.8
Central	£0.3	£1.7	£1.5
High	£0.3	£2.1	£1.9

Familiarisation costs

Most sites identified as potentially in scope of the new regulations are not currently required to report sampling data to the regulator. It is possible that they will therefore need to spend time becoming familiar with the regulations. It is assumed that facilities will spend 10-20 hours familiarising themselves with the requirements¹⁰⁷ and training staff. It is assumed that some of this will require legal services, and the average hourly wage of a worker in the legal/accounting sector is used, with an uplift of 22% used to account for non-labour staff costs.

Table 27: Familiarisation costs to MFs, £m

	2024
Low	£0.3

¹⁰⁵ In England: <https://www.gov.uk/government/publications/materials-facilities-how-to-report-on-mixed-waste-sampling>

¹⁰⁶ The fee may differ across nations depending on decisions by regulators in each nation

¹⁰⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/278833/mrf-consult-sum-resp.pdf; the previous MRF regulations IA assumed that small sites would need around 16 hours, and large sites 14 hours to train staff – an 2019 assessment of costs from the IA found that the costs assumed in the IA were in line with the true cost to sites

Central	£0.4
High	£0.6

Summary of costs

Table 28: Total Additional MF costs (net of baseline), £m

	2024	2027	2033
Capital costs	£7.1	£0.0	£0.0
Operational costs	£22.2	£22.2	£22.2
Familiarisation costs	£0.4	£0.0	£0.0
Regulator costs	£1.5	£1.5	£1.5
Total costs	£31.2	£23.7	£23.7

Table 30 summaries the additional (net of baseline) costs for the central scenario. Additional costs to MF businesses can largely be explained by the increased number of sites expected to be in scope, as well as the increased sampling required under the new regulations. When considering the total costs to the industry on a per site basis, assuming annualised capital costs¹⁰⁸, the average annual increase in costs per MF site is around £13-25k. This works out as an additional £0.70 to £1.40 per tonnage input on average. In WRAP's latest gate fee report¹⁰⁹, they estimate that the median MRF gate fee¹¹⁰ reported by LAs in 2019/20 was £43-£53 per tonne. Assuming MFs pass the full cost of these additional sampling requirements onto customers, the average MRF gate fee would expect to increase by 1.5%- 2.5%.

Also, as part of the amendments to the MF regulations and new sampling requirements, the ability of a MF to seek approval from the regulators to sample and undertake compositional analysis using visual detection technology, instead of manual sampling, will be an option within the regulations. MFs that wish to use visual detection technology will have to demonstrate that use of the technology still meets the minimum manual sampling requirements within the regulations, and the data can be submitted to the regulators in a useable, consistent format. This technology is currently available and is being further tested and used by some MFs already. There is likely to be a larger upfront capital cost for installing the technology, depending on the size of the site. However, it is also said to be able to substantially reduce the amount of staff labour required to undertake samples, which would subsequently reduce the above operational costs (although some level of manual sampling would still be

¹⁰⁸ Over 10 years

¹⁰⁹ <https://wrap.org.uk/sites/default/files/2021-01/Gate-Fees-Report-2019-20.pdf>

¹¹⁰ The fee charged by MRFs for waste the take as inputs

required to verify results). Further work into the advantages, disadvantages, and associated costs of using a visual detection system will be undertaken. In the interim, the option to use this technology will be included within regulation and guidance.

Costs to Reprocessors and Exporters

Under the reforms to the packaging regulation, all reprocessors and exporters of packaging will be required to register with the appropriate regulator and report data on packaging received, reprocessed and/or exported. This may bring further businesses into scope, and lead to some additional costs to these businesses. This will, however, fill a gap in the data, whereby under the current system only packaging received and reprocessed/exported by accredited businesses is recorded. This data will provide information on the quantity and quality of packaging handled, which will support the monitoring and achievement of EPR targets and outcomes, and the calculation of EPR payments to Local Authorities.

Currently accredited reprocessors or exporters are required to report certain information to the regulators, for example, including the source of the material input, the weight and type of packaging being reprocessed and exported, and the product the recycled material will be used for. Under the reforms, this information will still be required to be reported, with some at a more granular level.

In addition, packaging producers will still need to purchase recycling evidence from reprocessors and exporters to demonstrate they have met recycling targets, as under the current system. Reprocessors and exporters will therefore also be required to apply for accreditation, to allow them to sell this evidence. The estimated additional costs are outlined below.

Increased costs – Mandatory registration

All reprocessors and exporters of packaging waste will be required to register with the regulator and report some data information.

Stakeholders representing recyclers of different materials types were asked to provide their opinion on the likely number of reprocessors and exporters who are currently unaccredited but handle some packaging waste and would therefore come into scope. A common theme developed across material types, with stakeholders suggesting that the number would be low. In the case of aluminium and plastic, it was assumed that the recent spike in the price of PRNs for those materials¹¹¹ would have incentivised all previously unaccredited businesses to become accredited. For example, in 2017 there were 154 accredited plastic recyclers, however by 2020 this had risen to 281 (an increase of 82%). Similarly, the number of accredited aluminium recyclers rose by 90%, from 43 to 84, over the same period. For paper and card, it was felt that the vast majority of domestic recyclers are large and would already be accredited. There was less clarity on paper/card exporters, but this was still expected to be relatively few. Lastly, no new glass exporters were anticipated to come into scope but a small number of glass reprocessors may not be accredited.

¹¹¹ See Annex F

Some analysis was done to estimate the number of businesses that could come into scope under these regulations. Within the Pack Flow reports¹¹², Valpak estimate the tonnage of recycled packaging waste currently not captured via NPWD; packaging waste recycled by unaccredited businesses. Overall, these reports estimate that only 3% of packaging waste is not captured.

For the purposes of this analysis, we assume that this is recycled by businesses handling small tonnages and are therefore all small and micro businesses (SMBs). Generally, SMBs make up a large proportion of the number of businesses but a smaller proportion of revenue. ONS data¹¹³ shows that within the Materials Recovery sector, SMBs make up 93% of the businesses but 39% of revenue. Using revenue as a proxy for tonnage handled, we therefore assume that SMBs handle 39% of total packaging waste recycled. It is assumed that the majority of these businesses are already accredited¹¹⁴. Based on these assumptions, it is estimated that 2.4% of businesses handle 1% of the tonnage¹¹⁵. 7.2% of businesses therefore handle 3% of tonnage. Assuming therefore, that the 614 currently accredited businesses make up 92.8% of recyclers handling packaging waste, this leaves 48 businesses unaccredited. This was used as the central estimate.

Alternatively, assuming that all unaccredited businesses are micro, and using the same approach, currently obligated business make up 83.2% of total businesses in scope¹¹⁶, leading to an estimate of 124 unaccredited businesses. This was used as the high estimate.

£3.8k per business for complying current regulations (excluding regular fees) is used to estimate total cost per business (this assumption is discussed in more detail below). This is a conservative estimate as these businesses are likely to be smaller businesses and may therefore face lower than average costs to comply. It is assumed that these businesses would pay the regulator fee for smaller businesses (£505).

Table 29: Additional Reprocessor/Exporter costs, £m

	Low	Central	High
Data costs	£0	£ 0.18	£0.47
Regulator fee	£0	£0.02	£0.06

¹¹² <https://wrap.org.uk/resources/report/packflow-covid-19-reports>

¹¹³ <https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/annualbusinesssurvey>

¹¹⁴ 25% of accredited businesses are considered “small” by the regulator based on the tonnage handled, and therefore pay the lower registration fee

¹¹⁵ 93% divided by 39%.

¹¹⁶ Micro businesses make up 63% of businesses and 11% of turnover. Therefore 1% of turnover/packaging is received by 5.6% of businesses. 3% of packaging is handled by 16.8% of businesses, assuming all are micro.

Total	£ 0	£0.20	£0.53
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Additional requirements on accredited businesses

Accredited businesses are currently required to provide regulators with a breakdown of how they have spent revenue received from selling evidence (PRN/PERNs). In 2020, these businesses reported spending £3.6m on activities involved in complying with regulation. As there were 614 accredited businesses, this amounts to £5.9k per businesses. As discussed in more detail later in this section, these businesses are required to pay a fee to the regulator on becoming accredited. There are two fee levels dependant on the tonnage of packaging recycled¹¹⁷, and taking this into account, the average fee paid was £2.1k. Thus, the average amount spent by reprocessors and exporters on complying with regulation, aside from regulator fees, was £3.8k per businesses. This is likely to cover the costs of collecting the required data needed.

Engagement with stakeholders representing recyclers of different materials types was also conducted to understand the additional costs to businesses from having to provide more granular data on the packaging recycled. A common theme in these discussions was that the majority (if not all) of those currently accredited would collect more granular data than currently required by regulation already as this is required for business purposes¹¹⁸. It was therefore felt that any additional cost would be minimal¹¹⁹.

We have therefore used a range of scenarios to estimate the additional costs to these businesses, which all assume a small increase in costs. We assume that costs, aside from the regulator fee, will increase by 10%, 20% and 50% under the low, central and high estimate.

Table 30: Additional costs to currently accredited reprocessors/exporters, £m

	Low	Central	High
Additional costs to accredited reprocessors/exporters	£0.2	£0.5	£1.2

Familiarisation costs

It is assumed that these businesses will need to take time to familiarise themselves with the regulations. We spoke to stakeholders representing reprocessors and exporters who provided estimates of how many staff would be involved and how long this would take. It was felt that businesses would need a few days to 2 weeks of staff time

¹¹⁷ <https://www.gov.uk/guidance/packaging-waste-apply-to-be-an-accredited-reprocessor-or-exporter>; £505 for those issuing 400t or less of PRN/PERNs and £2616 for those issues over £400t of PRN/PERNs

¹¹⁸ For example, it is in the interest of the recycler to monitor input material to ensure the quality is in line with the price paid for it.

¹¹⁹ As stated in the text, industry representatives we spoke to were confident that the majority of businesses in scope would already be collecting more detailed data than current regulations require and that any additional requirements would therefore lead to minimal cost increases.

(FTE) for familiarisation activities. We therefore assume 1 week of FTE as our central option with the full range used as sensitivity in the low and high option. We assume that this will be mostly be undertaken by legal staff and the average wage for legal/accounting services is used¹²⁰, including a 22% uplift for non-staff labour costs.

Table 31: Familiarisation costs to reprocessors/exporters, £m

	Low	Central	High
Familiarisation Costs	£0.28	£0.60	£1.34

Public sector costs

Landfill tax

The landfill tax in the analysis is fixed at £91.35 per tonne. This is in line with the landfill tax assumed in WRAP's household collection costs analysis¹²¹ and analysis for the consistent recycling in England impact assessment. We assume that this tax rate will remain constant for the period 2024-2033. A fixed landfill tax rate is assumed for the purposes of economic modelling and to be consistent with WRAP recycling options and the consistency impact assessment. This might underestimate the total costs incurred by LAs should the rate of landfill tax increase.

Residual waste disposal is split between landfill and energy from waste (EfW). Within their modelling for household collection costs, WRAP use data from 'WasteDataFlow'¹²² to estimate the split of waste to landfill and EfW. The percentage split used is 81.5% to EfW and 18.5% to landfill, in line with assumptions made in the consistent recycling in England IA¹²³. We assume this remains constant throughout the period 2024-2032. Evidence would suggest that a lower proportion of non-household waste is sent to EfW¹²⁴, and we therefore assume that 61% of non-household residual goes to landfill¹²⁵.

¹²⁰ The average hourly wage for legal services is

£23.83/hour. (<https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/annualsurveyofhoursandearningsashe>)

¹²¹ WRAP have kept this constant to show the first order impact to LAs of increased recycling. The landfill tax costs are embedded within the net HH recycling management costs within WRAP's analysis. Thus we too followed the approach of fixing landfill tax at the 2019 rate rather than projecting forward.

¹²² <https://www.wastedataflow.org/>

¹²³ To be published shortly

¹²⁴ https://www.tolvik.com/wp-content/uploads/2021/05/Tolvik-UK-EfW-Statistics-2020-Report_Published-May-2021.pdf; 80% of residual waste to EfW in 2020 was Local Authority collected waste. Although this will include some business waste this is likely to be predominantly household waste.

¹²⁵ From Tolvik 2021 it is estimated that 4,940kt of residual from C&I sources is sent to incineration (IBA and RDF). Total municipal C&I is estimated at 12,680kt. This is calculated as 26,846kt (the implied total municipal residual tonnage in Tolvik 2021) minus 14,238kt (the total household residual tonnage in 2020, from UK stats on waste). https://www.tolvik.com/wp-content/uploads/2021/05/Tolvik-UK-EfW-Statistics-2020-Report_Published-May-2021.pdf

The total expenditure on landfill tax is a product of the residual waste tonnages, the landfill tax rate and the tonnage of residual waste disposed to landfill. Table 32 shows the landfill tax expenditure in the central estimate in the baseline option. Government receives less landfill tax revenue in option 1 than the baseline option due to the reduction in residual waste as more packaging waste is recycled (due to both modulated fees and mandatory labelling). The household element of this is a transfer from Government to producers under EPR.

Table 32 - Landfill tax expenditure by each sector - best estimate

			2024		2027		2033	
	% residual to landfill	Landfill tax rate	Residual (Mt)	Landfill tax expenditure (m)	Residual (Mt)	Landfill tax expenditure (m)	Residual (Mt)	Landfill tax expenditure (m)
	(a)	(b)	(c)	(a)*(b)*(c)	(d)	(a)*(b)*(d)	(e)	(a)*(b)*(e)
HH	18.5%	£91.35	1.68	£28.3	1.37	£23.1	1.28	£21.7
NHM	61.0%	£91.35	1.37	£76.5	0.83	£46.1	0.86	£47.7
C&I	61.0%	£91.35	0.84	£46.7	0.84	£46.6	0.83	£46.3
Total			3.89	£151.5	3.03	£115.8	2.97	£115.7

Table 33 shows that overall, by 2033 there will be £11.5m per year reduction in landfill tax payments as a result of EPR and labelling.

Table 33 - Reduction in landfill tax net of baseline, £m

	2024	2027	2033
HH	-£1.6	-£4.7	-£6.1
NHM	-£1.9	-£5.1	-£5.3
C&I ¹²⁶	£0.0	£0.0	£0.0
Total	-£3.6	-£9.8	-£11.5

Investment in IT costs

Funding is required to establish IT systems and nearly all the costs are expected to be incurred prior to the appraisal period. We have included these costs in the NPV calculations following advice from RPC.

¹²⁶ Not it is assumed that EPR will have no impact on other C&I packaging recycling rates, so there is no reduction in residual

This will amount to £6.59m in total and will fund the development phase, including the design, procurement, testing and roll out of new systems, and transition from the National Packaging Waste Database (NPWD)¹²⁷ to the new system. These costs have been estimated by Defra's Digital, Data and Technology Service (DDTS) based on their expert knowledge of IT projects.

Once the IT system has been developed, the costs of running the IT system will be borne by producers through the administrative fees they pay to the scheme administrator and / or the regulators.

Table 34: IT Investment costs, £m

£m	2020/21	2021/22	2022/23	2023/24	Total
IT Investment costs	£0.95	£3.59	£3.96	£3.00	£11.50

BENEFITS

Benefits to producers

It is expected that there will be efficiency savings to HH collection costs due to increased recycling capture rates. Although recycling collection and treatment costs will increase, this will be more than offset by reduced residual collection and disposal costs leading to lower costs overall. As these costs will be borne by producers, higher levels of recycling and more efficient collections will mean lower compliance costs.

These estimates are based on WRAP's modelling of HH collection and treatment costs for the consistent municipal recycling IA, with additional assumptions to estimate the impact of modulated fees on collection costs. Estimated increased tonnages in household recycling, as discussed earlier in the chapter, are assumed to be diverted from residual to recycling. The tonnage is multiplied by the cost of residual waste disposal costs per tonne (EfW and landfill gate fees, and landfill tax). This leads to a reduction in residual costs of £28.8m by 2033.

To estimate the impact on recycling costs, it is assumed that higher recycling leads to increased bulking costs. The proportion of material assumed to be collected through comingled streams is multiplied by the average Material Recovery Facility (MRF) gate fee, whereas the tonnage assumed to be separately collected is multiplied by the relevant material revenue. Overall, this leads to net savings of £15.8m by 2033.

Overall, this leads to a net saving of £44.6m per year by 2033 to obligated producers as Local Authorities will transfer collection costs to them once EPR is in place.

Table 35 – Difference in HH collection and treatment costs on baseline, £m

¹²⁷ <https://npwd.environment-agency.gov.uk/>

	2024	2027	2033
Recycling	-£4.3	-£11.9	-£15.8
Residual	-£10.9	-£25.3	-£28.8
Total	-£15.2	-£37.2	-£44.6

Benefits to businesses paying for household-like waste collections

As household-like packaging collected from businesses will also be in scope of mandatory labelling, businesses that pay for their own packaging waste collections will benefit from net collection cost reductions. This is due to packaging diverted from residual to recycling as a response to labelling. This is expected to rise to £4.4m per year by 2033. This is estimated by multiplying the additional recycled packaging in the NHM sector, by the additional recycling costs (for example sorting costs) and subtracting the additional residual cost (landfill and EfW costs) on a per tonne basis.

Table 36 – Difference in NHM collection and treatment costs on baseline, £m

	2024	2027	2033
Total	-£1.6	-£4.2	-£4.4

Benefits to reprocessors

Secondary market profit margin

One of the main benefits to businesses is the material revenue from the sale of any additional packaging material sent for recycling. Unpublished research by Valpak¹²⁸ suggests that reprocessors plan to significantly increase their capacity over the next 5 years, however some additional investment will still be needed to meet the expected increase in recyclate under the waste reforms. We have assumed that the prospective financial gains should offer sufficient incentive for reprocessors to invest accordingly.

Revenue can be gained for packaging collected for recycling at two stages in the waste supply chain. The first is for separately collected recyclate as collected, for example by LAs. The second is when recyclers sell reprocessed materials to be used as inputs for new products. Benefits to LAs from selling recyclate are already accounted for in the assessment of the net cost of recycling collections. For this reason, we account for benefits to reprocessors only here.

These wider economic benefits occur down the supply chain, i.e., at the stage of reprocessing and recycling dry materials that are then sold on the secondary materials markets. These benefits are considered indirect, and therefore not included in the Equivalent Annual Net Direct Cost to businesses (EANDCB). To calculate total materials

¹²⁸ The Impacts of a ban of Export of Plastic Waste (Valpak) 2021 (unpublished)

sold to the secondary materials markets we have used the projected recycling tonnages estimated for this impact assessment. We have then multiplied the tonnage placed on market for each material each year by the projected recycling rates. From that, we have removed the tonnage of material that is exported as the overseas reprocessors/recyclers would benefit from selling these materials in the secondary materials market¹²⁹. We have then multiplied the tonnage of reprocessed/recycled material by the reprocessed material prices. These are the prices paid in the secondary market when reprocessed materials are sold. As a conservative estimate we assume average reprocessed materials prices will be flat over the period to 2033. The table below presents the reprocessed materials prices.

Table 37 - Reprocessed materials prices (£/t)

	2024	2027	2032
Paper	400	400	400
Glass	50	50	50
Aluminium	1,578	1,578	1,578
Steel	560	560	560
Plastic	884	884	884

To account for the additional profit margin rather than the revenue, we have applied a proxy for profit margin to the turnover values based on data from the Annual Business Survey (ABS) which details GVA and turnover¹³⁰ for individual sectors, including the UK recycling sector. We have assumed a gross margin of 25% for UK based recyclers. This is based on historical GVA/turnover for the materials recovery and glass/paper sectors. This is applied to the additional turnover resulting from the policies to estimate net impact on margins.

To sum up, this is the formula that has been used for each material for each year:

Placed on market tonnage * recycling rate *(1- % of recycled material that is exported) * reprocessed material price *0.25 = gross profit margin of reprocessors

Table 38 shows the net gross profit to the recycling and reprocessors sectors under the baseline.

Table 38 – Baseline material gross profit from recycled material – central option (£m)

	2024	2027	2033

¹²⁹ <https://wrap.org.uk/resources/report/packflow-covid-19-reports>

¹³⁰ <https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/uknonfinancialbusinesseconomyannualbusinesssurveysectionsas>

Reprocessors and recyclers gross profit margin	£274.8	£304.2	£314.2
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We have then calculated these benefits with recycling rates and tonnages for option 1 and to assess the additional revenues originating from the introduction of EPR we have netted the baseline revenues to those. We then netted the benefits that were already realised in the baseline option to present the additional benefits originating from EPR. Table 40 shows the net gross profit to the recycling and reprocessors sectors under option 1 net of the baseline. By 2033 there are £16.3m per year in additional gross profit to reprocessors.

Table 39 - Option 1 gross profit margin of recyclers/reprocessors (net of baseline) – best estimate option (£m)

	2024	2027	2033
Best estimate	£4.4	£14.5	£18.0

Benefits to society

Greenhouse-Gas Savings

An environmental benefit of EPR is the reduction in greenhouse gas (GHG) emissions as a result of increased recycling. As discussed earlier in the assessment, by 2033 there is estimated to be an additional 422Kt of packaging diverted to recycling from residual waste.

Table 40- Additional packaging diverted to recycling from residual waste (Kt)¹³¹

	2024	2027	2033
Plastic	25	88	114
Wood	0	0	0
Aluminium	0	1	1
Steel	3	13	15
Paper/Card	34	102	115
Glass	52	128	158
Fibre Based Composite	5	14	19
Total	119	346	422

Diverting waste from residual to recycling will create GHG emissions savings. These are estimated here. The calculations are based on BEIS greenhouse gas conversion factors from 2019¹³² as well as WRAP modelling. These conversion factors allow organisations and individuals to calculate GHG emissions from a range of activities,

¹³¹ Figures might not add up due to rounding

¹³² <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018>

including waste disposal and recycling¹³³. The carbon factors used in this appraisal account for the different GHG emissions associated with the process of recycling compared to sending waste to EfW or landfill. These factors include emissions at each stage of the process, including transport the packaging, energy use from recycling as well as emissions release from burning in EfW or breakdown in landfill. One of the main benefits of recycling however, is the forgone virgin material produced. Producing virgin materials tends to have a significantly higher GHG impact than using recycled materials. This is also accounted for this the carbon factors.

Overall, there is predicted to be around 270kt of emissions savings per year by 2033.

Table 41 - Carbon reductions

	Carbon reductions (t)		
	2024	2027	2033
Plastic	40,816	143,063	187,469
Wood	0	0	0
Aluminium	1,857	5,883	6,558
Steel	4,018	16,669	19,493
Paper/Card	13,155	38,888	41,175
Glass	5,166	12,727	15,758
Fibre Based Composite	785	2,404	2,948
Total	65,798	219,633	273,401

For each of the Options' GHG emissions savings, we applied the carbon prices as presented in Table 42 over the appraised period. These are the updated prices released by BEIS in 2021¹³⁴.

Table 42 - Applied carbon prices, in £/t of CO₂

	Low	Central	High
2024	£128	£256	£384
2025	£130	£260	£390
2026	£132	£264	£396
2027	£134	£268	£402
2028	£136	£272	£408
2029	£138	£276	£414
2030	£140	£280	£420
2031	£142	£285	£427

¹³³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/726911/2018_methodology_paper_FINAL_v01-00.pdf

¹³⁴ <https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation>

2032	£144	£289	£433
2033	£147	£293	£440

By applying the carbon prices, it is estimated that £80.2m in societal benefits through greenhouse gas emissions reductions will be achieved per year as a result of EPR by 2033. These savings are presented in Table 43.

Table 43 - Total carbon savings

	2024 (£m)	2027 (£m)	2033 (£m)
Plastic	£10.4	£38.3	£55.0
Wood	£0.0	£0.0	£0.0
Aluminium	£0.5	£1.6	£1.9
Steel	£1.0	£4.5	£5.7
Paper/Card	£3.4	£10.4	£12.1
Glass	£1.3	£3.4	£4.6
Fibre Based Composite	£0.2	£0.6	£0.9
Total	£16.8	£58.8	£80.2

Non-monetised benefits:

- **A more vibrant domestic reprocessing market:** Proposals set out in the consultation aim to drive better design of packaging to enable greater recycling and to achieve consistency in the packaging materials collected for recycling. These measures are designed to increase the quantity and quality of material available to UK reprocessors, thereby increasing their confidence that they can access materials of the required quantity and quality on a consistent basis. This will be beneficial in creating a stronger, more stable, and more vibrant domestic reprocessing market.
- **Less contamination of recyclate:** As consumers respond to mandatory recyclability labels and become more effective recyclers (i.e., they correctly put recyclable items in the recycling bins and put non-recyclables into residual waste), contamination levels in mixed recycling collections are expected to reduce. This is likely to reduce the gate fees at materials recovery facility (MRFs). LAs currently effectively 'pay twice' for contamination. They pay a gate fee for recycling materials to be sorted at MRFs, typically in the range £40-50¹³⁵ / tonne. This process removes non-recyclable and contaminating materials which then need to be disposed of at a typical cost of £80-120 / tonne¹³⁶.

In addition, these are some of the system-wide benefits to the producer responsibility system.

¹³⁵ <https://wrap.org.uk/resources/report/gate-fees-report-2020>

¹³⁶ <https://www.letsrecycle.com/prices/efw-landfill-rdf-2/efw-landfill-rdf-2019-gate-fees/>

- **Incentives for long-term innovation and strategic planning:** the reforms will create a more stable and transparent system that will de-risk investment in innovation and encourage strategic planning.
- **Increased transparency:** Several measures will help towards creating a clearer and fairer system. This will benefit all actors in the system by creating a level playing field and giving stakeholders confidence in the system.
- **Reduced packaging:** as producers will have to cover the full net costs of managing the packaging they place on the market that becomes waste in households this will be a strong driver to encourage producers to use less packaging. This will in turn reduce the use of virgin materials as well as the environmental impact of manufacturing this packaging
- **Circular economy:** the changes to the packaging producer responsibility regime will help in creating a more circular economy where less is wasted, and packaging materials are kept in the economic cycle for longer.

EPR OPTION 2: OPTION 1 + FIBRE-BASED COMPOSITE CUPS TAKE BACK (PREFERRED OPTION)

This option assumes the introduction of EPR, modulated fees and mandatory labelling, as set out in option 1, as well as further measures applied to fibre-based composite cups and other fibre-based composite packaging. The proposed policy scenario for fibre-based composite cups consists of the implementation of mandatory reporting and take back of the fibre-based composite cups for recycling. Recycling targets, to be met by producers, will then be applied to fibre-based composites, including fibre-based composite cups.

There is no crossover in the analysis between option 1 and the impacts of these policies and so it is possible to sum the impacts for option 1 with the impacts of introducing a mandatory takeback and targets on these packaging types. More details on the costs and benefits of implementing these measures can be found below. Since the previous consultation we have commissioned external research into this area, which has enabled us to further develop these policies and improve our analysis.

Option 2 is our preferred option as it is the most ambitious option. It also ensures further reductions in the environmental costs associated with fibre-based composites.

BACKGROUND

The proposed policy option is to place a mandatory reporting and take-back requirement (henceforth MTB) on retailers of fibre-based composite cups – building on current good practice within the industry. This would require retailers that place fibre-based composite cups on the market to either provide a designated fibre-based composite cup bin and send the contents off for recycling, . In tandem with this, recycling rate targets will be levied on producers of all fibre-based composite packaging to ensure a certain proportion of these packaging types that are placed on the market are recycled each year.

While targets will directly increase the recycling rate, the mandatory take-back requirement on fibre-based composite cups will increase the supply of separately collected fibre-based composite cups, which could in turn make the recycling of fibre-based composite cups (and other fibre-based composite material) more financially viable. This will also give Government the data necessary to monitor recycling performance and set future recycling targets. In turn this would inform the deployment of and further measures by the sector (such as collection points at transport hubs or outside office blocks) that may be necessary to increase recycling rates to meet future targets.

At the time of the consultation IA, the evidence that we had on the impact of these policies was relatively limited, hence we commissioned more extensive data and modelling from Valpak¹³⁷. The data and modelling we received from Valpak underpins our calculation of the costs and benefits of this option. The approach taken by Valpak was to estimate the amount of fibre-based composite cups (SUFC) and other on-the-go fibre-based composite food packaging (OFFP) placed on the market (POM) each year and make informed assumptions about the proportions of waste flowing to different stages in the waste management chain (e.g. proportion littered, proportion collected, proportion going from collect to sort etc). From this, total amounts of waste pertaining to each stage or activity were obtained and to these amounts we can apply the assumed relevant rates per tonne to calculate key costs and benefits. Some rates are taken from Valpak, for others we have used alternatives. More details of the process and the assumptions underpinning the modelling are described in Annex J.

The policies are assumed to have no impact on POM but are modelled by reducing both the ground litter rate and the amount of collected waste that is disposed of by the collector (rather than sent on to be recycled) over time. Such impacts jointly increase the amount of fibre-based that is reprocessed and correspondingly reduce the amount of SUFC and OFFP waste sent to residual.

Mandatory take back is modelled by Valpak partly via a reduction in the ground litter rate (expected as the policy will provide more highly visible and convenient places to drop of single use items as well as likely increase citizen awareness) and partly by a reduction in the proportion of POM disposed of at the collection stage rather than sent on to be recycled. A reduction in the disposal rate at collection is assumed as MTB is expected to give the public more opportunities to dispose of cups in collection points provided by the scheme, rather than in litter bins, therefore permitting more waste at collection to be recycled.

Targets are primarily modelled by Valpak by inputting reductions over time in the amount of collected waste disposed of by the collector as this is the key behaviour expected to meet them. Targets are expected to have a less significant impact on ground litter than MTB, but some reduction has been modelled due to the fact targets will be implemented as part of a broader intervention/combination of policies and will be supported by increased communications and widespread provision of collection points. These changes to the ground litter and disposal rates at collection following the introduction of the policies drive differences in costs and benefits between the baseline and the policy option. The extent of these changes is described in more detail in Annex J.

MONETISED COSTS

New fibre-based composite cup bins

From discussions with stakeholders the cost of a fibre-based composite cup bin that allows the public to separate the different components of cups, is approximately £300¹³⁸. The total cost of purchasing bins would be paid by sellers/retailers that place filled fibre-based composite cups on the market – ‘fibre-based composite cup outlets’. There is uncertainty about the total number of sellers that would be in scope. In light of this we have used a low,

¹³⁷ WRAP/Valak Single-use Cups and On-the-Go Fibre-composite Food Packaging, 28 April 2021

¹³⁸ <https://www.hubbub.org.uk/recycling-disposable-coffee-cups>; For example, in their guidance to businesses on setting up fibre cup collections, they recommend several bins ranging from £180-£395.

central and high number of obligated outlets. The low estimate is the most conservative and consists only of coffee shops and fast-food outlets; sectors in which we expect most businesses will sell fibre-based composite cups. Additional sectors which may include some fibre-based composite cup sellers are added for the central and high estimates. A further explanation of the sectors included in these estimates can be found in Annex J.

A de minimis threshold will be put in place such that businesses with less than 10 staff will be exempt for the first two years. Businesses exempt for the first two years will install these bins in 2026, 2 years after the introduction of the policy, while those not exempt will install them in 2024.

It is assumed that each outlet will purchase one bin, with an average cost of £300. Under the central scenario this will lead to businesses spending £42m, of which £7m will be spent in 2024 and £36m in 2026.

Table 44 – Bin infrastructure costs and obligated outlets

	2024 obligated outlets	2024 cost, £m	2026 newly obligated outlets	2026 cost, £m	Total cost, £m
Low	18,220	5.47	70,920	21.28	£26.74
Central	22,660	6.80	120,450	36.14	£42.93
High	50,695	15.21	207,005	62.10	£77.31

Net collection costs

Fibre-based composite cup sellers will see additional collection costs relating to the cups they collect for recycling. We also assume that there will be additional collection costs relating to other fibre-based composite packaging collected to meet the fibre-based composite target.

Collection transport rates have been taken from research done by Valpak. The transport rates given pertain to different stages for OFFP and SUFC due to differences in the way each type of waste is managed according to Valpak. The same rates are not always relevant to each type of packaging, for example, the way OFFP waste is managed according to Valpak is such that, unlike for SUFC, fibre-based composite containers which are due to be recycled pass via the sorter before reaching the paper reprocessors.

Table 45 –Collection transport rates

Transport rates	£/tonne
Collect to sort transport cost, OFFP	115
Collect to paper reprocessor transport cost, SUFC	175

Fibre-based composite packaging sent straight to the reprocessor for recycling is assumed to have value attached and as such will lead to revenue for those collecting this packaging. Valpak assume a revenue of £150 per tonne for this material. Overall, it is estimated that there will be additional net collection costs of around £2.9m per year by 2033.

Table 46 –Net Collection Costs

	2024	2027	2033
--	------	------	------

Collection (Transport) Costs	£0.46	£4.49	£12.84
Primary Material Revenue	-£0.19	-£3.23	-£9.98
Net Collection Costs	£0.27	£1.26	£2.86

Training and familiarisation costs

We have assumed that the average coffee shop worker is paid £9.25¹³⁹/hour, and each shop will spend a total of 2 hours training their staff on fibre-based composite cup collections each year.¹⁴⁰ Overheads at 22% were added to this cost to businesses. We additionally expect 2 hours of familiarisation, calculated in the same way, in the first year of EPR only.

These costs are then scaled up by the number of obligated outlets. As with the fibre-based composite bin costs, the one-off 2 hour training cost will be staggered across two years due to the de minimis threshold with some businesses bearing this cost in 2024 and some in 2026. Training costs will also be lower overall between 2024-2026 and some businesses are exempt during this time.

Table 47 –Training and familiarisation costs, £m

	2024	2027	2033
Low	£0.91	£2.37	£2.67
Central	£1.13	£3.80	£4.28
High	£2.54	£6.85	£7.71

Enforcement costs

The enforcement of mandatory take back will entail further costs. In the first year for example, there will be a number of set up costs such as recruitment and planning delivery and following implementation, there will be ongoing annual costs such as inspections and management support. The extent of these costs has been quantified by the Environment Agency and the total yearly costs are given below:

Table 48 –Enforcement costs, £m

	2024	2027	2033
Enforcements costs	0.82	0.71	0.71

Landfill tax loss

¹³⁹ 2020 UK minimum wage uplifted to 2023 prices (assuming 2% growth rate each year). The wage level is expected to increase by 2% each year thereafter.

¹⁴⁰ Assumptions tested through the consultation IA

The policies are expected to lead to an increase in recycling and a corresponding decrease in residual. The reduction in residual waste entails a reduction in the tonnage sent to landfill and hence ultimately in the landfill tax received. This reduction constitutes a cost to HMT but a saving to businesses who pay for waste collection services, and LAs who pay for binned packaging waste and household collection services. Applying the landfill tax rate of £91.35 to the amount of residual tonnage going to landfill provided by Valpak in the baseline and under the policies allows us to isolate the component of total disposal cost that represents landfill tax losses. It is estimated that this will amount to around £0.6m per year by 2033.

Table 49 –Reduction in Landfill Tax, £m

	2024	2027	2033
Landfill Tax Reduction	£0.02	£0.20	£0.59

MONETISED BENEFITS

Material value

It is assumed that reprocessors will benefit from the additional tonnages of fibre-based composite packaging collected for recycling through additional secondary market revenue. We calculate the additional revenue to reprocessors by multiplying the additional recycled tonnage recycled by the paper/card secondary market material price (£400 per tonne¹⁴¹). This is multiplied by the proportion of paper/card packaging recycled in the UK to estimate the specific revenue increase for UK businesses¹⁴². To account for the additional profit margin rather than the revenue, we have applied a proxy for profit margin to the turnover values based on data from the Annual Business Survey (ABS) which details GVA and turnover¹⁴³ for individual sectors, including the UK recycling sector. We have assumed a gross margin of 25% for UK based recyclers. This is based on historical GVA/turnover for the materials recovery and glass/paper sectors. This is applied to the additional turnover resulting from the policies to estimate net impact on margins

Table 50 –Additional Secondary market profit, £m

	2024	2027	2033
Secondary Market Material Profit	£0.10	£1.19	£3.52

Residual waste disposal cost savings

It is assumed that all non-recycled SUFC and OFFP waste is disposed of as residual waste and sent to landfill or Energy from Waste (EfW). To calculate the total cost of disposing of residual waste, the following rates per tonne have been assumed:

Table 52 –Fibre-based composite packaging disposal rates

¹⁴¹ As used by Valpak and consistent with modelling for Option 1

¹⁴² <https://npwd.environment-agency.gov.uk/>

¹⁴³ <https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/uknonfinancialbusinesseconomyannualbusinesssurveysectionsas>

Disposal rates	£/tonne
EfW gate fee	£84.15
Landfill total cost	£119.26
<i>Landfill Gate fee</i>	<i>£27.91</i>
<i>Landfill tax</i>	<i>£91.35</i>
Haulage fee	£15
<i>Total residual disposal fee</i>	<i>£105.65</i>

To maintain consistency with the rest of the IA, we have used the same landfill and EfW gate fees as WRAP in their household collection modelling. In line with WRAP's option analysis, and consistent with what we have used previously in this IA, we have taken the landfill tax rate to be £91.35. We assume the percentage split of residual between EfW and Landfill is 81.5% to EfW and 18.5% to landfill and we assume that this split remains constant throughout the appraisal period. This assumption is also taken from WRAP's analysis. Finally, Valpak have also estimated a haulage fee of £15/tonne which captures the cost of moving residual waste around. We have integrated this into the overall disposal fee per tonne of £105.65, calculated as the weighted average of EfW and Landfill costs with these haulage costs added on.

Using Valpak's proportions that define how much OFFP and SUFC waste is disposed of each year in the baseline and the policy option, we have estimated the total tonnage sent to residual and applied the total residual disposal fee to estimate total disposal costs:

Table 53 –Disposal Cost Savings, £m

	2024	2027	2033
Disposal Cost Savings	£0.07	£1.32	£4.29

The net impact of the policy is to reduce disposal cost by £4.3m per year by 2033. This arises due to an increase in waste no longer being disposed of as residual and instead being recycled.

Litter cost savings

There are expected to be savings from reduced littering of fibre-based composite packaging. Litter savings have been split into ground and binned litter as the savings will accrue to different actors in the supply chain. It should be noted that binned litter costs are captured within the disposal savings outlined previously in this section. Ground litter costs are captured separately.

Table 54 – Ground Litter Cost Savings, £m

	2024	2027	2033
Baseline	£0.93	£1.01	£1.18
Option 2	£0.73	£0.79	£0.91
Savings	-£0.21	-£0.22	-£0.26

It is estimated that ground litter costs will fall by around £0.3m per year by 2033, whereas binned litter costs will reduce by £2.2m per year by 2033. Ground litter savings will accrue to Local Authorities and other litter cleaning authorities, whereas binned litter savings will accrue to packaging producers obligated under EPR.

Table 55 – Binned Litter Cost Savings, £m

	2024	2027	2033
Baseline	£2.99	£3.23	£3.77
Option 2	£2.92	£2.47	£1.55
Savings	-£0.07	-£0.75	-£2.22

The savings outline above are the savings from reduced residual disposal costs. There is additionally a fixed cost of litter which is not accounted for by simply applying the disposal rates to the amount of litter disposed. In order to calculate the fixed litter costs associated with OFFP and SUFC we have taken estimates from WRAP of the total cost of OFFP and SUFC litter management and the split of litter costs between fixed and disposal costs. The latter is estimated at 8% of litter costs relating to disposal and 92% relating to fixed costs, whereas the former is estimated at £42 million a year.¹⁴⁴ Based on this we have calculated total fixed litter costs at £38.64m and held this constant in the baseline and the policy options. This is done as we do not expect these costs to fall with a reduction in OFFP and SUFC litter because it is unlikely marginal decreases in litter will impact overall fixed costs. Due to the policies however, the *disposal* litter costs will fall relative to the baseline in line with the increase in the amount of waste sent to be reprocessed as less litter is disposed of (either as ground or bin litter).

Overall fibre-based composite litter costs are estimated to fall by £2.5m per year by 2033. This assumes that fixed costs will not fall.

Table 56 –Total litter costs, £m

	2024	2027	2033
Baseline	£42.56	£42.88	£43.59
Option 2	£42.29	£41.90	£41.10
Savings	-£0.28	-£0.98	-£2.49

GHG Emissions Savings

¹⁴⁴ [WRAP-eunomia-financial-cost-of-packaging-litter-phase-2-2021](#). See Table 3-17 for the split between fixed and disposal costs. See Table E2 for the total cost associated with option DRS 3 which is the relevant one for OFFP and SUFC.

It is estimated that by 2033, there will be an additional 35kt of fibre-based composite packaging diverted from residual to recycling under option 2.

Table 57 –Additional Recycled, Tonnes

	2024	2027	2033
Fibre-based composite	318	10,466	35,423

As described in the relevant section in option 1, by diverting packaging from residual to recycling there will be GHG emission savings. Particularly key for fibre-based composite packaging is the avoidance of methane emissions when sent to landfill.

Table 58 –GHG Emission Reduction, Tonnes

	2024	2027	2033
GHG Reductions	193	6,346	21,477

By applying the same carbon factors¹⁴⁵ as described in option 1 to the tonnage diverted from residual to recycling, it is estimated that option 2 will reduce GHG emissions by around 21kt per year by 2033.

Table 59 –GHG Emission Savings, £m

	2024	2027	2033
GHG Emission Savings	£0.05	£1.70	£6.30

By applying the same carbon prices¹⁴⁶ as described in option 1, this equates to around £6.3m of savings to society from reduced GHG emissions.

SECTION 6: RATIONALE AND EVIDENCE THAT JUSTIFY THE LEVEL OF ANALYSIS USED IN THE IA (PROPORTIONALITY APPROACH)

We have significantly expanded the evidence base and analysis compared to the 2021 consultation stage impact assessment. Of particular note, we have included the following additional pieces of analyses in this IA:

- Estimates of the impact of Covid-19 on the production and consumption of packaging
- Assessment of the impact of EPR on consumer prices

¹⁴⁵ <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018>

¹⁴⁶ <https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation>

- Estimates of obligated producer– including online marketplaces
- Monitoring and enforcement costs
- Familiarisation costs to all businesses impacted
- Improvements to the modelling of fibre-based composite polices
- The inclusion of additional materials from consistent municipal recycling in FNC calculations

SECTION 7: WIDER IMPACTS

SMALL AND MICRO SIZE BUSINESS ASSESSMENT (SAMBA)

Under the Producer Responsibility Obligations (Packaging Waste) Regulations 2007¹⁴⁷, a producer is an ‘obligated’ packaging producer if it, or a group of companies it is part of, handled at least 50 tonnes of packaging materials in the previous calendar year and has a turnover of more than £2 million a year (based on the previous financial year’s accounts)¹⁴⁸.

Defra has engaged with SMEs in our stakeholder engagement process and has carefully considered any options that may put an unnecessary burden on SMEs. The responses to the 2021 consultation have provided a clear steer on the options presented for the de minimis, with a majority¹⁴⁹ of respondents expressing a preference to reduce the de minimis to incorporate producers who handled at least 25 tonnes of packaging materials in the previous calendar year and had a turnover of £1 million. In addition to the support for a reduction in the de minimis, some respondents stressed the importance for finding a balance between excessive burden being placed on small businesses versus the strong belief in the ‘polluter pays’ principle.

Under the EPR scheme Brand Owners and Importers will be obligated to pay modulated fees to cover waste management costs (for the packaging they fill or have filled in the case of the Brand Owner, and for the filled packaging they import in the case of the Importer). There will also be a reporting obligation on Sellers (e.g., supermarkets) to report where they place packaging on the market, but not to pay modulated (disposal cost) fees. There will be an obligation on Distributors (see below) and an obligation on Online Marketplaces to report the packaging being sold through their marketplaces and pay disposal cost fees.

There will be two de minimis thresholds. An “upper” de-minimis threshold and a “lower” de-minimis threshold. Only those producers who are above the “upper” threshold will be required to pay disposal cost fees. Those that fall between the two thresholds will have reporting obligations only.

It is proposed that the “upper” de minimis threshold be set at £2 million annual turnover meaning that any producers of this turnover band and above are liable to meet disposal cost fees along with reporting, while the “lower” de minimis threshold be set at £1 million meaning that producers of turnover size £1-2m are liable for data reporting and regulator costs. Producers of size below £1 million are not obligated to meet any costs.

¹⁴⁷ <https://www.legislation.gov.uk/ukxi/2007/871/contents>

¹⁴⁸ <https://www.gov.uk/guidance/packaging-producer-responsibilities>

¹⁴⁹ 57% supported lowering the de minimis, 16% did not support this and 27% were unsure.

It is also proposed that Distributors (manufacturers and importers who sell unfilled packaging to businesses who fall *below* the "upper" de-minimis threshold) would take on the obligation on their behalf. For example a manufacturer selling unfilled fibre-based composite cups to a small coffee shop¹⁵⁰. While for the mandatory labelling there is no de minimis threshold.

Below, we consider separately the effect of implementing the proposed de minimis thresholds for the obligated producers, followed by a discussion of applying no de-minimis threshold for mandatory labelling and how we are going to mitigate any possible disproportionate impact on small and micro enterprises. We also discuss the impact of additional sampling requirement on small and micro. Material Facilities and fibre-based composite cups Mandatory Take Back on relevant SMBs.

IMPACT ON SMALL AND MICRO PRODUCERS – EPR

Under EPR, packaging producers will only be obligated for the packaging tonnages that they place on the market. This is in keeping with the 'polluter pays principle'. Producers will pay a fee per tonne of packaging they handle. As such, their obligation will be correlated with the amount of packaging they place on the market.

To calculate the potential regulatory burden that may be placed on small and micro businesses by reducing the de minimis threshold, we have incorporated externally produced econometric analysis that investigated the number of companies below the current de-minimis threshold, and the tonnage of packaging handled by those companies¹⁵¹. The report provided six hypothetical de-minimis options, structured around point of compliance and removal or decrease of the de-minimis threshold. The report informed our decision on our preferred approach to small and micro businesses. Eunomia was not able to include an option of "Brand Owner" because of the limitations of the data.

Although the main point of compliance will move to brand owners, this will likely cover several of the current producer categories. Some compliance will also fall on businesses other than brand owners. As such we have assumed that the number of producers obligated will not reduce¹⁵². We have also therefore used Eunomia's estimates of additional producers under the shared compliance scenario.

Overall, Eunomia estimate that around 1,900 additional producers will become obligated with lowering the de minimis to 25 tonnes and £1m turnover. However, Eunomia's central estimate is uncertain, and their analysis shows that the true number could be as high as 14,900¹⁵³. They estimate that these additional producers will handle 389k tonnages of packaging overall. This then is an estimate of the number of producers who will face data reporting

¹⁵⁰ Distributors may pass on the cost of meeting the obligations of producers below the de minimis. It is, however assumed that larger businesses would be able to meet the administrative burdens associated with meeting obligations at a lower cost than smaller businesses. Therefore the de minimis will to some extent shelter the smallest businesses from these costs.

¹⁵¹

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20670&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

¹⁵² This may be an overestimate of the number of producers. For example, many raw material manufacturers may not be obligated.

¹⁵³ Their central estimate is 1,823 however with a 90% confidence interval the overall range is estimated to be between 0 and 14,808.

requirements but will not be obligated to make payments towards the Full Net Cost of household packaging collection and management and binned packaging waste.

To understand the extent to which these additional producers are likely to be SMBs, we used ONS data¹⁵⁴ to estimate the average turnover per SMB for businesses within SIC codes from which producers are likely to be categorised¹⁵⁵. This would provide an indication for whether SMBs are likely to have a turnover between £1m and £2m. The average micro business within the SIC codes is estimated to have a turnover of £0.97m, while for small businesses the average turnover is £5.69m. This suggests that the average micro business will remain below the “lower” de minimis threshold, however it is likely that some may be newly obligated under data reporting requirements (if they also handle more than 25 tonnes of packaging). The average small business would already meet the turnover threshold to be obligated under the current system, however some may become newly obligated.

Eunomia’s research suggests that the average newly obligated producer handles around 210t of packaging. As explained however, producers falling in between the “upper” and the “lower” de minimis thresholds (those with turnover of between £1-2m) will not be liable to pay disposal cost fees. It will only be producers with a turnover of £2 million and greater who will be obligated for PRN and disposal costs based on the tonnages of packaging they deal with. These producers will be required to purchase PRNs based on the total packaging they place on the market, however, will only be obligated to pay the additional EPR fee on packaging likely to end up in household waste streams.

To estimate the average cost to producers per tonne of packaging we have divided the total compliance costs to producers (including SA costs) by the total tonnage of packaging handled. We estimate that the cost of complying with the requirement to purchase PRNs for all packaging, will be £28 per tonne, whereas the cost of complying with household Full Net Cost payments will be £256 per tonne¹⁵⁶.

Table 60 – Estimated compliance costs per tonne of packaging handled

	Cost per tonne
Household FNC	£256
PRN	£28

By multiplying the cost per tonne by the relevant tonnages, this leads to the following estimates. The average currently obligated producer handles 1.4kt of packaging¹⁵⁷ or 0.6kt of household packaging¹⁵⁸.

Table 61 – Estimated annual compliance costs per newly obligated business

¹⁵⁴ <https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/methodologies/annualbusinesssurveyabs>

¹⁵⁵ It is assumed that the majority of producers will be within the Manufacturing and Wholesale & Trade categories.

¹⁵⁶ For example, in 2024 the costs to producers of complying with household FNC payments will be £1.4bn (including SA costs). The tonnage of household packaging placed on the market in 2024 is 5Mt.

¹⁵⁷ There are approximately 7,000 currently obligated producers handling 10k tonnes of packaging. <https://npwd.environment-agency.gov.uk/>

¹⁵⁸ Assuming 42% of packaging is

Turnover	Household Tonnage (Kt)	Total tonnage (Kt)	Cost per business (£)	Cost as % of turnover
£1m			3,564	0.4%
£2m	117	278	41,603	2.1%

The cost per business for producers with a turnover of £1m consists of data reporting and regulator costs alone which will be independent of tonnage dealt with. For all producers with a turnover of between £1-2m, this is the expected ongoing annual cost. The estimate for producers of a turnover £2m (i.e. those above the “upper” threshold) is far higher at around £42k per newly obligated business, reflecting the additional burden of disposal and PRN costs.

Although there will therefore be additional costs to SMBs, under the reforms, additional costs will be related to the tonnage of packaging handled, which is shown to be correlated to turnover on average. To mitigate any increased costs to SMBs, a de minimis will remain in place, which will exclude the smallest producers (including the average micro business). In fact, according to Eunomia’s analysis, a de minimis at this level will still exclude around 21k businesses. The lowering of the de minimis therefore represents a suitable threshold at which, the number of obligated producers is increased, in line with the polluter pays principle, which also excluding the smallest businesses.

IMPACT ON SMALL AND MICRO PRODUCERS - LABELLING

We expect the packaging technologist costs to small/micro businesses to be £52.60/SKU¹⁵⁹. This cost represents the cost to the small/micro business of complying with the labelling requirement. We have doubled the expected cost per SKU for small/micro businesses due to them being more likely to rely on contractors and not having the economies of scale that larger businesses might have to drive the costs down. Based on Defra procured research on the impact of removing or lowering the De Minimis threshold¹⁶⁰ the total number of pack/fillers and importers handling consumer packaging that are expected to be small/micro businesses is 9,713. Therefore, of the 12,934 producers expected to comply with mandatory labelling/modulated fees, 75% are expected to be small/micro businesses. However, whilst the total packaging technologist costs are high (£91m in total), small/micro businesses would only be covering a small proportion of this cost as they are assumed to be placing significantly fewer SKU’s on the market. In the absence of reliable data, (and with an understanding that there is a significant variation in the number of SKUs placed on the market by small/micro businesses) we have assumed that small/micro businesses on average place 15 different SKUs on the market. This is a best estimate based on discussions with stakeholders. The cost per business would average at £789. In total, the cost to small/micro businesses is expected to be £7.6m over the appraisal period.

The other key cost is the familiarisation costs and ongoing training costs associated with complying with mandatory labelling. During the transition period, we expect each small business to spend 10-working hours familiarising

¹⁵⁹ Based on discussions with stakeholders such as WRAP and OPRL

¹⁶⁰ <http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20670&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

themselves with the new requirements. We expect 10 hours to be a reasonable estimate based on the size of the regulatory change and the number of different employees within each business that may be expected to be familiar with the new requirements. 10-hours is an average, with smaller businesses spending less time familiarising themselves, and larger businesses spending more time. We also assume that each small business will be allocated 3-day FTE to training each year to keep up to date with the latest labelling requirement– this could be split between a number of staff or carried out by one individual. The wage we have assumed for these costs is the median hourly wage of ‘advertising and market research’ as reported by the ONS in 2019, we have then increased this to a 2024 wage level (assuming a 2%/annum wage increase) and then added overheads at a rate of 22% (£19.30/hour)¹⁶¹. The familiarisation cost per small/micro businesses is expected to be £193/business. The training cost is expected to be £555/business.

We do not consider there to be any redesign costs to businesses (including small/micro businesses) due to sufficient time being given to businesses to integrate new labels into their packaging design.

Overall, small/micro packer/fillers and importers are estimated to face costs of £66m over the appraisal period. Although making up 75% of businesses, they are estimated to face 40% of the overall costs to businesses from mandatory labelling.

A de minimis has therefore not been set as the overall cost to SMBs is expected not expected to be significantly disproportionate. Enough time has been factored in such that the label can be introduced within the normal redesign cycle. Other costs are likely to be correlated with the number of SKUs placed on the market which is expected to be lower for smaller producers. Overall, ensuring that all packaging is labelled based on recyclability will maximise the impact of the policy.

IMPACT ON SMALL AND MICRO PRODUCERS – FIBRE-BASED COMPOSITE CUPS

All businesses that sell fibre-based composite cups will be obligated under a Mandatory Takeback (MTB) scheme. These businesses will be required to take back in scope cups (sold at any business) for recycling. This is expected to place additional costs on these businesses. Recognising that the proposed regulations may be unduly cumbersome for some SMBs we aim to set a ‘de minimis’ threshold. This refers to the cut-off point at which SMBs will be exempt from the burden of complying with MTB. The de minimis will exclude micro businesses from the requirements for the first two years of the obligation.

The key costs imposed on all businesses due to MTB are infrastructure costs and training/familiarisation costs. A cost of £300 per bin is expected, with all sellers of filled fibre-based composite cups in scope liable to pay this. Additionally, we expect around 2 hours a year ongoing training costs as well as a one-off cost associated with an expected 2-hour familiarisation time for each liable business. As these costs will be the same across all business irrespective of size, they are a proportionately greater burden the smaller the business.

¹⁶¹<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datalist?uri=employmentandlabourmarket/peopleinwork/earningsandworkinghours/datalist&filter=datasets&page=2> (Earnings and hours worked, UK region by industry by two-digit SIC: ASHE Table 5)

Valpak were commissioned to research and recommend different options for setting a de minimis¹⁶². This included analysis of the number, and market share, of businesses that would be excluded under different options, as well as industry engagement. It was shown that exempting all SMBs would likely exempt a large number of stores covering a significant proportion of the market share.

Research undertaken by Valpak suggests that out of a total of 3.2bn cups placed on the market in 2019, excluding businesses with less than 10 employees from MTB would mean 886m cups or around 28% of all cups placed on the market, would be purchased at stores without an MTB facility. These cups could however be dropped off at other stores with an MTB facility so even though the stores are exempt due to the de minimis, the cups they sell are not entirely out of scope.

The table below denotes the number of cups that would be sold at exempt versus non-exempt stores at varying de minimis levels.

Table 62 – Producers exempt under de minimis options

Employment size band	No de minimis	<5	<10	<20	<50
Number of cups sold by businesses out of scope (bn)	0.00	0.38	0.89	1.46	2.12
Number of cups sold by businesses in scope (bn)	3.22	2.84	2.33	1.76	1.1

Exempting all SMBs would exempt businesses with less than 50 employees, resulting in businesses representing a third (1.1bn of 3.2bn) of the market (by cups sold).

Furthermore, it is SMBs that are less likely to already part of voluntary initiatives. For example, while still an improvement, exempting all SMBs would mean targeting only larger retailers who are already part of the National Cup Recycling Scheme where gains relative to the baseline are smaller.

Setting the 'de minimis' threshold too low, and exempting more small and micro businesses, risks undermining the effectiveness of MTB hence ensuring SMBs are not be disproportionately impacted by the costs of complying with the policy is to be traded off against maximising its desired impact of increasing recycling rates of fibre-based composite cups.

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<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20670&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

Valpak considered various options for setting a de minimis, such as by revenue, size of the store (floor size) and number of cups sold. Although floor space was considered as an option, this was considered too difficult to regulate. We have therefore decided to opt for number of employees as the method for setting the de minimis as this is expected to be closely related to store size. This is however considered clearer for businesses. Furthermore, this measure is less likely than others (for example revenue) to change over time ensuring certain businesses do not fall in or out of scope of the threshold at different times.

It is proposed that any premise with less than 10 FTE employees will be exempt. This effectively exempts all micro businesses. This de minimis threshold will, however, be phased out and ultimately removed two years following the initial introduction of mandatory takeback, ensuring the maximum policy impact after this point. Furthermore, it is also hoped that as the scale of cups collected for recycling increases under the policy options the cost of recycling cups will fall. This mean that when small businesses do fall in scope, costs will have fallen such that the burden may no longer be unduly cumbersome.

It should also be noted that as the recycling market for fibre-based composite packaging grows over time, more data and insight into the structure of the sector will arise which may enable new possibilities for the setting of a de minimis level.

We have devised a low, central and high estimate for the number businesses liable to MTB based on the likelihood of certain sectors selling fibre-based composite cups (see Annex J for explanation of this). For each the low, central and high estimates, and the sectors they include, there are a number of businesses with less than 10 FTE employees which will be exempt under the de minimis threshold in the first two years following policy implementation.

Under the high estimate a total of 257,700 businesses have been deemed within scope of the policy, under the central estimate 143,110 have and under the low estimate only 89,140. These are the total number of businesses which will be liable in 2026 when the de minimis is phased out. However, in 2024 the number of obligated businesses is lower as those businesses with less than 10 FTE employees are exempt.

In the central estimate, implementing a de minimis threshold at less than 10 employees would exempt around 120,500 businesses, leaving about 22,600 in scope of the policy in the first two years.

The below table denotes the total number of businesses selling fibre-based composite cups and so potentially obligated under MTB.

Table 63 – Businesses by employee numbers

Employment size band	<10 (obligated from 2026)	>10 (obligated from 2024)	Total
Low	70,920	18,220	89,140
Central	120,450	22,660	143,110
High	207,005	50,695	257,700

IMPACT ON SMALL AND MICRO MATERIAL FACILITIES

Material Facilities (MFs) will be required to do enhanced sampling and compositional analysis on materials at input and output. Some Material Recovery Facilities (MRFs) managing mixed waste material are required to do

this already in England, Wales and Scotland under the MRF sampling regulations¹⁶³. However, sites considered to be a First Point of Consolidation (FPoC) are expected to come into scope, as well as those managing source separated waste streams. The sampling frequency for those already doing this sampling will also increase which increases costs. At present MRF regulations include a de minimis which excludes sites with an input below a 1,000t. Results from the previous consultation suggest that the majority of respondents were in favour of removing or changing the de minimis, however some pointed out that the smaller sites would find it difficult to comply with these proposed regulations.

FPoC are the first point at which packaging waste from different sources (for example different Local Authorities) will be mixed, and sampling is required to understand the tonnage, quality, and composition of waste from each source. This is because these factors will impact payments to Local Authorities under EPR. When setting a de minimis threshold, the quality and the importance of the data must be weighed with the burden on small and micro businesses.

Table 64 – Excluded sites and tonnage under de minimis options

	Excluded							
De Minimis Threshold	Tonnage	Proportion of Total Tonnage	Sites (Total)	Proportion of total sites	LA sites	Proportion of LA sites	Operators	Proportion of total operators
200t	9,814	0.0%	195	15%	25	14%	165	21%
500t	40,438	0.2%	288	22%	34	19%	244	32%
1,000t	106,798	0.5%	377	28%	47	27%	312	41%
2,000t	262,911	1.2%	480	36%	66	38%	383	50%
10,000t	2,052,419	9.4%	838	63%	135	77%	593	77%

Using waste permit data¹⁶⁴, it can be shown that maintaining the de minimis threshold at the current level would exclude 28% of sites. It would, however, only exclude 0.5% of the waste handled by potentially in scope sites. From the waste permit data is not possible to determine the source of waste for each site. This is important as sites will only be in scope if they take on waste from multiple sources. It is therefore possible that more sites than have been excluded in the analysis would actually be out of scope. It is therefore not possible to determine the accuracy of the estimated number of sites and tonnage excluded under different de minimis options.

¹⁶³ <https://www.gov.uk/government/publications/materials-facilities-how-to-report-on-mixed-waste-sampling>

¹⁶⁴ England <https://data.gov.uk/dataset/d409b2ba-796c-4436-82c7eb1831a9ef25/2019-waste-data-interrogator>; Scotland <https://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/>; NI and Wales waste return data provided by WRAP

Table 65 – Cost per tonne for different size sites,£

Operational costs per tonne of input (to site p/a)	Low	High
7,000	£2.11	£2.90
10,000	£2.05	£2.47
20,000	£1.93	£2.03
50,000	£1.57	£1.46
100,000	£0.97	£1.03
150,000	£0.37	£0.78

Data from a survey¹⁶⁵ asking MFs about the additional costs they would expect to face if sampling frequencies were increased were analysed. When plotting the cost per tonne for operational costs against the size of the site from the MF cost survey, there is a visible negative trend, such that the cost per tonne decreases as the size of the site increases. This suggests the possibility of economies of scale which would lead to disproportionate costs on smaller sites. A simple line of best fit was calculated for the data, firstly using a linear relationship and then a logarithmic relationship. The latter was the better fitting model, with an R squared of 0.58, in contrast to 0.55 for the linear trend. The R squared suggests there is some relationship between these variables in the data.

Cost per tonne estimates at different site sizes from this analysis are presented in Table 64. The low represents the linear trend and the high is the logarithmic trend. Only site sizes that fall within the datapoints in the data are included. The results should be treated with caution as they are from a small sample size (12) and are representative of what businesses have reported saying they will need, rather than actual costs. Nonetheless, it suggests it is not possible to rule out that smaller sites will face disproportionately higher costs than larger sites.

Due to this uncertainty, and the potential disproportional costs on smaller sites, the current de minimis excluding sites below 1,000 tonnes of input will be retained as the regulations are extended. This will then be reviewed in 2026/27 as part of a wider initial review of EPR.

IMPACT OF EPR ON CONSUMERS

¹⁶⁵ Estimated Costings and Facility Numbers for EPR Manual Sampling, WRAP/ Waite Resource Management Ltd. Unpublished

Average impacts

Under EPR packaging producers will take on the full net costs of collecting and disposing of packaging waste from household. This is a cost transfer for Local Authorities who currently pay for these services. It is possible that producers will pass these costs onto their consumers in the form of higher prices. In the previous IA, these potential price impacts on consumers were recognised as a key cost of EPR but were not quantified. We have subsequently undertaken research on how businesses are likely to react to the reforms and have quantified likely price changes for consumers.

Although some packaging producers will be exempt from EPR due to the de minimis threshold, it is assumed that the majority of packaging producers will be liable. Hence the fees will largely represent an **industry-wide** cost increase with all firms facing an increase in cost.

To calculate the exact cost pass through rate (CPT), defined as the amount of the cost increase that is passed onto consumers via increased prices, we would need to make use of measures of the elasticity of demand and the elasticity of the supply in the market for obligated produces operate¹⁶⁶. Due to a lack of the data necessary to estimate the relevant elasticity of demand and supply we have instead adopted an approach based on market structures¹⁶⁷¹⁶⁸. As explained by the Office of Fair Trading (OFT) the potential cost pass through will theoretically sit between the two extremes of the cost pass through under monopoly, which is 50%, and that under perfect competition which is 100%¹⁶⁹. In light of this, we have used these figures as a low estimate and high estimate. The central estimate has been obtained as a most likely scenario from the OFT based on a literature review of empirical research conducted by them. It should be noted that perfect competition is regarded as widely non-existent in reality, and likewise that the industries impacted by EPR are almost certainly not pure monopolies. As the high and low scenarios correspond to these market structures, they should be viewed as theoretical maximums and minimums, rather than outcomes which are likely to actually materialise.

Table 66 – Percentage of increase in cost due to EPR that is passed on to consumers

Low scenario (Pure monopoly)	Central Scenario	High Scenario (Perfect competition)
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¹⁶⁶ Elasticity of demand and supply refer to the extent that demand and supply change when the price of a good changes. If they are inelastic, when price changes the quantities demanded and supplied respond little. The cost pass through depends on the elasticity of demand relative to the elasticity of supply in the relative market. If the elasticity of demand is large relative to the elasticity of supply (i.e. demand reacts more to a change in price than supply) the pass-through rate will be low while if the elasticity of demand is small relative to the elasticity of supply (i.e. demand reacts less to a change in price than supply) the pass through rate will be high. For a more in depth explanation of the role elasticities play in cost pass through, see: [Microsoft Word - 524 OFT Cost Pass-Through Final R.docx \(publishing.service.gov.uk\)](#)

¹⁶⁷ Models of different market structures, the assumptions they make underpinning how prices are set, imply how firms will change prices in response to a change in cost and hence they will pin down a theoretical pass-through rate.]

¹⁶⁸ Market structures in economics refer to the characteristics of the market which determine the behaviour of firms within that market. Monopoly and perfect competition are two such market structures. Monopoly refers to where there is only 1 firm that sells the given good and as such this firm can decide the price at which it sells. Perfect competition refers a market where there are a very large number of firms and as such none have the ability to set the price at which they sell.

¹⁶⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/320912/Cost_Pass-Through_Report.pdf

50%

85%

100%

Impact on an average household

The total increased cost faced by all businesses impacted by EPR collectively will be equal to the target full net cost recovery. Assuming the cost pass through rate applies the same to all businesses, we can apply each of the rates in Table 65 to this figure to estimate the total annual cost passed on to consumers collectively via increased prices under each scenario.¹⁷⁰ The ONS have estimated that there were 27.8 million households in the UK in 2020, and based on this we have calculated that the change to yearly expenditure for the average household will fall between £23.87 and £47.73 depending on the cost pass through rate with the most likely increase being £40.57. This corresponds to a change to weekly expenditure of between 46p and 92p and week, with a central estimate of 78p¹⁷¹.

Table 67 – Increases in cost due to EPR

	Low Scenario	Central Scenario	High Scenario
Consumers weekly per household, £	0.46	0.78	0.92
Increase as a proportion of weekly spend¹⁷²	0.08%	0.13%	0.15%
Consumers yearly per household, £	23.87	40.57	47.73

This assumes that households do not adjust consumption in response to EPR meaning we assume that they consume the same goods in the same quantities as they did before EPR. This is a reasonable assumption to make as although noticeable when aggregated in weekly terms, the actual price impact per product is low and unlikely large enough to provoke changes to consumption even were consumers to be quite price sensitive with regard to EPR impacted goods¹⁷³.

Impact on CPI

¹⁷⁰: [Families and households in the UK - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/familiesandhouseholds)

¹⁷¹ [Families and households in the UK - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/familiesandhouseholds)

¹⁷² This is based on the average household weekly spend of 592 taken from the ONS.

<https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/bulletins/familyspendingintheuk/april2018tomarch2019>

¹⁷³ That is not to say that we assume consumers are not demand inelastic, rather that these price impacts are insignificant

WRAP previously conducted analysis on behalf of Defra to estimate the impact of EPR on Consumer Price Index (CPI) inflation. This provides an alternative method for estimating the average impact on consumers. Using Valpak's pack flow reports¹⁷⁴, it can be shown that consumer (which is used as a proxy for household) packaging is generally grocery and non-grocery retail packaging.

According to the Office of National Statistics (ONS) the value of retail sales (excl. automotive fuel) in 2019 was £392bn.¹⁷⁵ Based on the assumption that producers pass on 85% of their obligation, this would lead to retail sales increases of around £1.1bn. This is a 0.29% increase. When considering the basket of goods that make the CPI, categories closely related to grocery and non-grocery retail¹⁷⁶, accounted for 26% of the weighted basket in 2020. Under the assumption that EPR does not have an inflationary impact on other categories, a 0.29% rise in retail sales would increase CPI by 0.07%.

Table 69 – Impact of EPR on CPI

	Low	Central	High
Increase in value of retail sales	0.17%	0.29%	0.34%
Increase in CPI	0.04%	0.07%	0.09%

Distributional Impacts

To get an indication of the distributional impacts of an increase in consumer prices, we can apply the 78p per week increase to average weekly expenditure by income decile.¹⁷⁷

Table 70 – Increase in weekly expenditure by income decile

Decile	10	20	30	40	50	60	70	80	90	100	Average
Weekly expenditure (£)	249.5	285.6	360.6	424.2	525.1	589.8	649	747.7	864.7	1225.2	592
Percentage change in expenditure	0.31%	0.27%	0.22%	0.18%	0.15%	0.13%	0.12%	0.10%	0.09%	0.06%	0.13%

¹⁷⁴ <https://wrap.org.uk/resources/report/packflow-covid-19-reports>

¹⁷⁵ <https://www.ons.gov.uk/businessindustryandtrade/retailindustry/datasets/poundsdatatotalretailsales>

¹⁷⁶ 'Food and non-alcoholic beverages', 'Alcoholic beverages and tobacco', 'Clothing and footwear' and 'Furniture, household equipment and maintenance'

¹⁷⁷ 2019 dataset: [Family spending workbook 1: detailed expenditure and trends - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/peopleinwork/earningsandincome/datasets/familyspendingworkbook1)

This analysis assumes that all households will see their weekly expenditure rise by the average amount in nominal terms. This likely a simplifying assumption as the impact on weekly spending will be determined by the specific selection of goods purchased by a household with factors including:

- The number of goods purchased by a household (buying more goods is likely to be somewhat correlated with the amount of packaging used)
- The relative proportion of prices paid for these goods that cover packaging costs (packaging costs for some goods will be proportionally higher than others)
- The relative difficulty in recycling the packaging on goods purchased (this will impact the modulated fee on that packaging)

This analysis is therefore limited, however it does give some indication of the magnitude of the impact of cost rises on consumers on average and from different income deciles. Although lower income groups may see higher price rises than higher incomes groups, this increase is expected to be low, with the lowest income decile seeing increases of around 0.3%.

EPR is a transfer from government to businesses, and it should therefore be considered that households will benefit through savings to the public sector, equal to the increase in costs to businesses. This will have a positive impact on household through forgone tax payments or increase public expenditure.

IMPACT OF EPR ON TRADE

Producers will only be obligated for packaging intended for consumption (and therefore disposed of) in the UK. The same obligation will apply to packaging regardless of whether it was produced in the UK or imported. Any packaging produced, or filled, in the UK but exported for consumption outside the UK will not be covered under the requirements.

Specifically, businesses who are responsible for the import of filled packaging into the UK for sale will face an obligation under EPR. Where the importer is not based in the UK, it will be the first UK-based owner of the packaging who takes this obligation. It should be noted that importers of packaging are already obligated under the current producer responsibility regulations.

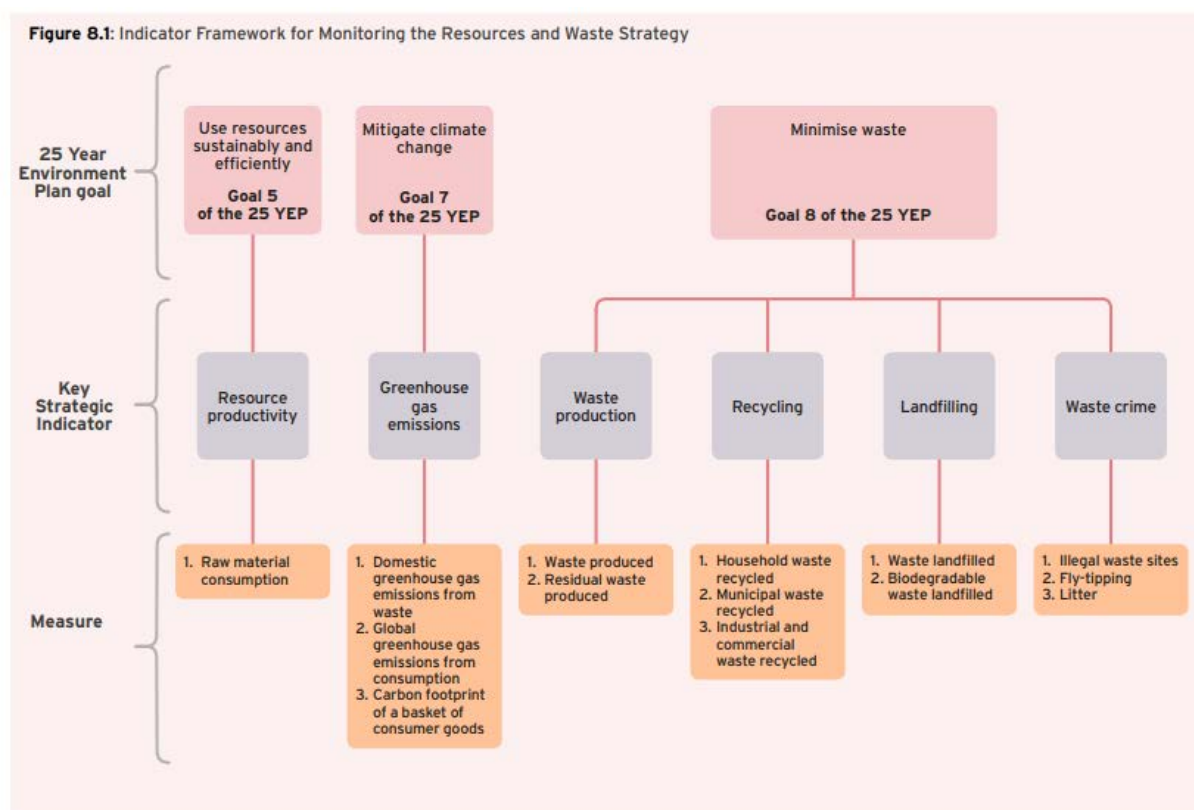
Similarly, businesses based in the UK who operate a website, or any other means by which information is made available over the internet, through which persons based outside the UK, other than the operator, are able to offer filled packaging for sale in the UK (whether or not the operator also does so), will have a reporting obligation. This is a new requirement and closes a loophole whereby packaged products sold by overseas sellers through online marketplaces are not captured.

As the reporting requirements will be the same for domestically produced or imported packaging, there is not expected to be any distortions on trade.

SECTION 8: MONITORING AND EVALUATION PLAN

Current monitoring arrangements

Monitoring change is focused on our intended outcomes, namely reductions in resource use and waste production and improvements in waste management (more recycling, less landfilling and less waste crime). The changes are part of a ‘golden thread’ which leads upwards to the objectives of the 25 Year Environment Plan¹⁷⁸, the Clean Growth Strategy, the Industrial Strategy, and the Litter Strategy. The framework of indicators is set out on page 139 of the Resources and Waste Strategy¹⁷⁹ and shown below for ease of reference.



The framework was devised prior to the focus on Net Zero, to which all three 25YEP goals are relevant. We have set out our approach to monitoring change in our *Monitoring Progress* report (available [here](#)).

Current data collection regimes

Data on waste is limited, something we are addressing through our work on waste tracking, which is due to be implemented, subject to consultation and legislative change, in the next couple of years. EPR will also ensure more granular data is collected from across the packaging waste supply chain:

- Packaging producers will be required to provide more granular data of the amount and types of packaging they place on the market. This will, include greater detail on sub-packaging categories (for example plastic polymer type) as well as whether that packaging is likely to end up in household or non-household waste.

¹⁷⁸ <https://www.gov.uk/government/publications/25-year-environment-plan>

¹⁷⁹ <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

- Points of First Consolidation (PoFC), including Transfer Stations (TS) and Material Recovery Facilities (MRF) will be required to provide sampling and compositional analysis, which will enable a better understanding of the proportion of packaging, and contamination, from different sources. This will mean collecting data from a wider range of Material Facilities (MF)s, and greater detail provided by those already reporting data.
- All reprocessors and exporters of packaging for recycling will be required to report data on the amount of packaging they recycle. This will fill a data gap whereby the requirements are essentially voluntary, and some businesses may choose not to report. There will also be a requirement to increase the granularity of data provided.

In the meantime, we rely on the Defra-funded WasteDataFlow reporting platform for local authority collected waste, on work delivered by WRAP, on our own in-house models (MELMOD¹⁸⁰ and FOWST¹⁸¹), and on bespoke Defra-funded measurement initiatives.

Proposed monitoring arrangements

We have devised a series of high-level theories of change from which a sub-set of SMART indicators will be selected. We expect that we will currently be collecting some of these, but that we will need to define and collect data on additional indicators relevant to specific policy initiatives.

We also plan to expand our routine monitoring from the high-level indicators shown above to a) material-based indicators e.g. food waste, packaging waste and b) lead indicators of change, e.g. shifting patterns of behaviour. These will be reported in future editions of the annual *Monitoring Progress* report.

Both activities are elements of an external commission for evaluation of the Resources and Waste Strategy which we expect to start in early 2022. We have approval to start the procurement process, which we will be initiating in autumn 2021.

These activities will cover a number of policies to be introduced as a result of the Resources and Waste Strategy, but will include specific assessment of EPR.

External influencing factors

The context within which EPR will be implemented is extremely complex, with many interacting parts, policies and actors. The complexity supplement to the Magenta Book is helpful in this respect and will be the basis of evaluation commissioning.

Key factors which may influence the outcome of EPR, which are not under our control, include:

- Decisions made by Local Authorities to do with implementing consistent recycling in England

¹⁸⁰ A model used to estimate emissions from landfill

¹⁸¹ A model used to estimate waste sector GHG emissions

- The growth of domestic reprocessing markets, as well as changes to the packaging waste export market
- Wider consumer pressures on packaging producers which influence packaging design and recyclability

We will ensure that evaluation takes account not only of our own activities but also those of other actors. Similarly, we will ensure that we look for unintended outcomes as well as intended outcomes, and that we assess both benefits and disbenefits, as whether an outcome is felt as a 'good' or 'bad' thing depends on who is affected, how and when.

Early indications that policies are not working as intended

We intend to commission both an impact evaluation and a process evaluation. The process evaluation will be carried out in parallel to policy implementation, to help us understand what is and is not working, get feedback from stakeholders and make corrections to design, implementation and regulation if needed. It will provide evidence to defend EPR in the face of unjustified external criticism, but also enable us to quickly stop policies which are not working as intended, or which may be causing hardship.

Performance evaluation

The impact evaluation we are commissioning will enable us to make a formal assessment of policy performance compared with expectations. We intend to build in a way of quantifying attribution, so we can distinguish, quantitatively, the impact of EPR as distinct from other factors while recognising the system interactions that mean it is rarely the case that a single policy leads to a single outcome.

The impact evaluation will gather quantitative and qualitative evidence about the difference EPR is making, which aspects are working, which are not working so well, and recommendations for future improvements. Following from this, we will be able to use the data to estimate cost-benefits and to satisfy any commitments we have made to carry out formal reviews.

Further Review and Post Implementation Review

A review of the impact of EPR will occur in the 2026/27 financial year. This review will focus on aspects such as a decision on whether Full Net Costs should be extended to non-household packaging, whether changes need to be made to the litter aspect of EPR payments (for example including ground litter), and whether data collection is sufficient (for example whether Material Facility sampling and compositional analysis is providing sufficiently accurate data).

A Post Implementation Review of EPR will occur five years after regulations come into force in the 2029/30 financial year.

SECTION 9: ANNEXES

ANNEX A: CURRENT PACKAGING REGULATIONS

Under the Packaging Waste Regulations, obligated producers¹⁸² are required to meet recycling targets set by Government. The regulations do not require obligated producers to collect or recycle their own packaging to meet their share of the UK packaging waste recycling targets. Rather, they must obtain evidence of recycling from accredited reprocessors or exporters to prove they have met their recycling obligation. This evidence is known as Packaging Waste Recovery Notes (PRNs) or Packaging Waste Export Recovery Notes (PERNs). These evidence notes are issued by accredited packaging waste reprocessors and exporters, respectively, and are acquired by packaging producers either directly or through a compliance scheme acting on their behalf. An accredited reprocessor or exporter can issue PRNs or PERNs equivalent to the amount of packaging waste reprocessed (e.g. 100 tonnes of steel packaging reprocessed allows the reprocessor to 'sell' 100 steel PRNs)¹⁸³.

The evidence notes have two functions. Firstly, they are a 'counting tool' for the quantities of packaging waste that is recycled and provide the evidence on which producers demonstrate they have complied with their obligations, and packaging recycling rates are determined, and the achievement of targets assessed. Secondly, they are a way to channel producer funding to support increased recycling operations since producers pay for PRNs / PERNs. This internalises some of the costs of recycling packaging waste to producers.

The Packaging Waste Regulations establish a de-minimis threshold, exempting businesses which have a turnover below £2m and who handle under 50 tonnes of packaging a year. However, the packaging that is handled by these businesses counts when calculating the UK's overall recycling performance. Therefore, targets on obligated producers are set higher than the equivalent UK recycling rate to account for this exempt packaging. The actual amount of exempt packaging changes from year to year. Business targets are therefore set at a level to account for these fluctuations. This also means that obligated producers pick up a share of the cost of meeting the targets for businesses that fall below this de minimis threshold.

Businesses obligated under the Packaging Waste Regulations can choose how to comply. They can:

- Contract directly with reprocessors/exporters and acquire PRNs and PERNs equivalent to their obligation (known as individual compliance); or
- Join one of several approved compliance schemes who manage compliance on behalf of their members; this includes managing the reporting of their packaging data and acquiring evidence (PRNs/PERNs). Most obligated producers have chosen to join a compliance scheme.

The price of evidence notes is determined by the market; they can vary in price in response to a range of factors, such as the availability of the supply of recyclable materials; the price of raw materials; the price of secondary materials; the availability of evidence; and the level at which the recycling targets have been set. The total income raised through the sale of PRNs/PERNs has therefore varied from year to year. For example, between 2010 and

¹⁸² An obligated producer includes any business involved in the packaging supply chain, i.e. one that manufactures raw materials for packaging, converts raw materials into packaging, uses packaging to wrap/contain goods, or sells or imports packaged products. The 'responsibility' for the packaging is currently split between these actors in the supply chain

¹⁸³ Further details on the existing regulations are available at <https://www.gov.uk/guidance/packaging-producer-responsibilities>

2019, the annual income from the sale PRNs/PERNs has ranged from £28 million to a high of £366 million in 2019.

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ANNEX B: UK GOVERNMENT AND DEVOLVED ADMINISTRATION COMMITMENTS

The **UK Government's** commitments include:

- UK Industrial Strategy (2018) and Clean Growth Strategy for England (2021)
 - Commitment to explore how we can better incentivise producers to manage resources more efficiently through producer responsibility systems.
- 25 Year Environment Plan for England (2018)
 - Commitment to reform the Producer Responsibility system (including the Packaging Waste Regulations) to incentivise producers to take greater responsibility for the environmental impacts of their products
- Resources and Waste Strategy for England (2018)
 - Maximising resource productivity - through more efficient manufacturing processes
 - Maximising the value from resources throughout their lifetimes - by designing products more smartly to increase longevity and enable recyclability
 - Managing materials at end of life – by targeting environmental impacts
 - Invoke the 'polluter pays' principle and extend producer responsibility for packaging, ensuring that producers pay the full costs of disposal for packaging they place on the market
 - Stimulate demand for recycled plastic by introducing a tax on plastic packaging with less than 30% recycled plastic
- UK government commitment to meet net zero domestic greenhouse-gas emissions by 2050.
- A manifesto commitment to introduce an Extended Producer Responsibility scheme.
- A manifesto commitment to introduce an export ban on plastic waste to non-OECD countries which will require investment in additional sorting and recycling facilities in the UK.

During 2020 **Welsh Government** undertook a consultation and engagement programme as a precursor to its next Waste Strategy – *Beyond Recycling – A strategy to make the circular economy in Wales a reality*. The strategy sets the ambition for Wales to become a zero-waste nation by 2050, meaning any discarded materials are recycled and re-circulated within the Welsh economy, with no loss of materials from the system – effectively a 100% recycling rate from all sectors. To support this Beyond Recycling sets high level objectives to tackle littering and to increase the range of plastic materials collected for recycling and develop more recycling infrastructure and end markets in Wales. In *Beyond Recycling* Welsh Government commits to work with the other governments of the UK in developing legislation for an Extended Producer Responsibility (EPR) scheme for packaging and then over time to develop an EPR approach for additional products such as tyres, textiles, bulky wastes (for example furniture, mattresses and carpets) and products used in construction.

¹⁸⁴ An Environmental Audit Committee 2017 report estimated that the PRN system covered around 10% of packaging waste disposal costs, with the remaining 90% funded by the taxpayer
<https://larac.org.uk/sites/default/files/LARAC%20POLICY%20PAPER%20The%20future%20of%20LA%20Waste%20Funding%200418.pdf>

The key aim of the Waste Management Plan for **Northern Ireland** is to set out Northern Ireland's intentions to work towards a sustainable and circular economy. This means using the "waste hierarchy" (waste prevention, preparing for re-use, recycling, recovery and finally disposal as a last option) as a guide to sustainable waste management. It is Northern Ireland's intention to revise the current Northern Ireland Waste Management Strategy - "*Delivering Resource Efficiency*" to include the fundamentals of the European circular economy package. The expectation is that the revised strategy would include: Northern Ireland's intentions on meeting the revised European municipal waste targets for recycling and landfill, introducing extended producer responsibility arrangements and a potential Deposit Return Scheme for drinks containers, meeting higher packaging waste recycling targets and adopting measures in relation to reducing all forms of littering.

In **Scotland** circular economy policy is set out in *Making Things Last: a circular economy strategy for Scotland*. This policy is underpinned by key principles, which include 'applying the waste hierarchy' and preventing waste and promoting reuse, and 'Polluter pays' meaning those who produce pollution should bear the costs of managing it to prevent damage to the environment or human health. Implementation is supported by a series of targets relating to increasing recycling, reducing food waste, reducing overall waste and reducing the use of landfill. The Scottish Government has recently consulted on additional legislative measures to support a circular economy and is working with the UK Government and other devolved nations on measures, including legislation, which will give new impetus to circular economy businesses and a modern, effective and efficient resource management system. This includes working jointly with the UK, Welsh and Northern Irish Governments on reforming the packaging regulations and introducing extended producer responsibility. Separately Scottish Government has regulations in place to introduce a Deposit Return Scheme for single-use drinks containers in 2022.

ANNEX C: PRE-EPR SWITCHES

As well as those initiated by the introduction of modulated fees it is expected that some packaging material switches will be made before this date. Based on discussions with WRAP we have included a small number of switches which are expected to occur before EPR is in place and are outside the scope of the analysis done using Eunomia model. It is expected that some of these switches will occur due to producers anticipating the introduction of modulated fees and preparing for the introduction of EPR¹⁸⁵. However, not all these switches will be attributable to EPR, as producers will respond to other influences to adopt more recyclable packaging, for example commitments under the UK Plastics Pact¹⁸⁶, the Plastic Packaging tax or for their own business reasons. These switches are therefore divided between the baseline and EPR options. This is an arbitrary split and sensitivity analysis was undertaken to understand the impact of using different assumptions.

The switches included in this IA were recommended by WRAP who have expert knowledge on the recyclability of packaging types and likely substitutes. As in the consultation IA, this analysis concentrates on switches between plastic polymers as this is where there is the clearest evidence of potential substitutes. Polyvinyl chloride (PVC) and

¹⁸⁵ It is worth noting that whilst we have modelled these switches, these are not definitive figures and are subject to change depending on the structure of modulated fees that are agreed on in Phase 2 of engagement with WRAP.

¹⁸⁶ <https://wrap.org.uk/taking-action/plastic-packaging/the-uk-plastics-pact>

polystyrene (PS) are identified as currently difficult to recycle and therefore likely to see diminished use by producers. A significant number of PS and PVC packaging items placed on the market are in the form of pots, tubs and trays (PTT) and based on recommendations by WRAP, we have assumed that a significant proportion of these packaging types will be substituted for more recyclable polymers before EPR is introduced. Some will remain in use at the introduction of EPR, however due to their current low recyclability these are expected to be phased out quickly under EPR as indicated by the Eunomia model¹⁸⁷. PS and PVC PTTs are assumed to be mainly substituted for polyethylene terephthalate (PET) equivalent with small amounts switching to polypropylene (PP) and polyethylene (PE).

The Table C.1 shows the tonnage of PS and PVC in the options 1 compared to the baseline for the years before 2024. The difference in PS and PVC placed on the market can be explained by switches related to PTTs which occur before modulated fees are in place.

Table C.1 Difference in PS and PVE in EPR Option and Baseline, tonnes

	2022	2023
PS	- 3,445	- 5,183
PVC	- 1,400	- 2,106
Total	- 4,845	- 7,288

Within the analysis PS and PVC are assumed to switch to PET, PP and PE as well as high-density polyethylene (HDPE), which are all based on discussions with WRAP. Table C.2 shows the difference in tonnage of these polymers in the municipal sector under the EPR and baseline options.

Table C.2 Difference in HDPE, PE, PET and PP in EPR Option and Baseline, tonnes

	2022	2023
PE	70	105
PET	3,741	5,628
PP	1,034	1,555
Total	4,845	7,288

¹⁸⁷ It should be noted that UK nations are in the process of consulting on a ban of PS food and drinks containers. If such policy were to be introduced before EPR, benefits relating to switched away from PS packaging would likely move to the baseline. Annex B describes sensitivity analysis on these assumptions and shows how this might impact the NPV.

Black plastic was also identified by WRAP as a packaging category likely to be phased out significantly before the introduction of EPR. As part of their analysis Eunomia sought to disaggregate plastic POM data to allow for the analysis for modulated fees on the use of black plastic and have therefore estimated the amount of household-like plastic placed on the market. Eunomia made the simplifying assumption that all household-like black plastic packaging is in the form of PTTs. WRAP has advised that almost all black PTTs will switch to an alternative by 2024, and therefore we have assumed that the majority of black plastic PTTs currently placed on the market will switch to a non-black equivalent of the same polymer type before 2024 in the EPR options. Since the consultation IA we discussed these assumptions further with plastic industry stakeholders. They suggested that the assumed placed on the market tonnage of black plastic packaging was likely too high. We have therefore reduced this for the final impact assessment.

Table C.3 Difference in Black Plastic PTTs in EPR Option and Baseline, tonnes

	2022	2023
Black PTT	- 7,199	- 10,830

We expect that some of this switching will occur as a result of producers preparing for modulated fees however producers are likely to be influenced by other pressures to make these changes. In order to attribute some of the impacts of these switches to modulated fees, it is assumed that these switches would have occurred at a slower rate under the baseline option. Due to a lack of evidence, switches in the baseline are set to occur half as quickly under the EPR option. As this is an arbitrary assumption, sensitivity analysis is included. The low option here assumes that none of these switches are attributable to EPR and would have occurred under the baseline option. The high option assumes that all pre-2024 switches are attributed to modulated fees.

The consequence of these switches is that packaging is diverted from residual to recycling. This will impact the cost of collecting and treating packaging in both the HH and NHM sectors as well as increasing the amount of recycled material available in secondary material markets. Finally diverting plastic away from landfill and energy for waste (EfW) will reduce greenhouse gas emissions. Table C.4 shows the costs and benefits of these switches in the period 2022-2023 under each option. This shows that there are £0.6m additional costs and £3.7m additional benefits from the central option compared to a option in which switches are fully captured under the baseline over this period. This is £3.4m net benefits. Assuming that all impacts are attributable to EPR adds £0.6m additional costs and £3.5m benefits totalling £3.2m net benefits.

Table C.4 – Discounted Additional Costs and Benefits from Packaging Switches Prior to EPR (2022-23)

£m	Low	Central	High
Costs			
Landfill Loss to HMT	£0	£0.3	£0.6
Total Costs	£0	£0.3	£0.6
Benefits			
GHG emissions savings	£0	£1.2	£2.4
Additional material revenue for recycling sector	£0	£1.0	£1.9

Reduced cost of collection and treatment of HH residual waste (inc landfill tax)	£0	£1.2	£2.2
Reduced cost of collection and treatment of HH recycling	£0	£0.3	£0.6
Total Benefits	£0	£3.7	£7.2
Total			
Net benefits	£0	£3.4	£6.6

ANNEX D: METHODOLOGY IN BASELINE PACKAGING PLACED ON THE MARKET METHODOLOGY

The Pack Flow reports detail the POM tonnages in both the consumer and non-consumer sectors. These sectors are used as a proxy for Household (HH) and Non-Household (NH) packaging waste within the IA. Almost all NH packaging identified in the Pack Flow reports is Commercial and Industrial (C&I)¹⁸⁸. Non-Household Municipal (NHM) refers to the wider municipal sector that includes businesses and public organisations producing household like packaging waste. NHM is essentially the household-like element of C&I packaging waste. Within this IA the portion of C&I that is not NHM is referred to as “other C&I”.

Non-Household Municipal

EPR modulated fees are expected to cover all household packaging from 2024 onwards. Mandatory labelling will apply to household and household-like primary packaging and it is therefore important to determine the amount of non-consumer packaging that is household-like in nature. This is difficult as non-consumer industries may use packaging that is household-like and that which is not. The Pack Flow reports point out that packaging in the hospitality sector is likely to be almost entirely household-like. However, it is not clear to what extent other non-household sectors will use household-like packaging.

Due to the uncertainty in the data, we have used several methods to calculate the amount of household-like packaging in the non-household sector on top of that contributed by hospitality. For our central estimate we assume that 56% of C&I packaging, as estimated in the Pack Flow reports, is municipal. This is the estimate of the proportion of C&I waste which is municipal using waste arising data.

It is recognised that estimates of the total amount of packaging differs when using POM methods and data on waste collected by local authorities and private businesses. Waste arising data is usually higher. This is because it could be over-inflated due to moisture content or contamination, and there is uncertainty over how much of the waste collected is household like packaging specifically. In contrast there is uncertainty in the amount of packaging POM not currently captured by the NPWD, such as that handled by unobligated producers. Although the Pack Flow reports attempt to account for this, it is possible that this is still underestimated. Therefore, based on recommendations by WRAP, we have used the upper POM estimate from the Pack Flow reports¹⁸⁹ as the central POM estimate in the IA for both the HH and NHM POM figures.

¹⁸⁸ The Pack Flow reports also identify a small amount of Agriculture and Construction and Demolition packaging which is classed as NH but is not C&I.

¹⁸⁹ The upper error margins

As in the DRS and consistent recycling IAs we have taken POM data for DRS materials from Valpak's Deposit Return Scheme for Drinks Containers¹⁹⁰ report. Future POM projections are taken from Valpak's Impact on Packaging Policy Reforms on UK Secondary Material Markets¹⁹¹ report, again in line with the consistent recycling and DRS IAs. These are based on projections from the Pack Flow reports and provide a business as usual (i.e. no DRS/consistency) view of future trends. It is assumed that consistent recycling and DRS will not impact the total amount or composition of packaging on the market; that 85%¹⁹² of DRS materials are captured by the scheme; and that all captured and non-captured DRS materials are out of scope of EPR and this IA. Subsequently, this amount of packaging is therefore removed from the baseline option¹⁹³ as well as all other options.

Table D.1 shows the DRS materials placed on market in 2017. As the implementation of DRS will differ across DA's¹⁹⁴, we have assumed DRS material tonnage will increase every year in line with the total POM growth trend, based on the Valpak secondary markets report¹⁹⁵ for the central estimate.

Table D.1 - 2017 DRS Packaging placed on the market

Drinks containers	Household POM Kilo-tonnes (Kt)	NHM POM Kilo-tonnes (Kt)	Total POM Kilo-tonnes (Kt)
Glass bottles	1,377	459	1,836
Aluminium cans	109	11	120
Steel cans	33	1	34
Plastic PET bottles	224	94	318
Total	1,734	565	2,308

Source: Valpak's Deposit Return Scheme for Drinks Containers report

Non- Household Municipal

Non-Household Municipal (NHM) waste refers to waste that is household-like in nature but collected from non-household sources such as businesses and public organisations. There is a high level of uncertainty in the amount of packaging collected as waste from the NHM sector which makes it difficult to accurately calculate the cost to

¹⁹⁰ <https://www.valpak.co.uk/more/reports/deposit-return-schemes-for-drinks-containers>

¹⁹¹ Valpak (2020), "The Impact of Proposed Packaging Policy Reform on the UK's Secondary Materials Market", unpublished report for WRAP.

¹⁹² In the DRS impact assessment a more gradual introduction is assumed whereby 75% is captured in year 1, 80% in year 2 and 85% from year 3 onwards. For simplicity the analysis in this impact assessment assumes an 85% capture rate for DRS materials from year 1. This simplification is expected to have minimal impact on the result.

¹⁹³ DRS covers the following beverage containers: PET bottles, aluminium and steel cans and glass bottles.

¹⁹⁴ We have assumed an 'All-in' DRS in Scotland and Wales, and an 'All-in no glass' in England, Northern Ireland from.

¹⁹⁵ Valpak, (2019) The impact of proposed packaging policy reforms on the UK's secondary materials markets

businesses of collecting this waste. This section discusses the uncertainty around NHM waste tonnage and provides a range of estimates of the potential cost of collecting NHM packaging waste.

To understand the amount of waste generated by the NHM sector, two key methodologies can be used. The first is using data on the amount of packaging placed on the market (POM). WRAP publish the material specific Pack Flow reports, which most recently estimated the amount of packaging POM in 2019. These reports also included forecasts for the amount of packaging POM up until 2022, as to account for the impacts of Covid-19 in the short-medium term. These reports compliment data provided by producers to the Environment Agency through the National Packaging Waste Database (NPWD) by accounting for packaging which is currently unobligated. The Pack Flow reports also estimate the split of packaging between sectors, including consumer and non-consumer, with more detailed estimates for some materials. Although POM refers to where packaging enters the market rather than where it is collected it is possible to make some inference of this. Consumer packaging is that which is sold by retailers directly to consumers. It can be assumed that the majority of this packaging is consumed, and therefore collected as waste, at home. Conversely it is expected that non-consumer packaging will largely be collected from businesses and public organisations. There is however likely to be some exceptions, for example where consumers purchase food from a supermarket which is then eaten, and the packaging disposed of, at work. The reverse is also possible for example where a drink is purchased at a café and then consumed at home. It is not known to what extent this occurs nevertheless POM data is able to give an indication of the amount of packaging in circulation and where is likely to be disposed of.

Alternatively, waste arising data can be used to determine where packaging is disposed of. Generally, waste arising methods combine an estimate of the amount of waste produced with waste composition analysis where samples of waste are examined to determine the make-up of waste from a particular sector. NHM waste is a subset of total Commercial and Industrial (C&I) waste and NHM waste arising estimates generally adapt C&I data to determine the amount that is municipal. WRAP have developed a model in the consistent recycling collections analysis using Waste Data Interrogator (WDI) data and sector specific waste composition analysis to estimate the amount and composition of NHM waste. As explained above, waste arising estimates tend to be higher than POM estimates.

The sector where the strongest data exists is the household or consumer sector and here POM and waste arising estimates differ by a relatively small amount. For example, Pack Flow reports estimate 5,377 Kt of consumer packaging POM in 2017¹⁹⁶. WRAP waste arising estimates give a figure of 5,950Kt of waste collected from households in the UK in 2017¹⁹⁷. This is around 11% higher than the POM estimate. There is however a much higher amount of uncertainty with NHM data.

The main estimates in this analysis are calculated based on POM figures using *both* Pack Flow reports cited throughout this paper, as well as additional assumptions. As to estimate NHM POM from 2024 onwards, we use

¹⁹⁶ [Pack Flow report -plastic packaging](#), [Pack Flow report-metal packaging](#) ; [Pack Flow-paper/card](#); [Wrap -glass packaging](#) ; [Wrap-wood packaging](#)

¹⁹⁷ England estimates taken from WRAP's household waste collection costs modelling. Figures uplifted to UK level using methodology outlined in Section 5.

2022 POM data the most recently published Pack Flow reports and apply growth rates from Valpak's secondary market reports to uplift these tonnages to 2024 levels.

The Pack Flow reports break non-consumer estimates down into sub-sectors. From there it is possible to determine C&I packaging. It is however difficult to then extract the amount of packaging that is household-like as different sectors will use this type of packaging to differing extents. The three main estimates are calculated using different methods of calculating the amount of C&I packaging which is non-household municipal.

Table D.2 - NHM tonnage estimates 2024

	Tonnage
Low	1,086kt
Central	3,671kt
High	5,419kt

Low estimate

The Pack Flow reports recommend that hospitality packaging is likely to be primarily household-like but predominantly collected away from the home. It is however unclear the extent to which the other sectors covered in these reports place household-like packaging on the market. We therefore use hospitality packaging only as the basis for our low estimate. In addition to hospitality POM further research was done to determine any sectors or businesses types that would produce a significant amount of household-like packaging which would be disposed of by businesses but not explicitly mentioned in the Pack Flow reports. Although a number of business-types were identified, appropriate data was only found for one of these: sellers of electrical goods. A significant amount of electrical goods sold to businesses are expected to be similar to those purchased by consumers and therefore use household-like packaging. An estimate of the amount and composition of packaging from products sold to businesses was estimated in two parts. Firstly, Waste Electrical and Electronic Equipment POM data collected by the Environment Agency (EA) was used alongside publicly available data on the weight of electrical products to estimate the number of products sold for each of the 12 categories in the EA data. Confidential data provided by businesses was then used to estimate the average weight of packaging for five key electrical categories. Lastly assumptions were made about the proportion of this packaging sold to businesses, based on consultation with experts from WRAP. We were then able to estimate the total IT equipment packaging expected to be disposed of in NHM settings. The total additional tonnage produced by this method inflated the low estimate by only a small amount.

Overall, this method produced a figure of 1,086Kt of packaging in 2024 after DRS materials were removed.

Central estimate

The central estimate uses an alternative method to determine the amount of NHM packaging. For this estimate we use high level waste arising data to calculate the proportion of total C&I waste which is NHM. It is then assumed that this proportion would be similar to the proportion of **C&I packaging** which is municipal. For the first consistent recycling consultation impact assessment, WRAP estimated the total amount of NHM waste to be 20.3Mt¹⁹⁸ in

¹⁹⁸ https://consult.defra.gov.uk/environmental-quality/consultation-on-consistency-in-household-and-busin/supporting_documents/recycleconsistencyconsultia.pdf

England in 2017. Defra have estimated that in the same year there was 36.1Mt of C&I waste in England¹⁹⁹. 56% of C&I waste is therefore estimated to be NHM in 2017.

At a material level 56% of metal C&I packaging was assumed to be municipal. Based on discussions in the glass Pack Flow reports 100% of non-consumer glass was assumed to be household-like. 18% of non-consumer wood was considered the maximum proportion that could be household-like. This is the proportion composed of cases, boxes, crates, and drums. This may still be an overestimate however at this proportion wood only makes up 2% of the estimated total NHM packaging. To account for the reduced proportion of wood considered municipal, the municipal proportion of paper/card and plastic were inflated slightly to 65% and 60% respectively.

Within the paper/card and plastic Pack Flow reports, C&I is made up of hospitality, retail back of store and manufacturing and other sectors. As discussed, hospitality is likely to be made up almost entirely of household-like packaging. For the other two categories it is unclear to what extent this packaging is municipal. Retail back of store packaging is likely to include transit packaging not in scope of EPR modulated fees. WRAP, within their NHM waste arising analysis, however, estimate that 44% of municipal materials which could be collected as dry recyclates are collected from retailers and wholesalers. A significant amount of this material is likely to be packaging. In both reports the manufacturing and other category makes up the highest proportion of C&I packaging (56% and 65% respectively). In the paper/card report manufacturing makes up around a third of this packaging while other services make up around two thirds. Other services represent European Union NACE codes G-U²⁰⁰ and includes a number of sectors identified by WRAP within their waste arising analysis as producing municipal waste such as education, health and office. WRAP also identify a small amount of manufacturing waste which is municipal. A similar combination of sectors is included within this category in the plastic report however it is less clear of the proportional splits. It is therefore reasonable to assume that there is a significant amount of municipal packaging in these sectors.

The method to further break down the tonnage for each material into the individual packaging formats for use in the modulated fees model is as follows. The tonnage for each material was split into hospitality and other NHM. The composition of the hospitality tonnage remained the same as estimated for option 1. The composition for the remaining tonnage was assumed to match the overall non-consumer composition from the Pack Flow reports.

This method produced a total NHM POM estimate of 3,671k in 2024, again with DRS materials removed.

High estimate

WRAP have updated their waste arising estimates for the second consistency recycling impact assessment and estimate 26.9Mt of NHM waste in 2018. Defra's 2018 estimate of C&I waste is 37.2Mt²⁰¹. This gives a considerably higher estimate of the proportion of C&I waste which is NHM at 72%. This was uplifted to 80% for the high estimate. Based on the analysis in the Pack Flow reports it is unlikely that 80% of their estimated C&I packaging is municipal

¹⁹⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918270/UK_Statistics_on_Waste_statistical_notice_March_2020_accessible_FINAL_updated_size_12.pdf

²⁰⁰ NACE code are the statistical classification of economic activities for the EU

²⁰¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918270/UK_Statistics_on_Waste_statistical_notice_March_2020_accessible_FINAL_updated_size_12.pdf

considering the likely proportion of non-household-like packaging such as retail transit, manufacturing and the high proportion of wooden pallets. However, this figure was used to highlight the uncertainty in the data when also considering waste arising estimates and to understand the impacts of a high NHM cost option.

For this option, the tonnages in the central estimate were scaled up such that each material retained the same proportion of the overall total, with the exception of glass which was already assumed to be 100% municipal packaging in the central option.

Using this method an estimate of 5,419Kt of packaging, excluding DRS materials, was produced for 2024.

ANNEX E: RECYCLED TONNAGES IN BASELINE METHODOLOGY

Recycled tonnages for each packaging material are also taken from the Pack Flow reports.

Again, the reports provide a useful amount of detail of recycling tonnages for different packaging formats however additional assumptions from Eunomia's analysis were also used to provide further granularity. Unlike with the POM estimates, the Pack Flow reports do not provide recycling estimates by sub-sector for the non-consumer sector. Eunomia use commercial municipal²⁰², complemented by household²⁰³, waste composition data to estimate the recycling rate of individual NHM packaging materials. These recycling rates are then multiplied by the NHM POM by packaging material to estimate the recycled tonnage as shown in Table E.1. The remaining non-consumer recycled tonnage from the Pack Flow reports was assumed to be 'other' C&I waste. For aluminium and steel, metal recycling from IBA is also factored in.

Table E.1 – Baseline recycling projections in tonnes (excluding packaging in scope of DRS) – best estimate

Packaging material	2024			2027			2033		
	Recycling, Kt			Recycling, Kt			Recycling, Kt		
	HH	NHM	Other C&I	HH	NHM	Other C&I	HH	NHM	Other C&I
Plastic	565	90	430	704	112	434	732	115	442
Wood	0	137	395	0	136	392	0	133	385
Aluminium	26	2	16	28	2	17	31	3	19
Steel	252	59	106	252	62	106	251	62	106
Paper/Card	1331	1649	1244	1376	2114	1282	1462	2239	1361
Glass	1180	363	-	1180	433	-	1185	431	0

²⁰² WRAP, 2019, National municipal commercial waste composition, England 2017, Prepared by Eunomia Research & Consulting Ltd

²⁰³ WRAP, 2019, Bristol, National Household Waste Composition 2017, prepared by Eunomia Research & Consulting Ltd.

Fibre based composite	26	5	-	30	6	-	33	8	-
Total	3380	2305	2192	3570	2865	2231	3694	2991	2312

This leads to NHM recycling rates that are generally lower than those for other C&I. That non-household household-like packaging has a lower recycling rate than non-household-like packaging is not an unreasonable assumption for some materials, however the other C&I recycling rates for plastic and paper/card are particularly high.

For plastic this seems reasonable based on the pack flow reports. The reports estimate significantly higher non-consumer plastic recycling rates than those for consumer plastic, largely driven by a close to 100% plastic film collection rate. In line with data used by the consistency IA, it is assumed that household-like film will be relatively low whereas C&I film, not in scope of EPR modulated fees, is known to be widely recycled. The majority of the recycled film identified by the reports is therefore likely to be other C&I.

It is less clear from the pack flow reports whether the same trend should be expected for non-consumer paper/card however other C&I paper/card will include a significant amount of transit and backhauled packaging.

The pack flow reports estimate high metal recycling rates, particularly for steel, which is estimated to have a consumer recycling rate above 100%. As discussed in the report, it is possible that some steel recycling captured as consumer is from non-consumer sources. One uncertainty here is calculating the proportion of metal recycling recovered from Incinerator Bottom Ash (IBA). For this analysis the tonnages of metal collected for recycling (i.e. at the kerbside, HWRC, bring bank) were taken from the pack flow reports however an alternative method was used to calculate metal recovered from IBA. This method was taken from Eunomia's modulated fees analysis, albeit with some assumptions updated. The alternative approach enabled greater flexibility in the modelling by allowing us to break the IBA recovered tonnage down by individual packaging format and for different sectors. For example, the former was useful for incorporating the impacts of DRS in the baseline.

The method of calculating the amount of metal collected for recycling through IBA consisted of extracting the tonnage of residual sent to incineration for each packaging format and calculating the proportion of this which is recovered through IBA. The residual tonnage was assumed to be the POM tonnage not recycled. Within the impact assessment it is assumed that 81.5%²⁰⁴ of household packaging and 39%²⁰⁵ of non-household packaging is sent to EfW. Estimates of the proportion of the tonnage sent to incineration which is extracted from IBA for each metal

²⁰⁴ This is in line with WRAP's household collection costs modelling which uses data from Waste Data Flow to estimate the split of household waste sent to EfW and Landfill.

²⁰⁵ From Tolvik 2021 it is estimated that 4,940kt of residual from C&I sources is sent to incineration (IBA and RDF). Total municipal C&I is estimated at 12,680kt. This is calculated as 26,846kt (the implied total municipal residual tonnage in Tolvik 2021) minus 14,238kt (the total household residual tonnage in 2020, from UK stats on waste). https://www.tolvik.com/wp-content/uploads/2021/05/Tolvik-UK-EfW-Statistics-2020-Report_Published-May-2021.pdf

was then applied to these figures. It was assumed that 80%²⁰⁶ of steel and 70% of aluminium²⁰⁷ sent to incineration is recovered for recycling from IBA. The recycling rates in Table E.2 include metal recycled from IBA. The tonnage recovered through IBA using this estimate is lower than in the pack flows leading to a slightly lower overall metal recycling rates.

The impacts of consistent recycling are taken from WRAP's modelling of the HH and NHM collection costs in the consistent recycling IA. All packaging in scope of DRS in each Nation is removed from the analysis as this will not be in scope of EPR. It is assumed that metal drinks cans and plastic PET drinks bottles are in scope of DRS in all Nations. Glass drinks bottles are assumed in scope of DRS in Scotland and Wales, but not Northern Ireland or England. It is assumed all DRS schemes will be in place by 2024.

Once we had established historical recycling tonnages for the sector, we applied the change in recycling growth rate from WRAP's analysis for the consistent municipal recycling collections IA to these tonnages²⁰⁸. This was done on a material basis and only applied to the core packaging materials in scope of consistent recycling. For household materials it was possible to extract the increase in recycling for each packaging material. For the NHM sector this was not possible due to limitations with waste arisings data. For the NHM sector the recycling rate was therefore increased by the same proportion for all materials in scope.

Table E.2 shows the recycling rates under a baseline option which excludes DRS materials. The removal of DRS materials reduces the total packaging recycling rate, as well as the recycling rate for the relevant material types, as DRS materials tend to be highly recycled compared to other packaging types.

Table E.2 - Baseline recycling rates excl. DRS materials – best estimate (includes HH, NHM and C&I)

	2024				2027				2033			
	HH	NHM	Other C&I	Total by packaging type	HH	NHM	Other C&I	Total by packaging type	HH	NHM	Other C&I	Total by packaging type
Plastic	42%	23%	95%	51%	52%	29%	95%	57%	53%	29%	95%	58%
Wood	0%	55%	36%	37%	0%	55%	36%	37%	0%	55%	36%	37%

²⁰⁶ Grosso M, Biganzoli L and Rigamonti L (2011) A quantitative estimate of potential aluminium recovery from incineration bottom ashes, Resources, Conservation and Recycling, 55, pp1178-84; Suggests that 70% of steel sent to incineration is captured. Valpak's metal flow covid edition report, estimates that 112kt of steel is captured through IBA. Based on their estimate that 157kt is sent to residual, assuming an 81.5% residual to EfW rate would suggest an over 100% capture rate for steel packaging sent to EfW.

²⁰⁷ <https://www.european-aluminium.eu/media/1337/fact-sheet-alu-recovery-bottom-ashes-feb14final-1.pdf>; as quoted in the Valpak's metal flow reports, 60-80% of aluminium packaging is shown to be captured. This is dependent on the thickness of the material with foil rates at the lower end and cans at the higher end. 70% is assumed a reasonable average point.

²⁰⁸ The reason for only using growth rates is due to the differences between the datasets used for the NHM waste estimates, in which WRAP data includes both packaging and non-packaging recycling. WRAP's NHM tonnage estimates use data from the Waste Data Interrogator (WDI) which is significantly different from the POM estimates produced by WRAP and Valpak. Thus, we applied the annual growth improvements from WRAP's NHM data to the actual POM tonnages.

Aluminium	55%	26%	42%	47%	55%	26%	42%	47%	55%	26%	42%	47%
Steel	92%	46%	97%	82%	92%	48%	97%	82%	92%	48%	97%	82%
Paper/Card	82%	70%	95%	81%	82%	87%	95%	88%	82%	87%	95%	88%
Glass	71%	78%	-	75%	72%	93%	-	76%	72%	93%	-	77%
Fibre Based Composite	52%	6%	-	23%	58%	7%	-	26%	59%	8%	-	26%
Total recycling rate	67%	63%	73%	67%	70%	76%	73%	73%	70%	77%	74%	72%

ANNEX F: PRN SYSTEM

Under EPR, Producers will still need to provide evidence of meeting recycling obligations for all packaging. As an interim measure, and to facilitate this, producers will continue to purchase Packaging Recycling Notes (PRNs) and Packaging Export Recycling Notes (PERNs) on all packaging. Where producers are obligated to make Full Net Cost (FNC) payments to cover their household and/or binned packaging waste, they will be required to make an additional payment to bring their contribution for the management of household packaging to FNC. This will be calculated as the modelled costs of LA household packaging waste management costs, minus the price paid by the reprocessor for the recyclate which incorporates the value of the PRN. This occurs as revenue from PRN/PERNs reduces the net cost to reprocessors of reprocessing packaging waste, which in turn allows reprocessors to pay a higher price for recyclate. This reduces net waste management costs paid for by LAs and businesses.

To ensure that producers of household packaging pay no more than FNC for their packaging, reprocessors must pass down the value of the PRN/PERNs they sell through paying higher prices for recyclate. This relies on an efficient market. It is acknowledged that the PRN/PERN market does not currently function at full efficiency. In particular it is recognised that significant price fluctuations and a lack of transparency may be curtailing the ability of buyers and sellers in the market to trade efficiently. There have been examples of larger reprocessors/exporters holding back PRN/PERNs thereby creating the perception of a shortage and driving a rise in prices. This is not illegal but does not help the functioning of the system. Government proposes that further consultation will be conducted to gain stakeholder views on the best way to increase the efficiency of the PRN/PERN market, such as requiring more regular reporting of data and a more active role for Compliance Schemes, with the expectation that necessary changes will be made to the system in time for the reforms in this IA.

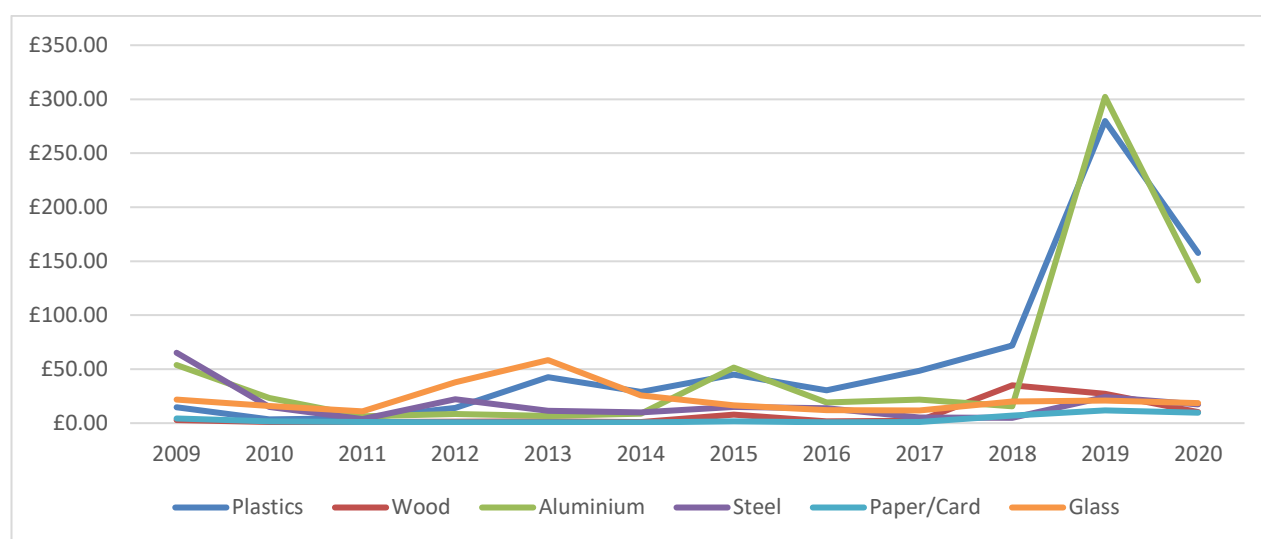
There must also be sufficient demand for packaging recyclate in aggregate, and enough competition such that reprocessors must pay the market price for recyclate, and cannot make supernormal profits. As well as expected increased demand for recycled packaging due to consumer preference, the falling cost of recycling and Government policy such as the plastic tax, additional demand for recyclate is also stimulated by ambitious packaging recycling

targets set by government. In addition, a key impact of the proposed waste reforms in the UK²⁰⁹, is to provide reprocessors with more certainty of supply of recyclate and stimulate investment. This should grow the recycling sector and increase competition for recyclate. It is acknowledged that markets for certain currently lesser recycled packaging such as plastic film and fibre-based composite cups may take time to develop, however the reforms should provide sufficient incentive to businesses to develop these markets.

PRN Costs

Under the current packaging producer responsibility system, obligated producers are required to meet recycling targets set by the government. Producers must purchase evidence (PRN/PERNs) of recycling from accredited reprocessors or exporters to prove they have met their obligation. The cost of this evidence varies by material depending on several factors, including how economically feasible it is to recycle the different packaging materials and the market perception of how much evidence is available. The PRN price for the different materials has varied over time, with the PRN prices for some materials showing more volatility than others.

Figure F.1 - Historical trends of PRN price per tonne of evidence by material 2009-2020 observed data



Source: Source: The Environment Exchange – average PRN prices

It should be noted that this is not an attempt to forecast future prices rather is an option which considers the impact of future targets. We assume that higher recycling targets would imply higher PRN prices as the demand for evidence of recycling will increase and hence producers will be willing to pay, on average, more per tonne than now. In Table F.2 we show the projected PRN prices assumed for the low, central and high scenarios. These are calculated as such:

- Low – The minimum of either the average price from the last 3 years, or the 2020 price
- Central – The maximum of either the average price from the last 3 years, or the 2020 price
- High – The highest price over the past 3 years

Table F.2 Projected PRN price for baseline, £ - best estimate

²⁰⁹ Including EPR for packaging, Deposit Return Scheme for drinks containers and consistent collections in England.

	Low	Central	High
Plastic	£158	£170	£280
Wood	£10	£24	£35
Aluminium	£132	£150	£302
Steel	£16	£17	£24
Paper/Card	£10	£10	£12
Glass	£19	£20	£21

To estimate the cost to producers of purchasing evidence to comply with their recycling obligation in a specific year, the total obligated tonnage per material²¹⁰ is multiplied by the relevant PRN price.

Table F.3 Compliance costs to packaging producers of purchasing PRN evidence – best estimate, £m

	2024	2027	2033
Plastic	£219	£248	£256
Wood	£10	£10	£10
Aluminium	£15	£16	£18
Steel	£8	£8	£8
Paper/Card	£40	£42	£44
Glass	£33	£35	£35
Total	£325	£359	£371

Operational costs (PRN scheme)

As discussed in the main text (data reporting costs), it is assumed that compliance schemes will be charged a membership fee to join the scheme which covers the cost of collating and reporting data, as well as regulatory advice. We assume that compliance schemes will also charge an issuing fee for PRNs purchased on behalf of members. The costs of procuring PRNs are based on Waste Care's charges²¹¹. This is an additional charge that

²¹⁰ The recycling obligation is the amount of packaging waste that is required to be recycled for obligated producers to meet their obligations and achieve the statutory packaging recycling targets. Obligated producers demonstrate they have met their obligations by purchasing PRNs or PERNs from accredited reprocessors and exporters.

²¹¹ Waste Care PRN charge - <http://www.wastecare.co.uk/compliance-services/packaging-compliance/costs-and-fees>

compliance schemes charge their members on top of the price of the PRN. This ranges from £0.5-£2 per tonne or PRN, the conservative price of £1 has been assumed²¹².

Table F.4 - PRN issuing costs

	2024 (£m)	2027 (£m)	2033 (£m)
Cost of procuring PRNs	£8	£8	£9

ANNEX G: LABELLING ASSUMPTIONS

Baseline Assumptions

In the baseline option, it is assumed that producers can decide whether to label their packaging or not and, if so whether to join a labelling scheme or adopt their own label or one of the many symbols in use.

The On-Pack-Recycling-Label (OPRL) scheme is a well-developed scheme that has been operating for 10 years. It has a substantial membership, so we have captured the costs associated with being member of this scheme in this assessment. As the decision to join OPRL is voluntary, it is assumed that the cost of membership to a business is equal to the benefit that the scheme offers. As a result, the cost associated with being a member of OPRL is not captured in the baseline. However, when calculating the costs to producers of complying with a mandatory labelling requirement the estimated costs of being a member of OPRL were deducted (for those businesses that are already members of OPRL).

Voluntary members of the OPRL scheme

In March 2020, OPRL estimated that the number of businesses using OPRL labels on their packaging was 479. In the baseline option, it is assumed that 20 new businesses will join the OPRL scheme each month between March 2020 and the start of 2024. This is due to:

- Producers becoming increasingly aware of the importance of communicating with their customers on how to dispose of packaging waste correctly and expected future requirements to label packaging; and
- Effective marketing by OPRL.

For the baseline, it is then assumed that as of 2024 this growth rate will plateau at 10 new businesses per month, due to a large proportion of businesses having become members. This growth rate is then assumed to plateau further from 2027, to 5 new members per month.

Table G.1 – Expected growth and number of OPRL voluntary members

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
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²¹² We have used the lowest proposed price from WasteCare research, £1 and to avoid overestimating the net benefit of an EPR system compared to the current PRN system.

Baseline (OPRL) growth per year (rounded)		~10%	~9%	~8%	~4%	~4%	~4%	~3%	~3%	~3%
Baseline (OPRL) voluntary members	1439	1559	1679	1799	1859	1919	1979	2039	2099	2159

OPRL membership and compliance costs

OPRL membership fees

In the baseline it is assumed that businesses who choose to join the OPRL scheme will pay a membership fee. The published membership fees from April 2021 for different business types/sizes are outlined below, along with the estimated proportion of businesses that fall within each category. All fees are inclusive of VAT. It is assumed, for this assessment, that these fee rates are fixed for the period 2024-33.

Table G.2 – OPRL annual membership fees from April 2021²¹³

Fees (inc. VAT)	Membership Category
£6,000	Major brands, retailers, packaging + materials manufacturers (businesses assumed to handle >1 billion pieces of packaging per annum) and waste management companies
£4,200	Large brands, retailers (assumed to handle 250m-1bn pieces of packaging per annum) and other packaging + materials manufacturers (assumed to handle <1bn pieces per annum)
£2,700	Supply chain – design agencies, packer/fillers, compliance schemes, consultancies
£2,160	Standard brands and retailers (<250m pieces of packaging per annum)
£474	Small independents and businesses exempt from PRNs

Packaging redesign costs

In the baseline it is expected that changes and updates to OPRL packaging rules will continue due to developments in packaging design as well as in recycling and waste management. Where businesses need to amend their labelling, Defra considers that OPRL give their members sufficient time to comply with their rule changes so that businesses can incorporate the new requirements as part of their normal packaging design and review processes as much as possible. As such, the costs associated with such reviews and design changes due to OPRL rule changes are assumed to be £0.

Training and familiarisation costs

In the baseline, we expect OPRL members to undertake training to enable them to comply with the scheme requirements. OPRL provides tools for their members to use including a suite of short webinars for members to use to ensure their teams are adequately trained and informed on how to use the labels. As a result of these tools, we expect each member to undertake 1.5 FTE days of training on OPRL rules and processes each year. The wage we have assumed for this cost is the median hourly wage for 'advertising and market research' as reported by the ONS

²¹³ <https://www.oprl.org.uk/get-involved/advance-notification-of-planned-fee-increase/>

in 2019, we have then increased this to a 2024 wage level (assuming a 2%/annum wage increase) and then added overheads at a rate of 22% (£17.52/hour)²¹⁴ resulting in a total cost for 1 FTE equal to £185. The total estimated training costs in the baseline associated with OPRL membership are summarised in Table G.3.

Table G.3 - Total costs to businesses associated with familiarisation of OPRL rules and processes (2024-2033), £m

	2024	2027	2033
Training and Familiarisation	£0.48	£0.60	£0.72

EPR Option Assumptions

As under the main EPR regulations, brand owners and importers will be the main obligated category. As this is not a current category in the regulations, we do not have data on the number of businesses likely to fall under this category. For this analysis, we have assumed that costs of labelling will accrue mainly to businesses under the packer / fillers and importers categories. The packer / fillers are used as a proxy for businesses that are most likely to be responsible for choosing the design and material composition of the packaging for their product.

Data on the number of producers in these categories, assuming no de minimis threshold, are taken from analysis by Eunomia²¹⁵. This study used regression analysis to estimate the number of producers below the current de minimis threshold. They estimate that there will be an additional 4,752 packer/fillers and 2,417 additional importers through lowering the de minimis. This is in addition to 4,153 current packer/fillers and 1,612 importers. This leads to an estimate of 12,934 businesses obligated under labelling, of which 1,439 are estimated to be members of OPRL already.

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Projected baseline (OPRL) voluntary members	1,439	1,559	1,679	1,799	1,859	1,919	1,979	2,039	2,099	2,159
Option 1 - additional businesses	11,495	11,468	11,395	11,321	11,308	11,294	11,281	11,268	11,254	11,241

ANNEX H: LITTER COSTS STUDY

²¹⁴<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datalist?uri=employmentandlabourmarket/peopleinwork/earningsandworkinghours/datalist&filter=datasets&page=2> (Earnings and hours worked, UK region by industry by two-digit SIC: ASHE Table 5)

²¹⁵

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20670&FromSearch=Y&Publisher=1&SearchText=de%20minimis&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

*Eunomia Research project approach*²¹⁶: This study was conducted by using local authority street cleaning outturns as a starting point. Disaggregation of these costs and attribution to litter was based on previous research with LAs in Scotland. Assumptions were verified where possible with interviews with UK authorities. Costs associated with specific litter fractions were modelled based on available litter composition data. Whilst this project has improved our understanding of litter costs the figures below are indicative. This is due to the significant methodological limitations of the analysis that hinder the generation of robust figures. Some limitations include:

- The lack of quantitative estimates due to LAs not monitoring the activities required to produce the core assumptions over time, and reporting functions not disaggregating by the required activities. Most assumptions obtained have been based on rough semi-qualitative estimates;
- Overrepresentation of London LAs in the sample;
- Reliance on small number of litter composition studies, of which only one study investigated litter volumes and only three recorded litter weights;
- Lack of robust information on rural authorities of a variety of socio-economic levels; authorities of low- and high-end levels of deprivation; as well as authorities representing different nations;
- Numerous assumptions made, and variables created throughout the modelling process based on very limited available information; and
- No Northern Ireland LAs in the sample.

Nonetheless, there are several key *findings relevant to EPR that have been incorporated into the IA*. According to the report, total street cleaning costs borne by UK primary local authority Street Cleansing Departments and Other Duty Bodies²¹⁷ was £932m, of which approximately £662 million was litter clean-up cost. It is estimated that packaging accounted for 35% of the total modelled cost of litter. This reflects that although packaging makes up a majority of litter by volume (~85%), when count (~42%) and weight (~40%) are used to attribute cost for different components of litter provision, this brings the relative contribution down; as staff time for ground litter is the largest fraction of cost (attributed on the basis of count) this leads to count-based units influencing the percentage attribution more than the other units. After removing clean-up costs attributed to packaging in scope of DRS scheme²¹⁸, litter clean-up costs attributed to EPR packaging amount to £218m²¹⁹ per year.

Unfortunately, when this report was produced it was assumed that an ‘All-in’ DRS would be implemented across all DAs. This has meant that *all* glass, metal and plastic beverage containers have been removed from the total cost estimates. As England and Northern Ireland will all implement an ‘All-in no glass’ DRS, this means that

²¹⁶ <https://wrap.org.uk/resources/report/financial-cost-of-packaging-litter-phase-2>

²¹⁷ ‘Primary LA street cleansing departments’ are street cleaning departments responsible for the majority of bin emptying, street sweeping etc. They are different from other departments who may have litter clearing within their remit, for example Parks or Highways. Beside LAs, other bodies (referred to as ‘Other Duty Bodies’) have a duty to remove litter. These are called litter authorities in the legislation and include schools for example.

²¹⁸ These are covered in the DRS impact assessment

²¹⁹ This includes costs associated with collection and disposal of composite fibre litter (£43m) which are included in the overall baseline costs. The methodology for calculating such is explained further under *EPR Option 2*.

littered glass beverage containers will in fact be in scope of EPR. It is therefore likely that the £218m modelled in this analysis is an underestimation.

ANNEX I: MATERIAL FACILITIES

Number of facilities in scope

In 2019, 101 MRFs provided sampling data through WRAP's MF Reporting Portal, which covers MFs in England and Wales. With the widening scope of sampling to all FPoC, research was conducted to understand the number of sites that would come into scope. WRAP and Waite Resources Management conducted analysis of permit returns data for each of the four nations, filtering by European Waste Catalogue (EWC) code to capture potentially in scope sites. This data included several site types that were not expected to be in scope, such as skip hire, HWRCs and civic amenity sites which were manually removed. Some other sites were removed based on the judgement of the consultants.

Overall, 1330 sites, run by 768 unique operators, were adjudged to be potentially classed as a FPoC. This largely consisted of TSs and MRFs. Only FPoCs which receive waste from multiple sources would be in scope of the sampling regulations. The MF data analysed was not able to show where waste was sourced from and it was therefore not possible to exclude sites which only received waste from one supplier. To try to mitigate this, site handling below 100t were also excluded as it was felt that these were more likely to handle waste from one supplier. This removed 162 further sites. Once account for the de minimis, with sites below 1,000 removed, the final total is 953.

Cost survey

To understand the costs to MFs associated with the new sampling requirements, WRAP and Waite Resources Management surveyed potentially in scope facilities, asking for details on any current sampling costs as well as estimates of any additional costs under the new requirements. 33 businesses were contacted, with 12 providing a response. Although a small sample size, the responses did cover both LA and private operated sites as well as a variety of different sized sites, ranging from 1,500t to 160,000t per year.

For each site, costs were provided for current costs, and expected additional costs under the new regulations. For each, costs were broken down into capital and operational cost. Many sites also provided more detailed commentary of how these costs were calculated. For example, operational costs were almost exclusively made up of operative staff salaries. Capital costs covered a range of items, including weighing scales, sampling tables, sorting conveyor and portable buildings.

As sites had differing opinions on the extent to which new equipment and staff would be needed (for example one site believed that their current equipment would be sufficient and costed no additional capital costs), current and additional costs were added together to estimate the total capital and operative costs needed for each site. For all sites, operative costs were significantly higher than capital costs. On average, once capital costs were depreciated over the life of the equipment, capital costs made up 4-8% of annual costs on average. For one outlier, around 40% of annual costs were capital, however this site appeared to have costed in the purchasing of software which reduced the need for staff.

ANNEX J: FIBRE-BASED COMPOSITES

Assumptions

SUFC and OFFP Placed on market (POM): Combined POM for SUFC and OFFP is assumed to be unaffected by the policies and is estimated to be 65.3k tonnes in 2019. This amounts to roughly 6.4 billion units placed onto the UK market.¹ This consists of 35,292 tonnes for SUFC or 3,217 million units, and 30,000 tonnes for OFFP or 3,208 million units. These unit and weight projections are taken from Valpak and are based on survey responses they received from key industry stakeholders. Survey respondents also provided estimates of POM growth rates and based on these estimates as relayed by Valpak a growth rate of 3% a year between 2024-2033 is assumed for SUFC and one of 2% is assumed for OFFP. Combining these two growth rates – and weighting them by the relative quantities of OFFP and SUFC packaging – we have calculated an annual growth rate of 2.5% in 2024 which increases yearly to a rate of around 2.6% by 2033. This marginal increase in the rate of combined POM growth over time arises due to the fact SUFC POM is growing quicker than OFFP POM; as time goes on SUFC POM comprises a larger proportion of the combined POM and hence the overall growth rate approaches that of SUFC. It is possible that the requirement for mandatory take-back of SUFCs may impact POM, incentivising retailers to reduce the number of fibre-based composite cups they place on the market in the first instance. We have not factored this assumption into our analysis due to the uncertainty around behavioural change. Beyond these packaging reforms, behavioural change will be influenced by the Covid-19 pandemic, technological advances and consumer preferences.

Baseline recycling rates: The baseline recycling rates for SUFC and OFFP have been derived by Valpak for 2019 based on the estimates of 2019 POM and data collected by the National Cup Recycling Scheme which indicates the total number of units recycled. The estimated rates are 2.77% in 2019 for SUFC and 0.68% for OFFP.² The National Cup Recycling scheme (relevant to SUFC) has set a target recycling rate of 8% by 2020 for current members over time such that the overall recycling rate approaches the recycling rate for its members. We have therefore assumed that in the baseline the recycling rate for SUFC will steadily increase from 2.8% in 2019 to 8% in 2033.³ Due to the lack of corresponding initiatives for OFFP, we have held the rate of 0.68% constant in the baseline.

Contamination and lids: After being used to serve food and drink, OFFP and SUFC containers are often contaminated. Contamination is modelled as a fixed additional percentage on top of POM for both SUFC and OFFP. Valpak have estimated a likely contamination rate of 6% for SUFC and one of 12% for OFFP and no change in in these contamination rates are assumed over time, in the baseline or under the policies. Such average rates of contamination were obtained by Valpak based on survey responses and other Valpak contacts.⁴ Additionally, for SUFC we also have a significant number of lids which are dealt with each year. The inclusion of contamination and lids means the total tonnage dealt with by the waste management system is higher than the total amount POM considering only the SUFC cups and OFFP containers – for example in 2019, the total tonnage dealt with by the waste management system considering these two packaging types amounted to 83,229 tonnes.

Plastic: A certain proportion of each unit of SUFC and OFFP is plastic (for example the plastic lining within coffee cups). Valpak have estimated that for SUFC this amount is 5% of the total unit weight, whereas for OFFP this is assumed to be 7%. This determines per unit of packaging; how much can go to the paper reprocessor and hence how much can ultimately be turned into recycled paper Following Valpak's assumptions, we have assumed that there is no recycling of the plastic component of SUFC and OFFP. It may be the case that as the amount of plastic collected increases, more of an end market develops and the recycling rate of plastic will be increased over time.

Impact of policies

Following analysis by Valpak, different proportions defining waste flows to different stages are assumed at each stage in the waste chain and the policies are modelled by altering these proportions over time. Different proportions are assumed in the case of SUFC and OFFP.

Table J:1 – Disposal and litter rates, SUFC under MTB and targets

	<u>Rate</u> <u>2020</u>	<u>Rate</u> <u>2025</u>	<u>Rate</u> <u>2033</u>
Ground litter rate (% of POM which is street litter)	10%	7%	7%
Proportion of non-street littered POM sent to sorter (lids) or paper reprocessor (cups and contamination)	4%	16%	60%
Disposal rate at sort (lids)	100%	100%	100%
Disposal rate at paper reprocessor (contamination and plastic)	100%	100%	100%
Fibre losses at paper reprocessor	10%	10%	10%

Table J:2 – Disposal and litter rates, OFFP under targets

	<u>Rate</u> <u>2020</u>	<u>Change</u> <u>2025</u>	<u>Rate</u> <u>2033</u>
Ground litter rate (% of POM which is street litter)	10%	9%	9%
Proportion of non-street littered POM sent to sorter (all)	1%	8%	62%
Disposal rate at sort (contamination)	95%	95%	95%
Disposal rate at sort (fibre and plastic)	10%	10%	10%
Disposal rate at paper reprocessor (contamination and plastic)	100%	100%	100%
Fibre losses at paper reprocessor	10%	10%	10%

As defined by Valpak, the collection stage refers to all waste which is collected and not lost to ground litter, so POM after removing ground litter. The waste – including contamination and lids – then moves about from the collector to the sorter and ultimately to the paper reprocessor. The process is different for SUFC and OFFP and different proportions are assumed.

Considering the rates as given in Table J:1 for SUFC in 2020, the waste management process for SUFC can be described as follows. 10% of SUFC POM is littered on the ground and hence is disposed immediately. Of all the waste collected (either from public bins or elsewhere), 96% is disposed at the collection stage. Of what remains, all of the lids are sent to the sorter where they are all disposed of whereas all of the cups and contamination is sent to the paper reprocessor. At the paper reprocessor 100% of contamination and all of the plastic part of the SUFC is disposed of, whereas 10% of the fibre part of the SUFC is leaving 90% of the fibre received by the paper reprocessor to be turned into recycled paper.

The total amount of recycled paper out of total SUFC POM is implied by these rates and can be calculated in the following way:

Recycled paper rate = (Total amount of fibre-based composite cups) * (Proportion collected) * (Proportion sent on to sorter) * (Proportion sent on to paper recycler) * (1-Fibre Losses at paper recycler)

Recycled paper rate = (95%*POM)* 90%*4%*100%*90% = 2.77%

Where 95% of POM defines the total fibre tonnage POM as 5% of each cup is assumed to be plastic. The disposal rate at sort for lids is 100% and the disposal rate at the paper reprocessor for contamination and the component of the SUFC which is plastic is also 100% meaning ultimately all plastic POM and all contamination is disposed of. If we add the total amount of lids and contamination to the amount of fibre not recycled, we can obtain the total amount disposed of:

Disposal tonnage = (1-2.77%)*(SUFC POM) + (All Contamination) + (All Lids POM).

The proportions and the process differ for OFFP. Considering the year 2020; the same initial litter disposal rates are assumed as for SUFC i.e. 10% of litter is disposed of on the ground and hence does not enter the waste chain. Of the 90% that does enter collection, a higher rate of 99% is disposed of. Of that which remains, all of it is sent to sort where 95% of contamination is disposed of along with 10% of the OFFP containers (plastic and fibre). The remaining contamination and OFFP containers are sent to the paper reprocessor where all remaining plastic and contamination is disposed of and 10% of fibre too. The remaining 90% of fibre received at the paper reprocessors is turned into recycled paper.

The policies are modelled by reducing the ground litter rate and the disposal rate at collection over time. The likely impact of MTB on the ground litter rate has been estimated by Valpak to amount to a one-off reduction of 2% following the introduction of the policy, while the impact on the disposal rate is expected to amount to a reduction of 10% by 2033 following introduction in 2024. Analysis from Valpak suggests a one-off decrease in the ground litter rate of 1% following the introduction of targets, while the reduction in the disposal rate is specific to OFFP and SUFC and depends on the initial recycling rate of each type of packaging. Given both targets and MTB apply to SUFC, the combined impact on the litter rate is a reduction of 3% (1% due to targets plus 2% due to MTB) meaning a fall in the overall ground litter rate from 10% in 2019 to 7% in 2025, a year after the policies are implemented, with no further reductions. The combined impact of MTB and Targets on the disposal rate at collection is a reduction of 10% due to MTB and 46% due to targets, so a 56% reduction overall.

For OFFP only Targets are applied meaning only a 1% reduction in the ground litter rate is expected, with the rate falling from 10% to 9% for all subsequent years after the policy is implemented. The reduction in the collection disposal rates due to targets is greater than that for SUFC, with OFFP seeing a reduction of almost 60%, from 99% in 2019 38% by 2033.

These changes drive the following increases in the combined recycling rate:

Table J:3 – Recycled fibre rate for SUFC and OFFP

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Average
Combined Recycling rate baseline	2.85%	3.06%	3.28%	3.50%	3.72%	3.94%	4.16%	4.39%	4.62%	4.84%	3.83%
Combined Recycling rate policy	4.30%	9.49%	15.12%	19.44%	23.75%	28.07%	32.38%	36.69%	41.04%	45.34%	25.56%
Impact	1.46%	6.43%	11.84%	15.94%	20.04%	24.13%	28.22%	32.30%	36.43%	40.50%	21.73%

The increases in the baseline recycling rate are driven by expected increases in the SUFC recycling rate up to 8% in 2033 to meet The National Cup Recycling scheme target. By 2033, the impact of the policies is to increase the combined recycling rate by 40.50%, from 4.84% in the baseline to 45.34%.

Calculation of obligated coffee cup outlets

Work undertaken by Valpak suggested that 257,700 businesses would be liable under the policies. To calculate this Valpak first identified the main sales channels where fibre-based composite cups would arise and then looked at which Standard Industrial Classification codes (SIC), given by the ONS, provided the best coverage of such channels.²²⁰ They arrived at 22 relevant SIC codes. There is however uncertainty about whether all businesses operating within these SIC codes do indeed sell fibre-based composite cups and as such this is potentially an overestimate. In light of this, we have used Valpak's figure as a high estimate and then removed SIC codes when it is not certain that all or most businesses sell fibre-based composite cups. The low estimate consists of only 1 SIC code, the one pertaining to coffee shops and fast food outlets and we are certain all or the vast majority of businesses in this sector sell fibre-based composite cups. The table below denotes the SIC codes used in each estimate as well as the number of businesses corresponding to each SIC code:

Table J:4 – SIC codes and number of businesses assumed in low, central and high estimates

SIC code	High	Central	Low
5610: Restaurants and mobile food service activities	89,140	89,140	89,140
5630: Beverage serving activities	37,965		
4711: Retail sale in non-specialised stores with food; beverages or tobacco predominating	30,820	30,820	
9319: Other sports activities	10,815		
5510: Hotels and similar accommodation	9,930		
5621: Event catering activities	9,445		
9312: Activities of sport clubs	9,040		
4799: Other retail sale not in stores; stalls or markets	8,005	8,005	
4719: Other retail sale in non-specialised stores	6,870	6,870	

²²⁰ ONS data taken for 2019 from [UK business: activity, size and location - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/business/businessactivityandlocation).

4776: Retail sale of flowers; plants; seeds; fertilisers; pet animals and pet food in specialised stores	6,560		
9329: Other amusement and recreation activities	6,220		
5520: Holiday and other short-stay accommodation	4,930		
9311: Operation of sports facilities	4,755		
4725: Retail sale of beverages in specialised stores	4,740	4,740	
4729: Other retail sale of food in specialised stores	4,375		
9313: Fitness facilities	3,445		
4724: Retail sale of bread; cakes; flour confectionery and sugar confectionery in specialised stores	3,370		
5629: Other food service activities	2,380	2,380	
5530: Camping grounds; recreational vehicle parks and trailer parks	2,170		
4781: Retail sale via stalls and markets of food; beverages and tobacco products	1,155	1,155	
5590: Other accommodation	1,075		
9321: Activities of amusement parks and theme parks	495		
Total	257,700	143,110	89,140

ANNEX K: PACKAGING COLLECTION COSTS BY NATION

Northern Ireland cost information was collected by WRAP who then modelled future costs based on the same methodology to their England collection costs modelling. Analysts from the Welsh Government collected current cost and tonnage data and then provided this to WRAP who were able to model costs in futures years and ensure that the approach used was largely in line with analysis from the other Nations.

Zero Waste Scotland provided cost and tonnage outputs from their own Scottish household waste collection costs modelling. Due to the nature of the information used, and confidentially agreements in place with Local Authorities, it was not possible to provide data at a granular enough level for WRAP to incorporate this into their modelling. Instead, Defra produced additional analysis based on the outputs of this modelling to incorporate them into this IA.

Zero Waste Scotland (ZWS) provided Defra with outputs from their own Scottish Household collection and disposal costs modelling. Having collected data from Local Authorities in confidence, they were unable to provide the full modelling and were only able to provide aggregated estimates for each waste stream. Further analysis was conducted by Defra to estimate the packaging element of these costs for the IA.

Table K:1 – Collection, disposal and transition costs from ZWS modelling, £m

Category	Kerbside residual	Kerbside dry	Disposal	Landfill tax	Transition costs
Rural inaccessible councils	£16	£4	£28	£9	£8
Rural accessible councils	£26	£7	£44	£18	£21

Urban councils	£55	£10	£55	£14	£40
Mixed, mainly urban, no city councils	£26	£11	£43	£16	£25
Mixed, mainly rural councils	£16	£5	£29	£12	£13
All Scottish councils	£139	£37	£198	£69	£107

Packaging residual costs were estimated using the following method. Collection costs were estimated by multiplying the kerbside residual costs by the proportion of packaging in residual kerbside collection in Scotland by weight (21%). This was taken from Household waste composition produced by Eunomia for WRAP²²¹.

To estimate the disposal costs, specific data on the tonnage of target dry materials collected for recycling and residual in Scotland, provided by ZWS were used. Using the same waste composition analysis, non-packaging dry recyclate was removed from these tonnages. Packaging in scope of the Scottish DRS system were also removed. The remaining packaging in residual tonnages were multiplied by a disposal cost per tonne. This was estimated by first estimating the proportion of residual waste sent to landfill (71%) and EfW (29%) in Scotland²²². For the proportion sent to landfill, the Scottish Landfill tax rate (£91.35²²³), was added to the assumed landfill gate fee used by WRAP in their household collection modelling (£27.91). Again, the EfW gate fee used by WRAP in their household collection modelling was used (£84.15).

Table K:2 – Kerbside residual tonnage by material type (Scotland)

Category	Kerbside residual								
	Paper (all)	Card	Cans Al & Fe	Food and drink cartons	Container Glass	Plastic bottles	Plastic PTT	Plastic film	Foil and aerosols
Rural inaccessible councils	7,245	2,460	1,227	318	5,706	1,317	3,772	6,608	796
Rural accessible councils	22,971	8,224	4,389	801	14,334	5,051	9,007	18,436	2,333
Urban councils	32,454	19,123	6,550	1,115	22,006	11,825	12,290	23,182	3,765

²²¹ <https://wrap.org.uk/sites/default/files/2021-10/WRAP-national-household-waste-comparison-2017.pdf>

²²² Waste Landfilled in Scotland and Waste Incinerated in Scotland; <https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-data-for-scotland>

²²³ <https://www.gov.scot/policies/taxes/landfill-tax/>

Mixed, mainly urban, not city councils	28,315	9,993	4,603	689	18,605	5,981	10,265	20,721	2,833
Mixed, mainly rural councils	13,482	4,330	2,310	350	7,689	3,019	4,756	10,857	1,367
All Scottish councils	104,467	44,130	19,078	3,273	68,339	27,193	40,090	79,804	11,093

Packaging related dry recycling costs were estimated as follows. Collection costs were estimated by multiplying the total dry collection costs by the proportion of packaging in dry collections by partially compacted volume. A specific estimate for Scotland was not available the proportion used by WRAP in their England collection costs modelling was used (78%). This was considered appropriate as waste composition analysis²²⁴ shows that the proportion of packaging in dry recycling by *weight* is similar in England and Scotland.

Table K:3 – Kerbside recycling tonnage by material type (Scotland)

Category	Kerbside recycling								
	Paper (all)	Card	Cans Al & Fe	Food and drink cartons	Container Glass	Plastic bottles	Plastic PTT	Plastic film	Foil and aerosols
Rural inaccessible councils	10,007	4,077	1,098	89	682	1,414	355	253	37
Rural accessible councils	18,509	6,912	1,979	333	6,103	3,584	1,356	922	292
Urban councils	15,068	6,475	2,009	308	11,902	3,401	1,264	783	291
Mixed, mainly urban, not city councils	22,173	9,422	2,947	462	13,717	5,449	2,020	1,110	427
Mixed, mainly rural councils	7,738	3,231	602	101	4,864	1,926	922	778	177
All Scottish councils	73,494	30,117	8,636	1,293	37,267	15,775	5,918	3,847	1,225

To estimate net recycling end-of-life treatment costs, target dry materials tonnages were again taken from ZWS analysis. As with residual tonnages, these were adjusted to remove non packaging recylate as well as packaging in scope of DRS. The number of LAs signed up to the Scottish Charter for Household Recycling was used as a proxy for the amount of waste collected as multistream (93%). It is assumed that LAs would receive material revenue for this packaging. Individual revenue per tonne rates were assumed for each high-level material type. Where possible these were aligned with WRAP household collection costs modelling. The proportion not collected as multistream (7%) was assumed to go to a Material Recycling Facility (MRF), with councils paying a gate fee for this material. In line with WRAP's modelling, a MRF gate fee of £60 per tonne was assumed. This accounts for reduced material value of this material once DRS packaging is removed.

²²⁴ <https://wrap.org.uk/sites/default/files/2021-10/WRAP-national-household-waste-comparison-2017.pdf>

Lastly, it was assumed that a certain proportion of costs associated with LAs transitioning to Scottish Charter for Household Recycling would relate to packaging. As the Charter includes separate food and dry collections, the proportion of packaging in food and dry recycling collections (60%) was used²²⁵. This was multiplied by total transition costs and added to the packaging recycling collection costs. This was annualised over the appraisal period.

Table K:4 – Estimated packaging costs (Scotland)

	Costs (£m)
Packaging residual collection	£29
Packaging residual disposal	£18
Packaging recycling collection	£29
Packaging recycling treatment	-£2
Packaging recycling collection transition (annualised over 7 years)	£6
Total net packaging costs	£80

ANNEX L: MODULATED FEES APPROACH AND SENSITIVITY ANALYSIS

Defra commissioned Eunomia to analyse and make recommendations on the logistics of both a modulated fees and deposit based EPR scheme²²⁶. Based on the findings in the report and following consultation with stakeholders, modulated fees were considered the more pragmatic and effective approach, so a deposit based EPR scheme for packaging is not being considered further.

A further objective of Eunomia's work was to suggest indicative fee levels and appraise the likely impacts of a modulated fees approach on producers. This included considering the impact of modulated fees on producers' behaviour in terms of packaging placed on the market. As part of this work Eunomia developed a model to provide indicative fees for 80 packaging types as well as assess the potential impact of these fees on producer behaviour and on packaging recycling rates. Defra have further adapted this model to quantify indicative impacts of modulated fees for this analysis.

The model analyses the impact of a modulated fees approach based on the recyclability of a packaging type, based on the recycling rate of that packaging type. As a consequence of a high modulated fee, producers either take action to increase the recycling rate of that packaging type (to lower the fee in subsequent years) or switch to packaging with a lower fee. The overall recycling rate will increase as individual packaging types see increased recycling rates, or where producers switch from lower to higher recycled packaging.

²²⁵ <https://wrap.org.uk/sites/default/files/2021-10/WRAP-national-household-waste-comparison-2017.pdf>

²²⁶ <http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20310&FromSearch=Y&Publisher=1&SearchText=Extended%20Producer%20Responsibility&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

The model can run a number of different scenarios based on the specification of modulated fees. Within the impact assessment Defra have used the following scenario:

- Fees are placed on packaging by weight by weight (rather than by item).
- The main modulation in fees, based on the material specific recycling rate²²⁷.

It should be noted that decisions on the workings of modulated fees will ultimately be down to the Scheme Administrator to decide, and the scenarios used in the Eunomia analysis, and this IA are purely indicative.

The overall fee (per tonne) for each packaging type is the net of two elements:

- The base fee is the net collection and treatment cost for that sub-material type.
- The recyclability fee is the main modulation and is based on the recycling rate. The lower the recycling rate, the higher the fee. This can be a positive or negative fee (the fee will be negative if the recycling rate of the packaging type is higher than the average recycling rate by material).

All fees across all materials sum to the Full Net Cost of managing household packaging. The fee for each packaging type will change on an annual basis as recycling rates change over time.

Within the model a high modulated fee assigned to a packaging type will impact producer's decisions in two main ways:

- Producers will take action to try to increase the recycling rate of that sub-material in order that the fee is lower in the next year.
- Producers will switch to a sub-material with a lower fee.

It is assumed that materials with a low recycling rate, and therefore a high fee, in a given year will see an increase in the recycling rate in the next year because of this. The model is set up so that sub-materials with low recycling rates will see rates increase more quickly than those with higher recycling rates – the exception being those packaging types with very low recycling rates (less than around 20%) which are considered to be very difficult to recycle and will therefore only experience small increases in the recycling rate.

Producers can also switch from a sub-material with a high fee to one with a lower fee. The *amount* of a particular sub-material which switches in a given year is based on the mechanics of the model. Essentially the lower the recycling rate of that sub-material, the higher the proportion of that material will switch. The *substitute* sub-material(s) it is possible for this sub-material to switch to must be pre-defined. If no substitute material is pre-defined for a particular material, no switching will occur.

For this analysis, only a small number of well-known switches were included. Based on discussions with WRAP, the following switches have been included within the IA analysis.

²²⁷ This aspect of the modulation calculates the fee for a packaging type by calculating the distance from recycling rate of that packaging to the average recycling rate. This average recycling rate can either be material specific or across all materials. For example the fee for PS PTTs can be calculated by determining how close it's recycling rate is from the general plastic recycling rate or the overall recycling rate for all materials.

- PS will switch to PP and PET
- PVC will switch to PE and PET
- Black plastic will switch to non-black plastic of the same polymer

Sensitivity

The impact of modulated fees on recycling rates will ultimately come down to decisions on the workings of modulated fees to be taken by the Scheme Administrator, and the decisions of producers on the back of this. The outputs modelling for this IA are included as an example of the potential impacts of modulated fees, however, may not reflect the final approach to modulated fees. The modelling is also a simplistic representation of the decisions made by producers under this scenario. We have therefore conducted sensitivity analysis to understand the impact on the outcomes of the policy should the impacts of modulated fees differ from those estimated for this analysis.

Three key outcomes could be influenced the impact of modulated fees on recycling rates:

- Overall packaging recycling rates
- Greenhouse gas emissions
- Household packaging collection and end-of-life management costs

Three scenarios were modelled for the modulated fees sensitivity analysis.

- Low - No additional recycling from modulated fees. Under this scenario there will still be some additional recycling from mandatory labelling and fibre-based composite cups mandatory takeback.
- Central scenario – As presented in the main IA text.
- High Scenario – Modulated fees impact on recycling rates is double that in the main modelling. For some individual packaging types (for example some Steel packaging) this would push the recycling rate above 100%. A limit of 100% recycling rate was placed on each packaging type.

Recycling rates

Overall, it is estimated that under the high scenario, an additional 89k tonnes of packaging is recycled every year by 2033 than under the central scenario. This increases the overall packaging recycling rate by around 2% points above the central scenario.

Table L:1 – Impact of modulated fees on recycled tonnage

Kt	Low	Central	High
Plastic	58	114	148
Wood	0	0	0
Aluminium	1	1	1
Steel	5	15	17
Paper/Card	95	113	131
Glass	51	158	190
Fibre based composite	5	19	23
Total	215	422	510

Under the low scenario it is estimated that there will be 206k tonnes less packaging recycled annually by 2033 than under the central scenario. This leads to a 2% point decrease in packaging recycling rates compared to the central scenario.

Table L:2 – Impact of Modulated fees on recycling rates

Kt	Low	Central	High
Plastic	60%	63%	65%
Wood	37%	37%	37%
Aluminium	48%	48%	48%
Steel	83%	85%	85%
Paper/Card	90%	90%	90%
Glass	79%	84%	86%
Fibre based compsite	51%	61%	63%
Total	74%	76%	78%

Greenhouse gas emissions

The increase in recycling diverted from residual in the high scenario and decrease in the low scenario leads to changes to the amount of GHG emissions savings. Under the low scenario there are 119k less emissions per year by 2033 which equates to £35m. In the high scenario there are 63kt additional GHG emissions savings per year by 2033, which is £18m in additional savings to society.

Table L:3 – Impact of modulated fees on GHG savings

	Low	Central	High
GHG Emissions (2033)	154,492	273,496	336,582
GHG Savings (2033)	£45.3	£80.2	£98.7

Household collection costs

In the low scenario, with less recycling and more residual collected from households, the cost of managing household packaging waste increases. Similarly, there is a reduction under the high scenario. It is assumed that the change in tonnages is not enough to impact fixed costs such as the number of vehicles, the number of households serviced per round and number of staff required. Rather the changes relate to changes in the residual disposal costs (landfill and EfW gate fees), and recycling MRF gate fees and material revenue.

Table L:4 – Impact of modulated fees on household collection costs, £m

	Low	Central	High
2024/25	£1135	£1114	£1092
2025/26	£1189	£1146	£1103
2026/27	£1206	£1149	£1093

2027/28	£1218	£1152	£1086
2028/29	£1235	£1159	£1084
2029/30	£1248	£1163	£1078
2030/31	£1260	£1166	£1073
2031/32	£1270	£1168	£1066
2032/33	£1276	£1174	£1072
2033/34	£1274	£1182	£1090

ANNEX M: ENGLAND HOUSEHOLD KERBSIDE COLLECTION COSTS SENSITIVITY ANALYSIS

Modelling to estimate that household kerbside packaging collection and treatment costs in England were modelled by WRAP using their routemap model. This modelling is based on a scenario in which Local Authorities in England are required to introduce consistent recycling for households in 2024. In addition, the modelling assumes a “all in no glass”²²⁸ DRS for drinks containers is introduced in England in 2024. Sensitivity analysis has been conducted to show the impact of these policies on packaging collection costs; the full net costs that producers will be required to cover.

Impact of DRS

Table M:1 – Impact of DRS assumptions on England Household Collection costs, £m

	Central Estimate			Without DRS			Difference		
	Recycling	Residual	Total	Recycling	Residual	Total	Recycling	Residual	Total
2024/25	695	242	936	669	248	916	-4%	2%	-2%
2025/26	735	225	961	714	232	946	-3%	3%	-2%
2026/27	743	221	963	721	228	949	-3%	3%	-2%
2027/28	745	220	965	724	227	951	-3%	3%	-1%
2028/29	752	219	970	731	226	957	-3%	3%	-1%

²²⁸ This will include PET drinks bottles and metal drinks can, but not glass drinks bottles.

2029/30	755	218	973	735	225	960	-3%	3%	-1%
2030/31	757	218	976	737	225	962	-3%	3%	-1%
2031/32	760	217	977	739	224	964	-3%	3%	-1%
2032/33	764	218	982	743	225	968	-3%	3%	-1%
2033/34	769	220	989	748	227	975	-3%	3%	-1%

To account for DRS two key assumptions are included in the modelling. The first is the tonnage of packaging removed from kerbside collections as consumers return DRS packaging directly to DRS Return Points. The tonnage of packaging assumed to be in scope of DRS are outlined in annex D. These are proportioned to England by population such that 84% of PET drinks bottles and metals drinks cans are assumed to be disposed on in England. It is assumed that DRS Return Points collect 75% of in scope packaging in 2024, rising to 90% by 2027 in line with assumptions in the DRS impact assessment. By 2027 it is assumed that around 210kt of DRS packaging are removed from kerbside collections in England.

The second assumption relates to MRF gate fees. WRAP assume that the removal of DRS packaging, seen as high value recycle, from kerbside collections, could lead to increases in MRF gate fees. With DRS in place MRF gate fees are assumed to rise to £60 per tonne. This contrasts with the baseline scenario in which MRF gate fees are assumed to be £35-£40 per tonne²²⁹.

Table M:1 shows the different in collection costs, with and without these assumptions. The without DRS scenario is shown to 1-2% lower than the central scenario used in this IA. Residual packaging costs increase by 2-3% due to increased tonnage of DRS packaging disposed of by this route. Packaging recycling costs are 3-4% lower, due to increased material revenue and lower MRF gate fees.

Consistency Scenario

Consistent recycling in England would require LAs to separately collect certain waste streams for recycling. As stated in the consistency consultation impact assessment²³⁰:

“The recyclable waste streams must be collected separately from each other except where this is not technically or economically practicable or there is no significant environmental benefit from collecting separately. It is likely that whilst some will arrange for the collection of recyclable waste streams separately, there will be many that will have to rely on the exceptions that allow them to collect some waste streams together for technical or economic reasons.”

²²⁹ Gate fees are based on WRAP research, which includes survey of LAs and discussion with MRFs. Some of this information is published in their annual gate fee report, although some additional assumptions are made in their modelling; <https://wrap.org.uk/resources/report/gate-fees-report-2020>

²³⁰ https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/supporting_documents/Consistency%20in%20recycling%20impact%20assessment.pdf

The central scenario in this IA assumes that to meet consistency requirements, the majority of LAs will move to a multi-stream²³¹ collection system, with some moving to a twin-stream²³² collection system. Overall, the scenario assumes that 244 LAs in England will use a multi-stream system and 69 will use a twin-stream system.

It is acknowledged however, that it is not possible to predict the decisions made by each LA, based on their individual circumstances. Two alternative scenarios are presented to demonstrate the impact of differing collection systems on household collection costs.

Table M:2 – Impact of Consistency assumptions on England household collection costs, £m

	Central Estimate						Difference		
	Recycling	Residual	Total	Recycling	Residual	Total	Recycling	Residual	Total
2024/25	695	230	926	633	221	854	-9%	-4%	-8%
2025/26	737	214	950	644	203	847	-13%	-5%	-11%
2026/27	744	209	954	647	200	847	-13%	-4%	-11%
2027/28	747	208	955	649	200	849	-13%	-4%	-11%
2028/29	754	207	960	652	200	851	-14%	-3%	-11%
2029/30	757	206	963	654	199	854	-14%	-3%	-11%
2030/31	759	206	966	656	199	856	-14%	-3%	-11%
2031/32	762	205	967	659	198	857	-14%	-3%	-11%
2032/33	766	206	972	662	199	861	-14%	-3%	-11%
2033/34	771	208	979	666	201	867	-14%	-3%	-11%

The first alternative scenario assumes the inverse to the first, with the majority of LAs switching to a twin-stream system with some remaining on a multi-stream collection system. Overall, 313 LAs switch to twin stream. Under

²³¹ Dry recycling materials are presented for collection by the household in three separate containers

²³² Dry recycling materials are presented for collection in two separate containers, for example fibres (paper and cardboard) in one and other dry materials in another

this scenario, LA household collections are 8-11% lower. This consists of a 9-14% reduction in recycling costs, as collections costs under twin stream are generally cheaper and 3-5% reductions in residual costs²³³.

The second alternative scenario modelled shows the cost of household packaging collections in the absence of consistency (assuming LAs don't change collection systems). This scenario assumes an "all in no glass" DRS is in place.

Table M:3 – Impact of Consistency assumptions on England household collection costs, £m

	Central Estimate			No Change			Difference		
	Recycling	Residual	Total	Recycling	Residual	Total	Recycling	Residual	Total
2024/25	695	242	936	603	260	863	-13%	8%	-8%
2025/26	735	225	961	606	256	862	-18%	14%	-10%
2026/27	743	221	963	609	253	862	-18%	15%	-11%
2027/28	745	220	965	611	254	865	-18%	15%	-10%
2028/29	752	219	970	614	254	868	-18%	16%	-11%
2029/30	755	218	973	617	254	871	-18%	16%	-10%
2030/31	757	218	976	620	255	874	-18%	17%	-10%
2031/32	760	217	977	622	254	876	-18%	17%	-10%
2032/33	764	218	982	625	255	879	-18%	17%	-10%
2033/34	769	220	989	628	257	884	-18%	17%	-11%

The total cost is between 8-11% lower than the central scenario. Residual costs are 8-17% higher, but recycling costs are 13-18% lower. This is largely due to lower kerbside recycling rates (lowering material revenue from recycle and increasing residual disposal costs) under a no change scenario.

²³³ Twin-stream collections generally collect a higher tonnage of material in the recycling stream (and therefore less in residual), however recycle collected through multistream is generally of a higher quality due to less contamination which makes recycling more efficient.